# Chhetri Academy

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GCSE MATHS

Geometry and measures

**Edexcel 1MA1 | Subtopic collection Topic 43**

# Area and perimeter

## Higher tier

Answers and examiner comments

| 149 | 2003-2025 | Higher |
| --- | --- | --- |
| question groups | available papers | tier |

### Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

**Name** _____ **Date** _____

Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

# Original question 15

The full source mark scheme begins on page 230. Use the original paper code, tier and question number shown above.

# Original question 5

The full source mark scheme begins on page 230. Use the original paper code, tier and question number shown above.

# Original question 8

The full source mark scheme begins on page 230. Use the original paper code, tier and question number shown above.

# Original question 13

The full source mark scheme begins on page 230. Use the original paper code, tier and question number shown above.

# Original question 9

No matching mark scheme was available in the supplied archive for this question.

# Original question 6

The full source mark scheme begins on page 284. Use the original paper code, tier and question number shown above.

# Original question 9

The full source mark scheme begins on page 284. Use the original paper code, tier and question number shown above.

# Original question 18

The full source mark scheme begins on page 284. Use the original paper code, tier and question number shown above.

# Original question 4

The full source mark scheme begins on page 335. Use the original paper code, tier and question number shown above.

# Original question 15

The full source mark scheme begins on page 335. Use the original paper code, tier and question number shown above.

| | | | | | |
|---|---|---|---|---|---|
| 6 | (a) | | 16 | 1 | B1 cao |
| | (b) | | 12 $cm^2$ | 2 | B1 for 12 cao, B1 (indep) for $cm^2$ |
| | (c) | | 15 | 2 | M1 for 5 × 3<br>A1 cao [SC: B1 for 10, 13 or 14] |

1380/1F

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|---|---|---|---|---|---|
| 13 | (a) | | Impossible | 1 | B1 cao |
| | (b) | | Even | 1 | B1 cao |
| | (c) | | Certain | 1 | B1 cao |

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| 4 | | | Reason | 1 | B1 for 'The first 2 pages may not be typical of the whole magazine' oe or 'sample size too small' oe |

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| 7 | | $\pi \times 5 \times 5$ | 78.5 | 2 | M1 for $\pi \times 5 \times 5$ (accept $\pi$ as 3.1 or better)<br>A1 for 77.5 to 78.6 or $25\pi$ |

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 12 | (a) | $2x + 9 + 2x - 3 + 4x + 5$ | $8x + 11$ | 2 | M1 for attempting to add $2x + 9$, $2x - 3$ and $4x + 5$ or for $8x + c$, $c \neq 0$<br>A1 for $8x + 11$ |
| | (b) | $8x + 11 = 39$<br>$8x = 28$ | 3.5 | 2 | M1 for "$ax$ $(+ c)$ " = 39 or $(39 - \text{'c'}) \div \text{'a'}$<br>A1f.t. for 3.5 oe provided '$c$' $\neq 0$ in (a) |

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|---|---|---|---|---|
| 7 | $\pi \times 12$ | 37.7 | 2 | M1 for $\pi \times 12$ accept π as $\frac{22}{7}$ or 3.1 or better<br>A1 for an answer in the range 37.6 to 37.8 |

1380_4H

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|---|---|---|---|---|---|
| 12 | (a) | $0.5\times6\times14$ | 42 | 2 | M1 for $0.5\times6\times14$ oe<br>A1 cao |
| | (b) | $\sqrt{6^2+14^2} = \sqrt{232}$ | 15.23 | 3 | M1 for $6^2+14^2$ or 36+196 or 232<br>M1 for $\sqrt{36+196}$ or $\sqrt{232}$<br>A1 for answer in the range 15.2 to 15.3 |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 21 (a) | | 28.5 | 1 | B1 for 28.5 or 2850 cm or 28.499 or 28.49… or 28.49 recurring oe |
| (b) | $2\times(147.5+28.5)$ | 352 | 3 | B1 for upper bound of length = 147.5 or 14750 cm or 147.49 recurring oe<br>M1 for 2 × ("upper bound width" + "upper bound length") where these are not the given values.<br>A1 cao 351.999-352 |

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| 26 | $\frac{40}{360}\times\pi\times8^2 - \frac{1}{2}\times8^2\times\sin 40^o$<br>= 22.34.... – 20.569...<br>OR<br>$\frac{40}{360}\times\pi\times8^2 -$<br>$8\times\sin 20^o\times8\times\cos 20^o$<br>= 22.34.... – 20.569... | 1.77 | 5 | M1 for $\frac{40}{360}$ oe seen or $0.1\dot{1}$ seen or ÷9<br>M1 for $\frac{40}{360}\times\pi\times8^2$ oe or sight of 22.3-22.35<br>M1 for $\frac{1}{2}\times8^2\times\sin 40^o$ or $8\times\sin\ 20\times8\times\cos 20$<br>or sight of 20.56-20.57<br><br>M1 (dep on at least one M1 scored) for the intention to find the difference between the area of triangle *OPS* and the area of sector *OPRS*<br>A1 for 1.74 -1.78<br>[B3: RAD: ±1.50(340...) or GRAD: 3.53(108...)] |

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|---|---|---|---|---|
| 5 | $\pi \times 10^2$ | 314 | 2 | M1 for $\pi \times 10^2$ oe **or** $3.14 \times 10^2$ oe **or** $100\pi$<br>A1 for 314 oe |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 19 (a) | 15 ÷ 10<br>8 × 1.5 | 12 | 2 | M1 for 15 ÷ 10 or 1.5 or $\frac{3}{2}$ or $\frac{2}{3}$<br>A1 cao |
| (b) | ½ × (8 +"a") × 5 | 50 | 2 | NB : ft from (a) provided '*DC*' > 8<br>M1 for $\frac{(8+"a")\times 5}{2}$<br>A1 ft<br>**or**<br>M1 for (8× 5) + ½("*DC*" − 8) × 5<br>A1 ft<br>**or**<br>M1 for ½ × "*DC*" × 15 − ½ × 8 × 10<br>A1 ft<br>**or**<br>M1 for ½ × 8 × 10 × "$1.5^2$" − ½ × 8 × 10<br>A1 ft |

1380_3H

| 1380/3H |
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| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 | $5 \times 8 \div 2$ | 20 | 2 | M1 for $5 \times 8 \div 2$ oe<br>A1 cao |

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| 24 | $35.5 \times 26.5$ | 940.75 | 3 | B1 for sight of 35.5 or 26.5 or 35.4999(...) or 26.4999(...)<br>M1 for UB length × UB width where<br>35.49 ≤ UB length ≤ 35.5<br>26.49 ≤ UB width ≤ 26.5<br>A1 for 940.74 - 940.75 (or $\frac{3763}{4}$ ) |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 8 | $12\times 7=84$<br>$84-\frac{1}{2}(3\times 6)$<br><br>$75\div 32$ | 3 | 4 | M1 for $12\times 7\,(=84)$<br>M1 for $"84"-\frac{1}{2}(3\times 6)\ \ (=75)$<br><br>M1 for "area" $\div 32$ or (32, 64,) 96 seen with "area" calculated.<br>A1 cao (dep on all M marks)<br><br>**or**<br>M1 for $12\times 4\ \ (=48)$<br>M1 for $"48"+\frac{1}{2}(12+6)\times 3$<br>M1 for "area" $\div 32$ or (32, 64,) 96 seen with "area" calculated.<br>A1 cao (dep on all M marks)<br><br>M1 for $6\times 3+\frac{1}{2}(3\times 6)\ (=27)$<br>M1 for $"27"+12\times 4$<br>M1 for "area" $\div 32$ or (32, 64,) 96 seen with "area" calculated.<br>A1 cao (dep on all M marks) |

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# Original question 14

The full source mark scheme begins on page 396. Use the original paper code, tier and question number shown above.

| | | | | |
|---|---|---|---|---|
| 7 | ½ × 6(10 + 8) – ½ × 3(7 + 5)<br><br>= 54 – 18 | 36 | 3 | M1 for ½ × 6(10 + 8) or ½ × 3(7 + 5) oe<br>M1(dep) for ½ × 6(10 + 8) – ½ × 3(7 + 5) oe<br>A1 cao |

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|---|---|---|---|---|---|
| 5 | | $\pi(6)^2 - \pi(5)^2$<br>$= 113(.0973\ldots) - 78.5(398\ldots)$<br>$=34.55751919$ | 34.6 | 3 | M1 for $\pi(6)^2$ oe or $\pi(5)^2$ oe or 113…<br>or 78.5…<br>M1 for $\pi(6)^2 - \pi(5)^2$ oe<br>A1 for 34.5 - 34.6 |

| 1380_4H |
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| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 23 | (a) | $x(2x+6)-3x = 100$<br>$2x^2+6x-3x = 100$<br>$2x^2+3x-100 = 0$ | Proof | 3 | M1 for a correct algebraic expression for the area of at least one rectangle<br>eg $x(2x+6)$ or $2x^2+6x$ or $3x$ oe<br>M1 for a correct algebraic expression for the area of the unshaded region<br>eg $x(2x+6)-3x$ (= 100)<br>or for eg x(2x+6)=100+3x<br><br>A1 for completion from eg $2x^2+6x-3x$ (= 100) oe |
| | (b) | $a=2 \quad b=3 \quad c=-100$<br>$x = \dfrac{-3\pm\sqrt{3^2-4(2)(-100)}}{2(2)}$<br>$= \dfrac{-3\pm\sqrt{809}}{4}$<br>$= 6.36073\ldots$ or $-7.86073\ldots$<br><br>**OR**<br><br>$x^2+3/2\,x-50 = 0$<br>$(x+\frac{3}{4})^2-(\frac{3}{4})^2-50 = 0$<br>$x+\frac{3}{4} = \pm\sqrt{(\frac{3}{4})^2+50}$<br>$x = 6.36073\ldots$ or $-7.86073\ldots$ | 6.36 | 4 | M1 for correct substitution in formula allow sign errors in $b$ and $c$<br>M1 for reduction to $\frac{-3\pm\sqrt{809}}{4}$ or $\frac{-3+\sqrt{809}}{4}$<br>A1 for 6.36 to 6.365 or $-7.86$ to $-7.865$<br>A1 for 6.36 to 6.365<br><br>OR<br><br>M1 for $(x+\frac{3}{4})^2$<br><br>M1 for $-\frac{3}{4}\pm\sqrt{\frac{9+800}{16}}$ or $-\frac{3}{4}+\sqrt{\frac{9+800}{16}}$<br>A1 for 6.36 to 6.365 or $-7.86$ to $-7.865$<br>A1 for 6.36 to 6.365<br><br>SC: T&I scores 1 mark for 1 correct root or 4 marks for correct length |

| 1380_4H |
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| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 | $5 \times 6 \div 2$ | $15\text{cm}^2$ | 3 | M1 $5 \times 6 \div 2$ oe seen<br>A1 15<br>B1 $\text{cm}^2$ |

# Original question 6

The full source mark scheme begins on page 415. Use the original paper code, tier and question number shown above.

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 21 | | $6^2-(2\sqrt{3})^2=36-12=24$<br>Area $=\frac{1}{2}\times 2\sqrt{3}\times\sqrt{24}=\sqrt{72}$<br>$=\sqrt{36\times 2}=6\sqrt{2}$ | proof | 5 | M1 $6^2-(2\sqrt{3})^2$ or $\sqrt{48}$ seen or $(2\sqrt{3})^2+x^2=6^2$ oe<br>A1 $\sqrt{24}$ oe<br>M1(dep on M1) $\frac{1}{2}\times 2\sqrt{3}\times$ '$\sqrt{24}$'<br>A1 $\sqrt{72}$ oe<br>A1 $6\sqrt{2}$ or $(k)=6$ |

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 7 | | $\frac{1}{2} \times 8 \times 15 = 60$<br>$60 \div 12$ | 5 | 4 | M1 for $\frac{1}{2} \times 8 \times 15$ (=60) **or** $12x$ **or** $12 \times ?$ oe<br>M1(dep) for equating 'area of triangle' to 'area of rectangle' ('areas' must be dimensionally correct) eg. $\frac{1}{2} \times 8 \times 15 = 12x$ **or** $60 = 12x$ (NB. $x$ may have a numerical value)<br>M1 (indep) for '60' ÷ 12<br>A1 cao<br><br>SC : B3 for an answer of 10 |

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| 8 | (a) | $\pi \times 6 \times 2$ | 37.7 | 2 | M1 for π × 12 or π × 2 × 6<br>A1 for 37.6- 37.8 |
| | (b) | (100 ÷ 12) × (50 ÷ 12) = 8 × 4 whole CDs | 36 | 2 | B2 for 33, 34, 35, 36<br>**or**<br>M1 for (100 ÷ 12) × (50 ÷ 12) oe **or** 8 × 4<br>A1 for 32<br><br>SC : B1 for 44 |

| 1380_4H |
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| 25 | | 642.5 × 397.5 | 255000 | 3 | B1 for 642.5 or 647.5 or 397.5 or 402.5 seen<br>M1 for $l_{LB} \times w_{LB}$ where<br>$642.5 \leq l_{LB} < 645$ and $397.5 \leq w_{LB} < 400$<br>A1 for 255393.75 or 255 000 coming from 255393.75 or from correct method |

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|---|---|---|---|---|---|
| 5 | (a) | | Points plotted | 1 | B1 points plotted (180,72) and (170,65) ±2mm |
| | (b) | | Positive | 1 | B1 positive (correlation) cao |
| | (c) | | Line of best fit | 1 | B1straight line passing between (140,40)(140,55) and between (185,60)(185,75) with a positive gradient |
| | (d) | | 52-60 | 1 | B1 within the range 52-60 or ft a single straight line segment with positive gradient. |

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| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 4 | | Big area = 144<br>Small area = 64<br>Area frame = 144 – 64<br>= 80<br>80 ÷ 4<br>Or<br>Area one piece is a trapezium<br>½ (12+8) × (12– 8)÷2<br>½ × 20 × 2 = 20<br>Or<br>Area of rectangle and 2 triangles<br>8 × 2 + 2× ( ½ × 2 × 2)<br>16 + 4<br>Or<br>Area of rectangle – 2 triangles<br>12×2-2× ( ½ × 2 × 2)<br>24-4 | 20 | 4 | M1 for 12 × 12 or 8 × 8 or 144 seen or 64 seen as areas<br>M1 for 12 × 12 – 8 × 8 or '144' – '64' or 80 seen as areas<br>M1 for (12 × 12 – 8 × 8) ÷ 4 or '(144 – 64)' ÷ 4 or '80' ÷ 4 seen as areas<br>A1 for 20 cao<br>Or<br>M1 for 12 – 8 or 4 seen as difference in lengths<br>M1 for height of trapezium = (12 – 8) ÷ 2 or '4' ÷ 2 or 2<br>M1 for area trapezium = ½ (12 + 8) × '2' oe<br>A1 for 20 cao<br>Or<br>M1 for ½ × (12 – 8 ) or 2 for width of frame<br>M1 for 8 × 2 = 16 for rectangle<br>M1 for 2× ( ½ × 2 × 2) or 4 for 2 triangles<br>A1 for 20 cao<br>Or<br>M1 for ½ × (12 – 8 ) or 2 for width of frame<br>M1 for 12 × 2 = 24 for rectangle<br>M1 for 2× ( ½ × 2 × 2) or 4 for 2 triangles<br>A1 for 20 cao<br><br>NB Marks can be awarded for correct measurements indicated on the diagram<br>Note If 80 is seen on the answer line following a correct calculation of one piece of card, full marks can be earned. |

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| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 15 | (a) | $(x + 2)(x + 1) + x(2x + 2)$<br>$= x^2 + 3x + 2 + 2x^2 + 2x$<br>Or<br>$(x + 2)(x + 1) + x[2x + 2 – (x + 2)] + (x + 2)(x)$<br>$= x^2 + x + 2x + 2 + x^2 + x^2 + 2x$<br>Or<br>$(2x + 2)(x + x + 1) – (x + 1)[2x + 2 – (x + 2)]$<br>$= (2x + 2)(2x + 1) – (x + 1)x$<br>$= 4x^2+6x+2-x^2-x$<br>Or<br>$(x+2)(2x+1) + xx = 2x^2+x+4x+2+x^2$ | $3x^2 + 5x + 2$ | 4 | M1 for area of 1 rectangle<br>Eg $(x + 2) \times (x + 1)$ oe or $x \times (2x + 2)$ oe<br>or $(2x+2)(x+x+1)$ oe or $x \times (x+1)$ oe<br>or $(x+2)(2x+1)$oe or $xx$ oe<br>A1 for correct simplification of this area<br>Eg $x^2 + x + 2x + 2$ (or better) or $2x^2 + 2x$ (or better)<br>or $4x^2+4x+2x+2$ (or better) or $x^2 + x$ (or better)<br>or $2x^2+x+4x+2$ (or better) or $x^2$<br>M1 (dep on M1) for a complete method to find the area using at least two quadratic expressions<br>Eg '$(x + 2)(x + 1)$' + '$x(2x + 2)$'<br>A1 cao for $3x^2 + 5x + 2$ |
| | (b) | $3x^2 + 5x + 2$<br>$= (3x + 2)(x + 1)$ | | 1 | B1 cao $(x + 1)$ |

# Original question 13

The full source mark scheme begins on page 428. Use the original paper code, tier and question number shown above.

# Original question 18

The full source mark scheme begins on page 446. Use the original paper code, tier and question number shown above.

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 5 | | (17 – 2.8) × 9.5 = 134.9<br>$\pi \times (3.8 \div 2)^2 = 11.34...$<br>134.9 – 2 × 11.34... = 112.21<br>112.21 ÷ 25 = 4.488 | 5 | 5 | M1 for (17 – 2.8) × 9.5 (=134.9)<br>or 17×9.5 – 2.8×9.5 ( = 161.5 – 26.6 = 134.9)<br>M1 for $\pi \times (3.8 \div 2)^2$ (= 11.33 – 11.35)<br>M1 (dep on M1) for '134.9' – 2 × '11.34'<br>A1 for 112 - 113<br>C1(dep on at least M1) for 'He needs 5 boxes' ft from candidate's calculation rounded up to the next integer |

# Original question 10

The full source mark scheme begins on page 466. Use the original paper code, tier and question number shown above.

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 12 | | | 36 – 9π | 3 | M1 for π×6×6 or 36π seen value 113.03-113.2<br>M1 for (12×12 –'π×6×6')÷4 or value 7.7-7.8<br>A1 for 36 – 9π oe<br>**OR**<br>M1 for π×6×6÷4 or 9π seen or value 28.2-28.3<br>M1 for 6×6 – 'π×6×6÷4' or value 7.7-7.8<br>A1 for 36 – 9π oe<br><br>NB: for M marks π may be given numerically. |
| 13* | | 180÷9×1:180÷9×3:180÷9×5<br>=20:60:100<br>Not enough cement<br>(but enough sand and enough gravel)<br><br>OR<br><br>1×15:3×15:5×15<br>=15:45:75<br>15+45+75=135 (<180)<br>Not enough cement (to make 180kg of concrete) | No + reason | 4 | M1 for 180 ÷ (1+3+5) ( = 20) or 3 multiples of 1: 3: 5<br>M1 for 1×"20" or 3×"20" or 5×"20" or 20 seen or 60 seen or 100 seen<br>A1 for (Cement =) 20, (Sand =) 60, (Gravel) = 100<br>C1 ft (provided both Ms awarded) for not enough cement oe<br>**OR**<br>M1 for (1×15 and) 3×15 and 5×15 or 9×15 or sight of the numbers 15, 45, 75 together.<br>M1 for '15' + '45' + '75'<br>A1 for 135 (<180)<br>C1 ft (provided both Ms awarded) for not enough cement oe |

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| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 16 | | | 84 | 4 | M1 for $x - 1 + 3x + 1 + 3x$ (= 56) or $7x = 56+1-1$ or $\frac{3x(x-1)}{2}$ oe<br>M1 for $7x = 56$ or 8 seen<br>M1 for $0.5\times(\text{'8'} - 1)\times(3\times\text{'8'})$<br>A1 cao Ignore any statement of units.<br>SC B2 for 8 as the answer or 7 identified as the height and 24 identified as the base of the triangle. |

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| 3 | | Work with whole shape:<br>12 − 9<br>4 × (3 + 15)<br>Work with 4 triangles:<br>15 + 12 + 9 = 36<br>4×36=144<br>144 – (9×8) =<br>Work with single triangles:<br>15 + 12 + 9 = 36<br>4×(36-18) = | 72 | 3 | M1 12 – 9 (=3)<br>M1 for 4 × (“3” + 15) oe<br>A1 cao<br><br>OR<br>M1 for 4×(15 + 12 + 9) (=144)<br>M1 for ‘144’-9×8 oe<br>A1 cao<br><br>OR<br>M1 (15 + 12 + 9) – (2 × 9) (=18) oe<br>M1 for 4× “18” oe<br>A1 cao |

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| 15 | (a) | $\frac{1}{2} \times (4 + 12) \times 10$ | 80 | 2 | M1 for a fully correct method for area of *QRST*<br>A1 cao |
| | (b) | **For example**<br>$\frac{PT+10}{PT} = \frac{12}{4} = 3$<br>$PT + 10 = 3PT$<br>$2PT = 10$ | 5 | 3 | M1 for a correct scale factor or ratio using two corresponding sides from two similar triangles or two sides within the same triangle (may be seen within an equation)<br>eg. $\frac{12}{4}$oe **or** 4 : 12 oe **or** $\frac{PT}{4}$**or** $\frac{PS}{12}$ **or** $\frac{12}{12-4}$ etc.<br><br>M1 for a correct equation with *PT* or *PS* as the only variable **or** complete correct method using scale factor<br><br>A1 cao |

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| 19 | | $\frac{30}{360} \times \pi \times 15^2$ | 58.8 | 2 | M1 for a correct method to find the area of sector *OAB*<br>A1 for answer in range 58.8 − 58.9125 |

**1MA0_2H**

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 4 | | | 150 | 3 | M1 300 ÷ 20 (= 15) or 200 ÷ 20 (=10) or<br>3 ÷ 0.2 (= 15) or 2 ÷ 0.2 (=10)<br>M1(dep) '15' × '10'<br>A1 cao<br><br>OR<br><br>M1 300 × 200 (= 60000) or 20 × 20 (=400)<br>or 3 × 2 (= 6) or 0.2 × 0.2 (=0.04)<br>M1 (dep) '60000' ÷ '400' or '6' ÷ '0.04'<br>A1 cao |

# Original question 5

The full source mark scheme begins on page 485. Use the original paper code, tier and question number shown above.

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| **10** | | | 1.5 | 4 | M1 for correct expression for perimeter<br>eg. $4 + 3x + x + 6 + 4 + 3x + x + 6$ oe<br>M1 for forming a correct equation<br>eg. $4 + 3x + x + 6 + 4 + 3x + x + 6 = 32$ oe<br>M1 for $8x = 12$ or $12 \div 8$<br>A1 for 1.5 oe<br><br>**OR**<br><br>M1 for correct expression for semi-perimeter<br>eg. $4 + 3x + x + 6$ oe<br>M1 for forming a correct equation<br>eg. $4 + 3x + x + 6 = 16$ oe<br>M1 for $4x = 6$ or $6 \div 4$<br>A1 for 1.5 oe |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| ***11 QWC** | | $\frac{30}{24} \times 60 = 75$ | Debbie + explanation | 4 | M1 for reading 24 (mins) and 30 (km) or a pair of other values for Debbie<br>M1 for correct method to calculate speed<br>eg. 30 ÷ 24 oe<br>A1 for 74 – 76 or for 1.2 – 1.3 and 1.1<br>C1 (dep on M2) for correct conclusion, eg Debbie is fastest from comparison of "74 – 76" with 66 (kph) or "1.2 – 1.3" and 1.1 (km per minute)<br><br>**OR**<br><br>M1 for using an appropriate pair of values for Ian's speed eg 66 and 60, 33 and 30, 11 and 10<br>M1 for pair of values plotted on graph<br>A1 for correct line drawn<br>C1 (dep on M2) for Debbie is fastest from comparison of gradients.<br><br>**OR**<br><br>M1 for reading 24 (mins) and 30 (km) or a pair other values for Debbie<br>M1 for Ian's time for same distance or Ian's distance for same time.<br>A1 for a pair of comparable values.<br>C1 (dep on M2) for Debbie is fastest from comparison of comparable values. |

**PAPER: 1MA0_1H**

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 20 | | | $5x^2$ | 4 | M1 for $4x \times 4x$<br>M1 for $(2x \times 4x)/2$ or $(2x \times x)/2$ or $(3x \times 4x)/2$<br>M1(dep M2) for "$16x^2$" – "$4x^2$" – "$x^2$" – "$6x^2$"<br>A1 for $5x^2$<br><br>**OR**<br><br>M1 for $\sqrt{(2x)^2 + (4x)^2}$ $(= \sqrt{20x^2} = \sqrt{20}\,x)$<br>M1 for $\sqrt{(x)^2 + (2x)^2}$ $(= \sqrt{5x^2} = \sqrt{5}\,x)$<br>M1(dep M2) for $\frac{\text{"}\sqrt{5}\,x\text{"} \times \text{"}\sqrt{20}\,x\text{"}}{2}$ $(= \frac{\sqrt{100}}{2}\,x^2)$<br>A1 for $5x^2$ |

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 22 | | | 1200 $cm^3$ | 4 | M1 for $10 \times 2 \times 2$ and $15 \times 2$<br>M1 for "40" × "30"<br>A1 for 1200<br>B1 (indep) for $cm^3$<br><br>OR<br><br>M1 for $10 \times 15$ or $2^3$ or 8 indicated as scale factor<br>M1 for $10 \times 15 \times 2 \times 2 \times 2$<br>A1 for 1200<br>B1 (indep) for $cm^3$<br><br>SC B2 for 600 $cm^3$ (B1 for 600) |

| | | | | | |
|---|---|---|---|---|---|
| 23 | | *d*: UB = 54.5 (or 54.499), LB = 53.5<br>*C:* UB = 170.5 (or 170.499), LB = 169.5<br>170.5 ÷ 53.5<br>169.5 ÷ 54.5 | 3.19<br>3.11.. | 4 | B1 for any one correct bound quoted<br>M1 for 170.5 ÷ 53.5 or 169.5 ÷ 54.5<br>A1 for UB = answer in range 3.18 to 3.19 from correct working<br>A1 for LB = 3.11.. from correct working |

**PAPER: 1MA0_2H**

| | | | | | |
|---|---|---|---|---|---|
| 8 | | 4.5 × 2 + 3 × 2 = 15<br>or<br>4 × 3 + 2 × 1.5 = 15<br>or<br>4 × 4.5 – 2 × 1.5 = 15 | 7 | 4 | M1 for a correct method to calculate at least one area using correct dimensions<br>M1 for a complete method to find the total area (can be implied by 15)<br>M1 for “15” ÷ 2.25 (=6.66…) or 2.25 × 6 (=13.5) or 2.25 × 7 (=15.75) or repeated addition to within 2.25 of “15”<br>C1 (dep on at least 1 method mark) for 7 packs clearly identified and supported by their calculations |

# Original question 4

The full source mark scheme begins on page 500. Use the original paper code, tier and question number shown above.

| | | | | | |
|---|---|---|---|---|---|
| 8 | | | 38 | 5 | M1 $3x - 5 = 19 - x$<br>M1 for a correct operation to collect the $x$ terms or the number terms on one side of an equation of the form $ax + b = cx + d$<br>A1 for $x = 6$<br>M1 for substituting their value of $x$ in the three expressions and adding **or** substituting their value of $x$ after adding the three expressions<br>A1 cao |

PAPER: 1MA0_1H

| | | | | |
|---|---|---|---|---|
| 12 | | 440 | 2 | M1 for 140 × π oe or 439<br>A1 for 439.6 – 440 |
| *13 | Distance ÷ speed: 30 ÷ 70 (= 0.42-0.43); Distance ÷ time: 30 ÷ 26 (=1.15…);<br>Speed × time: = 70 × 26 (=1820 mins);<br>mph to miles/min =70÷ 60 (=1.16-1.17);<br>Minutes to hours is 26 ÷ 60 (=0.43…) | No with correct figure | 3 | M1 for a calculation which uses the Time × Speed = Distance relationship **OR** a conversion of units eg between hours & minutes or between mph & miles per min<br>M1 for a calculation involving both of the above<br>C1 for "no" with a correct calculation, with units, from working: 25.2-25.8 minutes, 30.1-30.8 miles, 69-69.3 mph<br><br>NB: 70 ÷ 26 × 30 as a single stage calculation gets 0 marks |

**PAPER: 1MA0_2H**

PAPER: 1MA0_2H

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 18 | | 49.5 | 4 | M1 for $\tan 54 = \frac{\text{height}}{6}$<br><br>M1 for (height =) 6 × tan54 (=8.2-8.3)<br>M1 for $\frac{1}{2}$ × '8.258..' × 12<br>A1 for 49.2 - 50<br><br>**OR**<br><br>M1 for $\cos 54 = \frac{6}{AC}$<br>M1 for ($AC$ = ) $\frac{6}{\cos 54}$ (=10.2(07...))<br><br>M1 for $\frac{1}{2}$ × 12 × '10.207' × sin54<br>A1 for 49.2 - 50<br><br>**OR**<br><br>M1 for $\frac{AC}{\sin 54} = \frac{12}{\sin 72}$<br><br>M1 for ($AC$ =) $\frac{12}{\sin 72}$ × sin54 (=10.2(07...))<br><br>M1 for $\frac{1}{2}$ × 12 × '10.207' × sin54<br>A1 for 49.2 – 50 |

**PAPER: 1MA0_2H**

PAPER: 1MA0_2H

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 22 (a) | | 'show' | 2 | M1 for $\frac{1}{2} \times (x - 4 + x + 5) \times 2$ **or**<br>$2x \times (x - 4) + \frac{1}{2} \times 2x \times 9$<br>A1 for completion with correct processes seen |
| (b) | | 13 | 3 | M1 for $\frac{-1 \pm \sqrt{1^2 - 4 \times 2 \times -351}}{2 \times 2}$ condone incorrect sign for 351<br><br>M1 for $\frac{-1 \pm \sqrt{2809}}{4}$<br>A1 for 13<br>NB for either M mark accept + only in place of ±<br>**OR**<br>M2 for $(2x + 27)(x - 13)$<br>(M1 for $(2x \pm 27)(x \pm 13)$ )<br>A1 for 13 |

| | | | | | |
|---|---|---|---|---|---|
| 13 | | | 7.5 | 3 | B1 for length given as $\frac{\sqrt{120}}{4}$ oe<br>M1 for squaring $\frac{\sqrt{120}}{4}$ or $\frac{120}{4\times4}$ oe<br>A1 for $\frac{120}{16}$ oe or $7\frac{1}{2}$ or 7.5 oe<br><br>SC B1 for $\sqrt{30} \times \sqrt{30}$ |

| PAPER: 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *14 | | | 113 | 5 | B1 for stating angle *TAO* = 90<br>M1 for stating angle *OBA* or angle *OAB* = 90 – 58 (=32)<br>M1 for stating angle *ABT* = 180 − 58 – 41 (=81) or angle *AOB* = 180 – 64 (=116)<br>A1 for 113 clearly identified as the answer<br>C1 (dep on M1) for correct statements for method used:<br>angle between tangent and radius = $90^{o}$<br>AND at least one of<br>base angles of an isosceles triangle are equal<br>sum of angles in a triangle is 180<br>sum of angles in a quadrilateral is 360<br><br>NB angles may be seen in diagram |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 13 | | 32.2 | 4 | M1 for $BC = \frac{10}{4} \times 5$ (= 12.5)<br>M1 for $EC = \frac{10}{4} \times 5.8 - 5.8$ (=8.7)<br>M1(dep on at least M1) for '12.5' + '8.7' + 5 + 6<br>A1 cao<br><br>OR<br><br>M1 for $BC = \frac{5}{4} \times 10$ (= 12.5)<br>M1 for $EC = \frac{5.8}{5} \times$ '12.5' – 5.8 (= 8.7)<br>M1 (dep on at least M1) for '12.5' + '8.7' + 5 + 6<br>A1 cao<br><br>OR<br><br>M1 for $BC = \frac{5}{4} \times 10$ (= 12.5)<br>M1 for $EC = \frac{6}{4} \times 5.8$ (= 8.7)<br>M1 (dep on at least M1) for '12.5' + '8.7' + 5 + 6<br>A1 cao<br><br>OR<br><br>M1 for 4 + 5 + 5.8 (= 14.8)<br>M1 for $\frac{10}{4} \times$ '14.8' (= 37)<br>M1 (dep on at least M1) for '37' – 4 – 5.8 + 5<br>A1 cao |

**PAPER: 5MB3H_01**

PAPER: 5MB3H_01

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 16 | (a) | $\frac{1}{2} \times 5 \times 5 \times \sin 60^o$<br>or<br>$\sqrt{5^2 - 2.5^2} = 4.330.....$<br>$\frac{1}{2} \times 5 \times 4.33$ ... ... | 10.8 | 3 | M1 for using a triangle of sides 5 cm and angle $60^o$ or a right-angled triangle of sides 5 cm and 2.5 cm<br>M1 for a complete correct method to find the area of the triangle<br>A1 for answer in the range 10.8 to 10.9 |
| | (b) | | 7 | 4 | M1 for $\frac{4}{3} \times \pi \times 17.5^3$ (= 22449.29...) or $\frac{1}{2} \times \frac{4}{3} \times \pi \times 35^3$ (= 89797.19...)<br>M1 for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 17.5^3$ (= 11224.6)<br>M1 (dep on M1) for 80 × 1000 ÷ '11224.6' oe<br>A1 for 7 or (dep on M2) ft rounded down. |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 13 | | 32.2 | 4 | M1 for $BC = \frac{10}{4} \times 5$ (= 12.5)<br>M1 for $EC = \frac{10}{4} \times 5.8 - 5.8$ (=8.7)<br>M1(dep on at least M1) for '12.5' + '8.7' + 5 + 6<br>A1 cao<br><br>OR<br><br>M1 for $BC = \frac{5}{4} \times 10$ (= 12.5)<br>M1 for $EC = \frac{5.8}{5} \times$ '12.5' – 5.8 (= 8.7)<br>M1 (dep on at least M1) for '12.5' + '8.7' + 5 + 6<br>A1 cao<br><br>OR<br><br>M1 for $BC = \frac{5}{4} \times 10$ (= 12.5)<br>M1 for $EC = \frac{6}{4} \times 5.8$ (= 8.7)<br>M1 (dep on at least M1) for '12.5' + '8.7' + 5 + 6<br>A1 cao<br><br>OR<br><br>M1 for 4 + 5 + 5.8 (= 14.8)<br>M1 for $\frac{10}{4} \times$ '14.8' (= 37)<br>M1 (dep on at least M1) for '37' – 4 – 5.8 + 5<br>A1 cao |

**PAPER: 5MB3H_01**

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 16 | (a) | $\frac{1}{2} \times 5 \times 5 \times \sin 60^o$<br>or<br>$\sqrt{5^2 - 2.5^2} = 4.330.....$<br>$\frac{1}{2} \times 5 \times 4.33$ ... ... | 10.8 | 3 | M1 for using a triangle of sides 5 cm and angle $60^o$ or a right-angled triangle of sides 5 cm and 2.5 cm<br>M1 for a complete correct method to find the area of the triangle<br>A1 for answer in the range 10.8 to 10.9 |
| | (b) | | 7 | 4 | M1 for $\frac{4}{3} \times \pi \times 17.5^3$ (= 22449.29...) or $\frac{1}{2} \times \frac{4}{3} \times \pi \times 35^3$ (= 89797.19...)<br>M1 for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 17.5^3$ (= 11224.6)<br>M1 (dep on M1) for 80 × 1000 ÷ '11224.6' oe<br>A1 for 7 or (dep on M2) ft rounded down. |

# Original question 7

The full source mark scheme begins on page 518. Use the original paper code, tier and question number shown above.

| | | | | | |
|---|---|---|---|---|---|
| 4 | | | 28.3 | 2 | M1 for $\pi \times 9$ or $2 \times \pi \times 4.5$ oe<br>A1 for 28.25 – 28.3 |

PAPER: 1MA0_2H

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 9 | | | $5\frac{2}{3}$ | 4 | M1 for $AB = 2x$ or $DC = 2x + 4$ or for $38 - 4$<br>M1(dep) for $x$ + "$x$" + "$2x$" + "$2x$ + 4" or for "38 – 4" ÷ 6<br>M1 for "$6x + 4$" = 38<br>A1 for $5\frac{2}{3}$ oe<br>NB: Accept answers in the range 5.6 to 5.7 if M3 scored.<br>SC if M0 then B2 for answer in range 5.6 – 5.7 |

Paper: 5MB3H_01

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 5 | | | 41.1 to 41.2 | 3 | M1 for a method to find the circumference of the circle, eg. π ×16 (= 50.265..)<br>M1 for a method to find the length of the semicircle, eg. “50.265.." ÷ 2 (= 25.132..)<br>A1 for answer in the range 41.1 to 41.2 |

PAPER: 1MA0_1H

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 7 | | | 9 | 4 | M1 for method to find area of one rectangle,<br>eg 15 × 8 (=120) or 15 × 11 (=165)<br>M1 (dep) for subtracting from/by given area,<br>eg (138 – "120") (=18) or "165" – 138 (=27)<br>M1 for final step from complete method shown,<br>eg 15 − "18"÷ 3 or "27" ÷ 3<br>A1 cao<br><br>**OR**<br>M1 for a correct expression for the area of one rectangle,<br>eg (8 + 3) × (15 − $x$) or 8 × $x$<br>M1 (dep) for a correct equation<br>eg (8 + 3) × (15 − $x$) + 8 × $x$ = 138<br>M1 for correct method to isolate $x$, eg 3$x$ = 27<br>A1 cao |
| *8 | | | $x$ = 130 + correct reasons | 4 | M1 for angle $BFG$ = 65 may be seen on diagram<br>M1 (dep) for correct method to calculate $x$, eg ($x$=) 65 + 65 (=130) **or** ($x$=) 180 − (180 – 2 × 65) (=130)<br>C2 for $x$ = 130 **and** full appropriate reasons related to method shown<br>(C1 (dep on M1) for any one appropriate reason related to method shown)<br>eg alternate angles;<br>base angles in an isosceles triangle are equal;<br>angles in a triangle add up to 180°;<br>angles on a straight line add up to 180°;<br>exterior angle of triangle = sum of two interior opposite angles;<br>co-interior angles add up to 180° (allied angles)<br><br>NB Any reasons stated **must** be used |

**PAPER: 1MA0_1H**

PAPER: 1MA0_1H

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 18 | (a) | | 7.5 | 2 | M1 for $\frac{12}{18}$ oe **or** $\frac{18}{12}$ oe **or** $\frac{12}{5}$ oe **or** $\frac{5}{12}$ oe<br>A1 cao |
| | (b) | | 45 | 3 | M1 for $\left("\frac{3}{2}"\right)^2$ oe or $\left("\frac{2}{3}"\right)^2$ oe<br>M1 for complete method to find area of shaded region,<br>eg $36 \times "1.5"^2 - 36$<br>A1 cao<br><br>(SC B2 for 81) |

# Original question 11

The full source mark scheme begins on page 538. Use the original paper code, tier and question number shown above.

| | | | |
|---|---|---|---|
| 9 | | 2 cm grid. Crosses changed to filled in circles. Right axis labelled | |

| | | | | | |
|---|---|---|---|---|---|
| 2 | | | 108 | 5 | M1 for a method for finding the dimensions<br>eg length & width = 12 or 2 × length + width = 21<br>A1 for length = 9 (could be shown on diagram)<br>A1 for width = 3 (could be shown on diagram)<br>M1 for area = "9" × "3" × 4<br>A1 cao |

| | | | | | |
|---|---|---|---|---|---|
| 13 | | | 48 | 5 | M1 for 8 – 2 (= 6)<br>M1 (indep) for $x^2 + 8^2$ (provided $x \leq 8$)<br>M1 (dep on previous M1) fo $\sqrt{"x"^2 + 8^2}$ or $\sqrt{"100"}$<br>M1 (dep on M2) for 4 × 2 + 4 × "10"<br>A1 cao |

**PAPER: 1MA0_1H**

# Original question 11

The full source mark scheme begins on page 556. Use the original paper code, tier and question number shown above.

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 13 | | $x^2+10x+22$ | 4 | M1 for $(x+8) - (x+5)$ (=3) or $(x+4) - (x+2)$ (=2)<br>M1 for area of one rectangle<br>eg $(x+2)(x+5)$ (= $x^2+7x+10$)<br>M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4)$ (= $x^2+7x+10 + 3x+12$)<br>A1 cao |

| | | | | |
|---|---|---|---|---|
| 13 | | 29.6 | 4 | M1 for $8^2 + 5^2$ or 64 + 25 or 89<br>M1 (dep) $\sqrt{"8^2"+"5^2"}$ (=9.4)<br>M1 for "9.4..." × π<br>A1 for 29.5 – 29.65 |
| *14 | | 49 | 3 | M1 for 180 - 56 - 75<br>A1 for 49<br>C1 for alternate segment theorem and angles on a straight line add up to $180^o$<br>OR alternate segment theorem and angles in a triangle add up to $180^o$<br>Appropriate to methods shown |

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| | | | | | |
|---|---|---|---|---|---|
| 16 | | | 13.75 | 5 | M1 for finding perimeter of rectangle<br>e.g. $5x + 5 + 5x + 5 + 4x + 4x$ $(= 18x + 10)$<br>M1 for finding perimeter of trapezium e.g. $9x – 2 + 7x – 2 + 10x$ $(=26x – 4)$<br>M1 for equation e.g. $26x – 4 = 18x + 10$ (or $8x = 14$)<br>A1 for finding the value of $x$ as 1.75<br>B1 ft for subs of $x$ into $5x + 5$ and evaluated (=13.75) |

# Original question 7

The full source mark scheme begins on page 579. Use the original paper code, tier and question number shown above.

# Original question 2

The full source mark scheme begins on page 598. Use the original paper code, tier and question number shown above.

# Original question 14

The full source mark scheme begins on page 598. Use the original paper code, tier and question number shown above.

| | | | | | |
|---|---|---|---|---|---|
| 15 | | | 20.94 | 5 | M1 for method to find circumference of circle,<br>eg. $2\times\pi\times2.45$ or $\pi\times4.9$ (= 15.393....)<br>M1 (dep) for $\frac{105}{360}\times$ "15.393 ... (= 4.4898...)<br>M1 for "4.4898.." ÷ 1.75 (= 2.565...) or "4.9" ÷ 1.75 (= 2.8) oe or "9.3898…" ÷ 1.75 (=5.3656…)<br>M1 for total cost = "6" × 3.49 (=20.94) or cost of arc or straight edges = "3" × 3.49 (=10.47)<br>A1 cao |

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# Original question 17

The full source mark scheme begins on page 611. Use the original paper code, tier and question number shown above.

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 | | 750 $cm^3$ | 3 | M1 for $30 \times 25$<br>A1 for 750<br>B1 (indep) for $cm^3$ |

| | | | | |
|---|---|---|---|---|
| 12 | | 100 – 25π | 3 | M1 for π×5×5 or 25π<br>M1 for (10×10 –"π×5×5")<br>A1 for 100 – 25π oe<br>NB: ignore the inclusion of any units. |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 25 | | $\frac{1}{4}-\frac{\sqrt{6}}{12}$ | 3 | M1 for $\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{2}$ or $\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{3}}{3}$<br>M1 for $\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{2}-\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{3}}{3}$<br>A1 for $\frac{1}{4}-\frac{\sqrt{6}}{12}$ oe<br>OR<br>M1 for (BC =) $\frac{\sqrt{2}}{2}-\frac{\sqrt{3}}{3}$<br>M1 for $\frac{1}{2}\times\left\{\frac{\sqrt{2}}{2}-\frac{\sqrt{3}}{3}\right\}\times\frac{\sqrt{2}}{2}$<br>A1 for $\frac{1}{4}-\frac{\sqrt{6}}{12}$ oe |

## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA0_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| 1 | | Model provided for all candidates. Diagram enlarged and also provided for MLP. | Standard mark scheme |
| 2 | (a) | Reflection drawn on the diagram. Shading changed to dotty shading. Wording changed 'It shows shape P and shape Q given on a grid. Describe fully the single transformation that maps shape P onto shape Q.' Grid enlarged. y axis is cut at -4. 3 answer lines given. | Marked scheme changed to:<br>B1 Reflection<br>B1 in the line $x = -1$ |
| | (b) | Rotation drawn on the diagram. Wording changed 'It shows shape P and shape S given on a grid.' Describe fully the single transformation that maps shape P onto shape S.' 3 answer lines given. | Mark scheme changed to:<br>B1 Rotation or rotate<br>B1 90° anticlockwise<br>B1 about (0, 1) |
| 7 | | Diagram enlarged.<br>Braille only: Plan of floor labelled ABCDEFGH as 1F Q24. | Standard mark scheme |
| 10 | | Diagram enlarged. Crosses changed to filled in circles. Arrows heads changed to open headed arrows. | Standard mark scheme |
| 12 | | Diagram enlarged. Shading changed to dotty shading.<br>Braille only: Diagram turned into horizontal position (circle inside square). | Standard mark scheme |

<table>
<tr><th colspan="4">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Modification</th><th>Notes</th></tr>
<tr><td>14</td><td>(a)<br><br>(b)</td><td>Diagram lines made longer and thicker<br>Braille only: Angle A 75° exactly for bisection.<br>Diagram kept the same size. Point P has been moved to the left.</td><td>Standard mark scheme</td></tr>
<tr><td>15</td><td>(a)<br><br><br><br><br><br><br><br>(b)</td><td>Grid enlarged. Small squares removed. Lines of the box plot have been moved.<br>‘16 year old workers’ lines are at ‘75,125,175,200 and 300’.<br>‘18 year old workers’ lines are at ‘125, 200, 225, 275 and 375’.<br><br>‘£130’ changed to ‘£125’</td><td>Standard mark scheme with these following values<br><br><table><tr><td></td><td>Age 16</td><td></td><td>Age 18</td></tr><tr><td>HV</td><td>300</td><td><</td><td>375</td></tr><tr><td>LV</td><td>75</td><td><</td><td>125</td></tr><tr><td>Median</td><td>175</td><td><</td><td>225</td></tr><tr><td>Range</td><td>225</td><td><</td><td>250</td></tr><tr><td>IQR</td><td>75</td><td>=</td><td>75</td></tr></table></td></tr>
<tr><td>14</td><td></td><td>Grid enlarged. Small squares removed. [Leeway needed for answering the question.]</td><td>Standard mark scheme</td></tr>
<tr><td>17</td><td>(a)<br>(b)</td><td>Wording added above the table ‘There are four spaces to fill.’<br>Grid enlarged. Right axis labelled.</td><td>Standard mark scheme</td></tr>
<tr><td>18</td><td></td><td>Diagram enlarged.</td><td>Standard mark scheme</td></tr>
</table>

| PAPER: 1MA0_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| 19 | | Grid enlarged. [Leeway need for answering the question.] | Standard mark scheme |
| 20 | | Diagram enlarged. Cross changed to filled in circle. | Standard mark scheme |
| 21 | | Diagram enlarged. Wording added 'There are six spaces to fill.' | Standard mark scheme |
| 23 | | Diagram enlarged | Standard mark scheme |

| | | | | | |
|---|---|---|---|---|---|
| 3 | | | 9.25 | 3 | M2 for $x + x + 4 + x + x + 4 = 45$ oe or $x + x + 4 = 22.5$ oe<br>(M1 for $x + x + 4 + x + x + 4$ oe)<br>A1 for 9.25 or $\frac{37}{4}$ oe<br>OR<br>M1 for $45 - 8$ (= 37) or $22.5 - 4$ (= 18.5)<br>M1 for $(45 - 8) \div 4$ or $(22.5 - 4) \div 2$<br>A1 for 9.25 or $\frac{37}{4}$ oe |

**PAPER: 1MA0_2H**

PAPER: 1MA0_2H

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 22 | | | 28.9 | 3 | M2 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe + $\frac{75}{360} \times 2 \times \pi \times 10$ oe (= 7.85... + 13.08... = 20.94..)<br><br>(M1 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe or $\frac{75}{360} \times 2 \times \pi \times 10$ oe )<br><br>A1 for 28.9 to 28.95 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | | | $A = 13x + 8$ | 3 | M1 for $5(2x + 1)$ or $3(x + 1)$ or $5 \times 2x + 1 + 3 \times x + 1$<br>M1 for $5(2x + 1) + 3(x + 1)$ or $13x + 8$ oe<br>A1 for $A = 13x + 8$ oe<br>OR<br>M1 for $8(x + 1)$ or $5x$ or $8 \times x + 1 + 5x$<br>M1 for $8(x + 1) + 5x$ or $13x + 8$ oe<br>A1 for $A = 13x + 8$ oe<br>OR<br>M1 for $8(2x + 1)$ or $3x$ or $8 \times 2x + 1 - 3x$<br>M1 for $8(2x + 1) - 3x$ or $13x + 8$ oe<br>A1 for $A = 13x + 8$ oe |

**PAPER: 5MB2H/01**

| | | | | |
|---|---|---|---|---|
| 7 | $(7 + 3 + 3) \times (4 + 3 + 3) - 7 \times 4 = 102$<br>OR<br>$2 \times 7 \times 3 + 2 \times 4 \times 3 + 4 \times 3 \times 3 = 102$ | 11 | 4 | M1 for a correct method to find the area of one appropriate rectangle<br>M1 for a complete method to find the area of the path<br>M1 (dep on M1) for "102" ÷ 10<br>A1 cao from correct working |
| *8 | | Bathroom Mart and correct figures | 4 | M1 for $\frac{1}{3} \times 1500$ (= 500) or $\frac{2}{3} \times 1500$ (= 1000)<br>M2 for a correct method to reduce 1500 by 60% and then by a further 15% eg 1500 × "0.4" × "0.85" (= 510) oe<br>(M1 for method to find 60% or 40% of 1500 e.g. $\frac{60}{100} \times 1500$ (= 900)<br>C1 for 510 **and** 500 with a correct conclusion. |

| PAPER: 1MA0/1H | | | | |
|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| *9 | | 95° with reasons | 4 | M1 for angle *DBC* = 180 – 125 (= 55)<br>**or** angle *EAC* = 180 – 125 (=55) (May be on diagram)<br>A1 for *x* = 95<br>C2 (dep on M1) with full reasons for their given method, e.g.<br>angles on a straight line add up to 180° **and** angles in a triangle add up to 180° **and** corresponding angles are equal<br>**or** allied angles / co-interior angles add up to 180°<br>**and** angles in a triangle add up to 180°<br>(C1 (dep on M1) for one appropriate reason linked to parallel lines)<br><br>M1 for angle *CDB* = 125 – 30 (= 95) ) (May be on diagram)<br>A1 for *x* = 95<br>C2 (dep on M1) for full reasons, for their given method, e.g.<br>exterior angles are equal to the sum of the interior opposite angles **and** corresponding angles are equal<br>(C1 (dep on M1) for one of these appropriate reasons linked to parallel lines) |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 26 | | 8 | 4 | M1 for $(2\sqrt{10})^2 - 2^2$ (= 36)<br>A1 for ($CD$ =) 6<br>M1 (dep on M1) for '6' × 4 – $\frac{1}{2}$ × '6' × 2 – $\frac{1}{2}$ × 2 × 2 – $\frac{1}{2}$ × ('6' – 2) × 4<br>C1 for area of 8 from fully correct working |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 11 | $\pi \times 6^2 - 2 \times 6 \times 6$ | 41.1 | 4 | M1 for correct method to work out the area of the circle or quarter circle or semi-circle eg $\pi \times 6^2$ (=113(.09..)); $\pi \times 6^2 \div 2 = 56.5(4..)$; $\pi \times 6^2 \div 4 = 28.2(7\ldots)$)<br>M1 for method to work out the area of the square (=72) oe or a triangle eg ½×6×6 (=18)<br>M1 for complete method to find shaded area.<br>A1 for value in the range 41.04 - 41.112 |

| | | | | | |
|---|---|---|---|---|---|
| 7 | (a) | | $10 < a \leq 15$ | 1 | B1 cao |
| | (b) | | 12.5 | 4 | M1 for finding 4 products $fx$ consistently within interval (including end points)<br>M1 (dep) for use of at least 4 correct mid points<br>M1 (dep on first M1) for $\sum fx \div \sum f$<br>A1 cao |

PAPER: 5MB1H_01

| | | | | | |
|---|---|---|---|---|---|
| 9 | $10 \times 4^2 - 4 - 21 = 135$<br>$2 \times 4 - 3 = 5$<br>$135 \div 5 = 27$<br><br>$10x^2 - x - 21$<br>$= (2x - 3)(5x + 7)$<br>$5 \times 4 + 7$ | 27 | 3 | M1 for $10 \times 4^2 - 4 - 21$ (= 135)<br>M1 for $135 \div (2 \times 4 - 3)$<br>A1 cao<br><br>OR<br>M1 for factorising to give $5x + 7$ or $5x + n$, $n \neq 7$ or $mx + 7$, $m \neq 5$)<br>M1 (dep) for substitution of $x = 4$ into expression for length of rectangle<br>A1 cao | E |

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| Question | Working | Answer | Mark | Notes | Type |
|---|---|---|---|---|---|
| 16 | $\frac{(\sqrt{5}+\sqrt{5}+6)}{2} \times (\sqrt{5}-2)$<br>$(\sqrt{5}+3)(\sqrt{5}-2)$<br>$5+3\sqrt{5}-2\sqrt{5}-6$<br><br><br><br>$\sqrt{5}(\sqrt{5}-2)+\frac{6(\sqrt{5}-2)}{2}$<br>$5-2\sqrt{5}+3\sqrt{5}-6$ | $\sqrt{5}-1$ | 3 | M1 for $\frac{(\sqrt{5}+\sqrt{5}+6)}{2} \times (\sqrt{5}-2)$<br>M1 for expansion $5+3\sqrt{5}-2\sqrt{5}-6$ with 3 terms out of 4 correct including signs or all 4 terms correct ignoring signs<br>A1 cao<br><br>OR<br>M1 for $\sqrt{5}(\sqrt{5}-2)+\frac{6(\sqrt{5}-2)}{2}$<br>M1 for expansion $5-2\sqrt{5}+3\sqrt{5}-6$ with 3 terms out of 4 correct including signs or all 4 terms correct ignoring signs<br>A1 cao | E |

| | | | | |
|---|---|---|---|---|
| 3 | | 105.7 | 2 | M1 for $\pi \times 5.8 \times 5.8$ oe<br>A1 for 105.6 to 105.8 |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 15 | | 18 | 4 | M1 for correct initial use of Pythagoras eg $(AB^2 =)\ 10^2 - 6^2$ (= 64) or $AB = 8$<br>M1 (dep M1) for "$\sqrt{64}$" ÷ 2 (= 4)<br>M1 for method to find area of trapezium eg $\frac{1}{2} \times$ "4" $\times (6 \div 2 + 6)$<br>A1 cao<br><br>OR<br>M1 for correct initial use of Pythagoras eg $(AB^2 =)\ 10^2 - 6^2$ (= 64) or $AB = 8$<br>M1 (dep M1) for method to find area of $\Delta ABC$ eg $\frac{1}{2} \times$ "$\sqrt{64}$" $\times 6$ ( = 24)<br>or area of $\Delta AED$ $\frac{1}{2} \times 6 \div 2 \times$ "4" ( = 6) or $24 \times (\frac{1}{2})^2$ (= 6)<br>M1 for a complete method to find area of $EDBC$ e.g $\frac{3}{4} \times$ "24" eg "24" − "6"<br>A1 cao |

| | | | | |
|---|---|---|---|---|
| 4 | | $x^2 + 6x = 1$ | M1<br><br>M1<br><br>A1 | writes the area using algebraic terms e.g. $(x + 3) \times (x + 3)$ or at least two correct area expressions which may be written on the diagram or $x$ given as $\sqrt{10} - 3$<br>expands and includes the given 10 e.g. $x^2 + 3x + 3x + 9 = 10$; condone one error in the four terms when expanding or $10 - 3\sqrt{10} - 3\sqrt{10} + 9 + 6\sqrt{10} - 18$ (=1) condone 1 error in the 6 terms<br>rearranges to give the given equation or shows surd expression simplifies to 1 |

| | | | | |
|---|---|---|---|---|
| 21 | | 8600 | P1<br>P1<br><br>P1<br><br>A1 | for process to find the length of the rectangle, e.g. 24 × 4 (= 96)<br>for process to find the perpendicular height of an equilateral triangle of side (24 × 2) cm, e.g. 48sin60 (= 41.5(69..)) or $\sqrt{48^2 - 24^2}$ (= $24\sqrt{3}$ oe)<br>for complete process to find the width of rectangle, e.g. "41.5(69..)" + 24 + 24 (= 89.5(69..))<br>for answer in the range 8592 to 8602 |

| | | | | | |
|---|---|---|---|---|---|
| 8 | | 5.59 | M1 | For use of $\pi r^2 = 49$, where $r$ is the radius or $r = 3.9(49\ldots)$ or diameter $= 7.8(9865\ldots)$ | |
| | | | M1 | For use of Pythagoras to set up an equation in $x^2$ e.g. $x^2 + x^2 = (d)^2$ or $x^2 = r^2 + r^2$ | For use of trigonometry to set up an equation in $x$ eg $\sin 45 = x \div d$ |
| | | | M1 | (dep on M2) Rearrange to $(x^2 =)$ 2× "3.949.." $^2$ | Rearrange to $(x=)$ "7.898.." × sin 45 oe |
| | | | A1 | 5.5 to 5.6 | |

Paper: 1MA1/1H

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 4 | | Daisy is wrong | P1 | for process to find area of any relevant circle ie $\pi\times4^2$ (=16π), $\pi\times7^2$ (=49π), $\pi\times10^2$ (=100π) **or** $7^2$ and $4^2$ |
| | | (supported) | P1 | for completed method to find shaded area eg "$\pi\times7^2$" – "$\pi\times4^2$" (=33π) **or** use of radii eg $7^2 - 4^2$ (=33) |
| | | | A1 | for 2 comparable figures, eg 33π and 100π **or** 33 and 100 **or** 103 to 103.7 and 314 to 314.2 **or** 103 to 103.7 and 104.6 to 104.8 |
| | | | C1 | statement eg No because it should be $\frac{33}{100}$ and their accurate figures<br>Allow use of π = 3 or better |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | | Shows reasoning to reach $y=3$ | M1<br><br>M1<br><br>M1<br><br>A1 | forms equation<br>eg $2x + 6 = 5x - 9$<br><br>isolates $x$ and number terms<br>$3x = 15$<br><br>substitutes "5" into side length<br>eg $2 \times 5 + 6$ (=16)<br><br>$48 \div 16 = 3$ **or** $16 \times 3 = 48$ | $48 \div 3$ (=16)<br><br>forms equation $2x+6=$"16" **or** $5x - 9 =$ "16"<br><br>isolates $x$ and number terms<br>$2x =$ "10" **or** $5x =$ "25"<br><br>shows $x=5$ for both solutions | $3(2x + 6) = 48$ **or**<br>$3(5x - 9) = 48$, condone missing bracket<br>Isolates $x$ and number terms $6x =$ "30" **or**<br>$15x =$ "75"<br><br>forms the second equation<br><br>$x=5$ from 2 different equations. |

| Paper: 1MA1/1H |
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|---|---|---|---|---|
| 23 | | $x > 2$ | P1<br><br>M1<br><br>M1<br>M1<br><br>A1 | for process to derive algebraic expressions for area of both rectangle and triangle eg $(x - 1)(3x - 2)$ and $(2x \times x) \div 2$ (condone missing brackets)<br>for method to rearrange inequality to $2x^2-5x+2> 0$ oe providing in the form $ax^2 + bx + c >0$<br>for a correct method to solve $2x^2-5x+2>0$<br>for establishing critical values 2 and $\frac{1}{2}$<br>$x > 2$ |

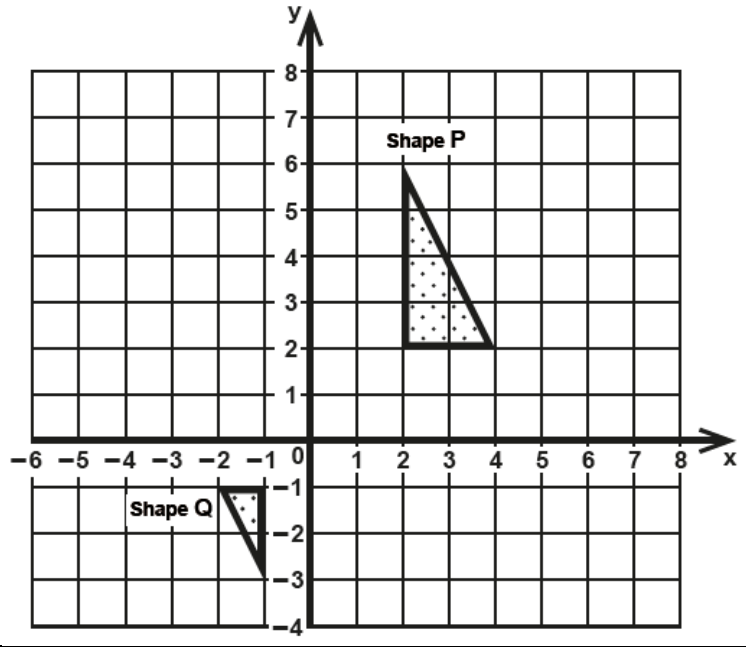
## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 3 | | Diagram enlarged. Angles moved outside the angle arcs and the angle arcs made smaller.<br>Arrow heads made longer and more obvious.<br>Wording added 'AD is parallel to BC. AB is parallel to EC.' | Standard mark scheme |
| 4 | | Diagram enlarged. Cross changed to a solid dot. Shading changed to dotty shading. | Standard mark scheme |
| 5 | | Frequency column has been extended to allow for working. | Standard mark scheme |
| 6 | | Diagram enlarged. Wording added 'All marked angles are right angles'.<br>MLP only: *x* changed to *e*, *y* changed to *f*.<br>Braille only: will label the corners of the rectangle A to D and will give information about the rectangle. | Standard mark scheme with *x* replaced by *e*, and *y* replaced by *f*. |
| 7 | | Diagram enlarged. Crosses changed to solid dots. | Standard mark scheme |

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 12 | | Numbers on the table changed: least height changed from 154 to 155, lower quartile changed from 161 to 160 and interquartile range changed from 7 to 10. | |
| 12 | (a) | Diagram enlarged and labelled 'Diagram (i)'.<br>Diagram (ii) put below Diagram (i) on the same page in the diagram book.<br>Axis label moved to the left of the horizontal axis. | M1 for method to find UQ (168) or highest value (174), may be implied by correct values plotted<br>M1 for showing a box and at least 3 correctly plotted values from 155, 160, 165, 170, 175<br>A1 fully correct box plot |
| | (b) | Diagram enlarged and labelled 'Diagram (ii)'.<br>Axis label moved to the left of the horizontal axis.<br>Points on the box plot changed to: 145, 155, 160, 165 and 170. | Med IQR Range<br>Y7 160 10 25<br>Y11 165 10 20<br>otherwise standard mark scheme using these figures |
| 14 | | MLP only: $x$ has been changed to $e$ and $y$ has been changed to $f$. | Standard mark scheme with $x$ replaced by $e$, and $y$ replaced by $f$. |

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 18 | | Question reversed. Wording added 'It shows Shape P and Shape Q given on a grid.'<br>Question changed to 'Describe fully the transformation that maps Shape P onto Shape Q.'<br>Three answer lines provided. Shape Q drawn on the grid. Shape P and Shape Q labelled.<br>Shape P has been moved down a square so that the new coordinates of Shape P are (2,2) (4,2)(2,6).<br>New coordinates of Shape Q are (-1,-1)(-2,-1)(-1,-3).<br>X axis has been reduced so it goes from -6 to 8; Y axis has been reduced so it goes from -4 to 8.<br> | B1 for centre of enlargement (0,0)<br>B1 for sf given as $-\frac{1}{2}$ |

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 19 | | Diagram enlarged. | Standard mark scheme |
| 20 | | Table has been turned to vertical format | Standard mark scheme |
| 22 | | Diagram enlarged. Wording changed to 'It shows two triangles CDA and BEA that are similar.' Wording added 'CB equals x cm, BA = 8 cm, AE = 12 cm and ED = 3 cm.' | Standard mark scheme |
| 23 | | Diagrams enlarged. Braille only: will add information about the diagram. | Standard mark scheme |

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|---|---|---|---|---|
| 6 | | 147 | P1 | starts process, eg uses $x$ and $x + 7$ |
| | | | P1 | starts to work with at least 6 correct sides, may be on the diagram or in an expression |
| | | | P1 | (dep on previous P1) gives a correct expression for the perimeter,<br>eg $x + x + 7 + x + 7 + x + 7 + x + x + 7 + x + 7 + x + 7$<br>or adds at least 6 correct sides and equates to 70 |
| | | | A1 | for width = 3.5 oe **and** length = 10.5 oe |
| | | | B1 | ft (dep P2) for correct area for their $x$ |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 8 | 216 | P1 | for process to work with ratio<br>eg 72 ÷ (3 + 4 + 5) (= 6) **or** 72 ÷ 12 (= 6) | |
| | | P1 | for process to find length of base or height of triangle<br>eg 3 × "6" (= 18) **or** 4 × "6" (= 24)<br><br>**OR** process to find area scale factor<br>eg "6" × "6" (= 36) | |
| | | P1 | complete process to find the area of the triangle<br>eg ½ × "18" × "24" **or** ½ × 3 × 4 × "6"$^2$ | |
| | | A1 | cao | |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 6 | No<br>(supported) | P1 | For a process to calculate the initial or new pressure,<br>eg (70 +10) ÷ (20+10) (=2.6 to 2.7) **or** 80 ÷ 30 (=2.6 to 2.7) **or** 70 ÷ 20 (=3.5) | Accept any value in the range 2.6 to 2.7 if unsupported by working |
| | | P1 | For a complete process to make a comparison<br>eg. 0.8 × "3.5" (=2.8)<br>**OR** $\frac{("3.5"-"2.6")}{"3.5"}$ ×100 (=22 to 26)<br>**OR** "3.5" × 0.2 (=0.7) **and** 80 ÷ 30 (=2.6 to 2.7)<br>**OR** $\frac{"2.6"}{"3.5"}$ (× 100) (=0.74 to 0.78 **or** 74 to 78) | |
| | | A1 | for a correct conclusion supported by accurate figures<br>eg 2.8 **and** 2.6(6…)<br>**OR** decrease is 24% (or 22% to 26%)<br>**OR** 0.7 **and** 2.6 to 2.7 **and** 3.5<br>**OR** 0.7 **and** 0.9<br>**OR** 0.76 (or 0.74 to 0.78)<br>**OR** 76% (or 74% to 78%) | Allow truncation or rounding of figures |

| | | | | |
|---|---|---|---|---|
| 3 | Triangle of area 18 | M1 | for a complete method to find area of trapezium<br>eg $\frac{1}{2}(2 + 7) \times 4$ (= 18)<br>**OR** for a triangle drawn of area 36<br>**OR** for a triangle that would give an area ft their area of trapezium | The value for the area of the trapezium must be clear for the ft to be checked. |
| | | A1 | for a triangle drawn of area 18<br>eg base = 6, height = 6 or base = 9, height = 4 | Accept use of dimensions that are not whole numbers as long as the intention is clear |

| Paper: 1MA1/3H |
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|---|---|---|---|---|
| 7 | shown | C1<br><br>C1<br><br>C1<br><br>C1 | for method to find area of semicircle,<br>eg $\pi \times 10^2 \div 2$ (= $50\pi$)<br><br>for method to find area of quarter circle,<br>for $\pi \times 20^2 \div 4$ (= $100\pi$)<br><br>for a complete method to find area shaded **and** area of square,<br>eg $\pi \times 20^2 \div 4 - \pi \times 10^2 \div 2$ **and** $20 \times 20$<br><br>fully correct working leading to $\frac{\pi}{8}$ | Can award first 3 marks if a value for $\pi$ is used<br><br>Working out to find the area of the shaded region **must** be shown |

| | | | | | |
|---|---|---|---|---|---|
| 5 | No<br><br>(supported) | P1 | calculates area of trapezium eg ½ × 7 × (10+16) (= 91) | | |
| | | P1 | for division by coverage eg ÷2 or [area of trapezium] ÷ 2 (= 45.5) or process to find coverage per tin eg 5 × 2 (= 10) | for process to find number of tins bought eg 160 ÷ 16.99 = 9 tins | [area of trapezium] needs to be clearly stated if the process of finding the area is not clear |
| | | P1 | for division to find the number of tins eg ÷5 or "45.5" ÷ 5 (= 9.1) **or** [area of trapezium] ÷ "10" (= 9.1) | for using whole no. of tins to find total litres eg 9 × 5 (= 45) | |
| | | P1 | (dep on at least P2) for a process to multiply a whole number of tins (rounded up) by 16.99 | (dep on at least P2) for a process to find the total coverage eg "45" × 2 (= 90) | |
| | | C1 | for 'No' supported by correct figures eg 169.9 or 90 **and** 91 | | There must be a conclusion ("No" or equivalent wording) including the figure 169.9 and working showing processes followed. |

| Paper: 1MA1/2H |
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Paper: 1MA1/2H

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 13 | 84.9 | P1 | shows a process to find the radius or diameter eg $44 = 2 \times \pi \times r$<br>**or** $r = \frac{22}{\pi}$ **or** $d = \frac{44}{\pi}$<br>**or** $r = 7.0028$ **or** $d = 14.0056..$ | Allow $r$ in the range 7 to 7.1 and $d$ in the range 14 to 14.1<br>Could be shown on the diagram. |
| | | P1 | (dep on P1) complete method to find the area<br>eg ½ × "$d$" $^2$ × Sin60 oe, ½ × 14 × Tan60 oe, ½ × 14 × $\sqrt{14^2 - 7^2}$ oe | |
| | | A1 | for answer in the range 84.8 to 85 | If the correct answer in the range is given in working and then rounded incorrectly award full marks. |

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|---|---|---|---|---|
| 16 | 39.9 | P1<br><br>P1<br><br>P1<br><br>P1<br><br>A1 | for finding the length of the minor or major arc<br>eg $\frac{220}{360}\pi\times12$ (= 23(.03834..))<br><br>for substituting into the sine or cosine rule to find *OD*<br>eg 14 ÷ sin140 = *OD* ÷ sin 24<br>**or** ($OD^2$=) $6^2+14^2-2\times6\times14\times\cos24$ (=78.5....)<br><br>for a complete process to find the length *OD*<br>eg 14 ÷ sin140 × sin24 (=8.8(58778..))<br><br>for a complete process to find the perimeter<br>eg "23(.03834..)" + 14+ "8.8(58778..)" – 6<br><br>for an answer in the range 39.8 to 40 | Allow appropriate rounding if calculation seen in parts<br><br>Must involve *OD* in the relationship but may be implied<br><br>May be seen in multiple calculations<br><br>If an answer in the range is seen in working and then incorrectly rounded award full marks. |

**Paper: 1MA1/3H**

| | | | | |
|---|---|---|---|---|
| 7 | 8.5 | P1<br><br>P1<br><br>P1<br><br>A1 | for process to use the area of *PQRS* to find the length of *PQ*,<br>eg $10y = 45$ **or** $45 \div 10$ (= 4.5)<br><br>for process to use the perimeter of *ABCD*,<br>eg $2x + 2 \times$ "4.5" = 26 **or** $26 - 2 \times$ "4.5" (= 17) **or** $26 \div 2$ (= 13)<br><br>for process to use length of *BC* to find length of *AB*,<br>eg solves $2x + 2 \times$ "4.5" = 26 **or** $(26 - 2 \times$ "4.5"$) \div 2$ **or** "13" – "4.5"<br><br>for 8.5 **or** $8\frac{1}{2}$ | Sets up equation for area<br><br>Uses perimeter of *ABCD*<br><br><br><br>Accept $\frac{17}{2}$ |

**Paper: 1MA1/1H**

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 9 (a) | 100 : 81 | M1 | for a scale factor of 0.9 oe used;<br>**OR** for 10 : 9 oe<br>**OR** 81 : 100 oe<br>**OR** 81% | |
| | | A1 | for 100 : 81 oe | eg. 1 : 0.81, accept 1.23(4...) : 1 |
| (b) | 6 : 5 | P1 | for 1.44 oe used as the scale factor **or** 1.2 oe<br>**OR** for 144 : 100 oe or $\sqrt{144} : \sqrt{100}$ oe<br>**OR** 5 : 6 oe | |
| | | A1 | for 6 : 5 oe | eg 1.2 : 1, accept 1 : 0.83(3...) |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 12 | 25.4 | P2 | for finding the size of the angle eg $\frac{40\times360}{\pi\times7^2}$ (=93.5(4..))<br>**or** for working with proportion,<br>eg $\frac{40}{49\pi}$ (=0.259(8…) or 0.26) **or** $\frac{49\pi}{40}$ (=3.84(8…) or 3.85) | |
| | | (P1 | for finding the area of the circle eg π × 7² (=153(.938..) or 154) ) | May be embedded |
| | | P1 | (dep on P2) for a process to find the arc length,<br>eg $\frac{"93.5(4...)"}{360}$ × π × 2 × 7 (=11.4(28…)) **or** $\frac{40}{49\pi}$ × π × 2 × 7<br>(=11.4(28…)) **or** π × 2 × 7 ÷ $\frac{49\pi}{40}$ (=11.4(28…)) | |
| | | A1 | for answer in the range 25 to 25.44 | If an answer is shown in the range in working and then incorrectly rounded award full marks.<br>Accept $\frac{178}{7}$ |

**Paper: 1MA1/2H**

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|---|---|---|---|---|
| 14 | 36 | P1<br><br><br><br>P1<br><br><br><br><br>P1<br><br><br><br>A1 | for process to find an expression for the area of triangle<br>eg $\frac{1}{2} \times 24 \times AE \times \sin 30$ (= $6AE$)<br><br>(dep P1) for process to link the area of rectangle with the area of the triangle eg $2 \times \frac{1}{2} \times 24 \times AE \times \sin 30$ (= $12AE$)<br>or for $AB = 12$<br><br>(indep) for use of given ratio eg $AE = 3AB$ oe,<br>eg area of rectangle = $AE \times AB = 3x \times x$<br><br>cao | Accept any correct expression,<br>eg $\frac{1}{2} \times 24 \times y \times \sin 30$<br><br><br><br><br>May be shown on the diagram by labelling $AE$ and $AB$ with, for example, $3x$, $x$ or $x$, $\frac{1}{3}x$ or $\frac{3}{4}x$, $\frac{1}{4}x$<br>Do not accept 3, 1 or 1, $\frac{1}{3}$ or $\frac{3}{4}$, $\frac{1}{4}$ for this mark. |

| Paper: 1MA1/3H |
|---|

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 14 | 5 | P1 | for process to find the area of the triangle,<br>eg. $0.5 \times (x + 4)(x - 2)$ oe<br>OR for process to find the area of rectangle and $27.5 \times 2$,<br>eg. $(x + 4)(x - 2)$ and 55 | Trial and improvement methods must be fully correct identifying the value of $x$ as 7 (3 marks) or the shortest side as 5 (4 marks) |
| | | P1 | (dep P1) for process to expand the brackets and derive a quadratic equation,<br>eg. $x^2 + 4x - 2x - 8 = 55$ or $0.5(x^2 + 4x - 2x - 8) = 27.5$ oe | |
| | | P1 | (dep P2) for complete process to solve the quadratic equation<br>$x^2 + 2x - 63 = 0$<br>eg $(x - 7)(x + 9)$ (= 0) or $\frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -63}}{2 \times 1}$<br>or $(x + 1)^2 - 1 - 63$ (= 0) | |
| | | A1 | cao<br><br>SC: B1 for $x^2 + 4x - 2x - 8 = 27.5$ | An answer of 5 with no supportive working gets no marks |

**Paper: 1MA1/1H**

| | | | | | |
|---|---|---|---|---|---|
| 23 | (a) | Shown | C1 | for a method to find the area of half of the parallelogram or of the whole parallelogram,<br>eg ½(2$x$ – 1)(10 – $x$) sin150 or ½(2$x$ – 1)(10 – $x$)× ½ oe<br>or (2$x$ – 1)(10–$x$) sin150 or (2$x$ – 1)(10–$x$) × ½ oe | |
| | | | C1 | for a correct expansion of the whole area<br>eg ½ (20$x$ – 10 – 2$x^2$ + $x$) or ½ (–2$x^2$ + 21$x$ – 10) or –$x^2$ + 10.5$x$ – 5 | |
| | | | C1 | complete chain of reasoning with fully correct algebra dealing with the inequality eg<br>$x^2$ – 10.5$x$ + 5 < –15 or $x^2$ – 10.5$x$ + 20 < 0 or 2$x^2$ – 21$x$ + 10 < –30<br>which lead to 2$x^2$ – 21$x$ + 40 < 0 | |
| | (b) | 2.5 < $x$ < 8 | M1 | for factorising, (2$x$ – 5)($x$ – 8) | Could use the formula |
| | | | A1 | for critical values, 2.5, 8 | |
| | | | A1 | for any statement that $x$ is greater than 2.5 and $x$ is less than 8 | Need not be given as an inequality statement |

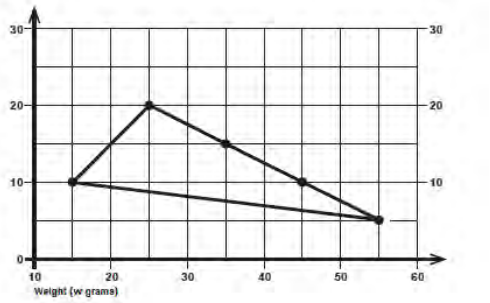
**Paper: 1MA1/2H**

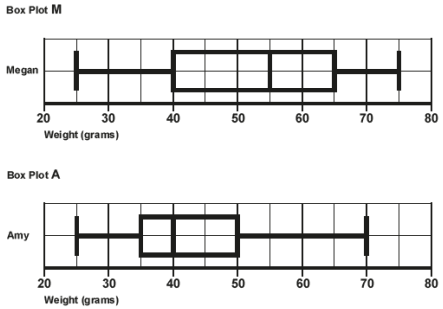
| | | | | |
|---|---|---|---|---|
| 25 | 9.75 | P1 | process to find the gradient of **L** $\left(=-\frac{3}{2}\right)$ | |
| | | P1 | process to find the gradient of the perpendicular line **M**<br>eg use of $-\frac{1}{m}$ or states gradient as $\frac{2}{3}$<br>**or** $y=\frac{2}{3}x+c$ | |
| | | B1 | (indep) gives $y$ coordinate of $B = 8.5$ oe | Could be indicated other ways, eg 8.5 on the $y$ axis of a diagram |
| | | P1 | (dep P2) process to find $x$ coordinate of $C$ (= 3)<br>or $y$ coordinate of $C$ (= 4)<br>eg the first stage of solving equations or using elimination by substitution, to find a coordinate of $C$. | ft their linear equation for M with L; allow some error in manipulation of these linear equations as long as the overall process is correct. |
| | | A1 | 9.75 oe | Award 0 marks for a correct answer with no supportive working. |

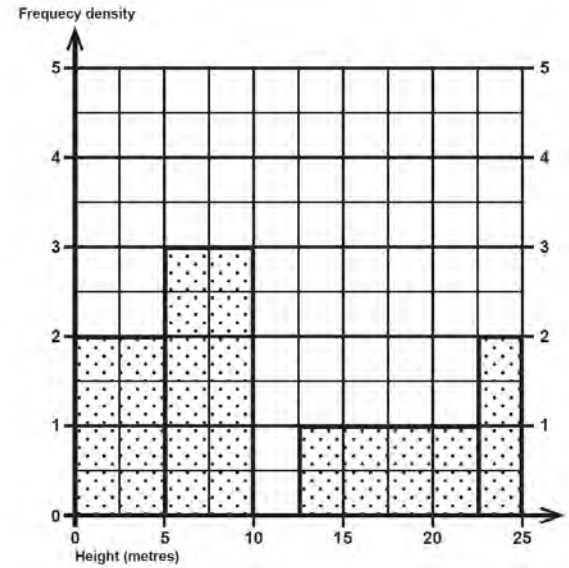
## Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

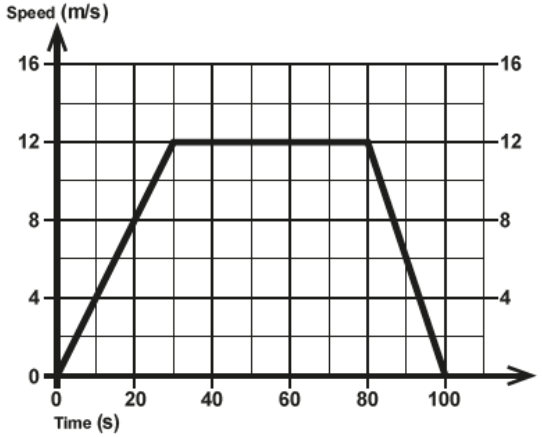
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA1_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 1 | | Diagram enlarged and changed:<br><br><br>Crosses changed to solid circles. Axes label moved to the left of the horizontal axis.<br>Frequency changed as follows: $10 < w \leq 20$ 5 $20 < w \leq 30$ 20 $30 < w \leq 40$ 15<br>$40 < w \leq 50$ 10 $50 < w \leq 60$ 5<br>Question wording changed from '50 potatoes' to '55 potatoes'. | Standard mark scheme, but reference to the first point is now "(15,5) has been incorrectly plotted at (15,10)" |
| 3 | | Wording added 'Tom and Adam have some stamps.' Information moved to Diagram Book. | Standard mark scheme |
| 5 | | Diagram enlarged. Graphs labelled as 'Graph A, graph B etc'. | Standard mark scheme |
| 9 | | Diagrams enlarged; models should be provided for all candidates.<br>Wording added 'The cuboid has length 18 cm, width 8 cm and height 6 cm.' | Standard mark scheme. |

| PAPER: 1MA1_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 11 | | Box plots changed as shown.<br><br><br>Wording added 'They show box plot M and box plot A.'<br>Megan's box plot labelled 'Box plot M' and Amy's box plot labelled 'Box plot A.'<br>Horizontal axes labels moved to the left.<br>Megan's box plot: Lowest 25, Highest 75, Median 55, IQR 40-65 (=25), range = 50<br>Amy's box plot: Lowest 25, Highest 70, Median 40, IQR 35-60 (=25), range = 45 | Part (a): C1 explanation<br>eg 'No' the median is 55<br>Part (b):<br>C1: a correct comparison of medians eg the median weight for Megan was greater than the median weight for Amy<br>C1: a correct comparison of a measure of spread eg the IQR of weights for Megan was the same as the IQR of weights for Amy<br>For the award of both marks at least one of the comparisons must be in the context of the question<br>Additional guidance:<br>Simply quoting values for median, range and IQR is insufficient, they must be compared<br>Figures given must be correct.<br>Comparisons can relate to the range or the IQR |
| 12 | | Diagram enlarged. Angle *EAD* marked with an angle arc.<br>Angle moved outside of the angle arc and the angle arc made smaller. | Standard mark scheme |
| 15 | | MLP only: *x* changed to *y*. | Standard mark scheme with letters changed as indicated. |
| 16 | | Wording added 'Each card is numbered from 1-9.' | Standard mark scheme |
| 17 | | Diagram enlarged.<br>Angle moved outside of the angle arc and the angle arc made smaller. | Standard mark scheme |

| PAPER: 1MA1_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 18 | | Histogram changed as shown below.<br><br><br>Diagram enlarged. Right axis labelled. Shading changed to dotty shading.<br>Axes labels moved to the left of the horizontal axis and above the vertical axis.<br>Wording added 'It shows an incomplete histogram.'<br>Grid extended to 5 on the vertical axis. | Mark scheme adjusted as follows:<br><br>M1: method to find any frequency,<br>eg 2 × 5 (= 10) **or** 3 × 5 (= 15) **or** 1 × 10 (= 10)<br>**or** 2 × 2.5 (= 5) oe<br><br>**or** method to use areas<br>eg 2 × 4 (=8) or 2 × 6 (=12) or 4 × 2 (=8) or 1 × 4 (=4)<br>oe<br><br>complete method to find total frequency for the four intervals<br>eg "10 + "15" + "10" + "5" (=40)<br><br>**or** "8" + "12" + "8" + "4" (=32)<br><br>C1: Bar of height 4 (8 squares high) |
| 19 | | Diagram enlarged. Wording added for MLP only 'A hemisphere is half a sphere.'<br>Formula placed above hemisphere. Wording for Braille only: 'The model represents a hemisphere with diameter 8.4cm.' | Standard mark scheme |
| 20 | | Braille only- *c* changed to *r* and *d* changed to *s* | Standard mark scheme with the letters changed as indicated. |

| PAPER: 1MA1_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 21 | | Diagram enlarged. Right axis labelled. Vertical axis marked in units of 4.<br>Axes labels moved to the left of the horizontal axis and above the vertical axis.<br><br> | Standard mark scheme |
| 23 | | Diagram enlarged.<br>Angle moved outside of the angle arc and the angle arc made smaller.<br>Wording added 'with sides $(2x - 1)$ cm and $(10 - x)$ cm. An angle of 150° is marked' | Standard mark scheme |
| 24 | | Diagram enlarged. Shading changed to dotty shading.<br>Wording added 'It shows square *ABCD* on a coordinate grid.'<br>Shape provided for all candidates labelled *ABCD* on both sides.<br>Wording added 'A cut out shape may be available if you wish to use it.' | Standard mark scheme |

| | | | | |
|---|---|---|---|---|
| 22 | 0.5 | P1 | derive an algebraic expression for the area of A<br>eg $\frac{1}{8}\pi\,[\,(5x-1)^2-(3x-1)^2\,]$ | |
| | | P1 | expand and simplify for either area A or area B<br>eg $\frac{1}{8}\pi\,(16x^2-4x)$ **or** $\pi(x^2-2x+1)$ | |
| | | P1 | (dep P2) equate and rearrange into a quadratic eqn of the form $ax^2 + bx + c = 0$<br>eg $2x^2 + 3x - 2 = 0$ | |
| | | P1 | (dep P3) factorise eg $(2x-1)(x+2) = 0$ **or** use of formula eg<br>$\frac{-3\pm\sqrt{3^2-4\times2\times-2}}{2\times2}$ | |
| | | A1 | oe | Accept only the single value of 0.5 oe but award 0 marks for a correct answer with no supportive working |

**Paper: 1MA1/1H**

| | | | | |
|---|---|---|---|---|
| 7 | 35.3 | P1<br><br>P1<br><br>P1<br><br>A1 | for starting the process to find length of third side of triangle,<br>eg $9^2 - 6^2$ (= 45) **or** $6^2 + x^2 = 9^2$<br><br>for $\sqrt{9^2 - 6^2}$ or $\sqrt{81 - 36}$ or $\sqrt{45}$ or $3\sqrt{5}$ (= 6.7..) **or** $r^2 = 45$<br><br>for stating or using $\pi \times$ [radius]$^2 \div 4$<br><br>for answer in range 35.2 to 35.4 | <br><br><br><br>[radius] is any value<br><br>If an answer in the range 35.2 to 35.4 is given in the working space then incorrectly rounded, award full marks<br>No working, answer only, no marks |

| Paper: 1MA1/2H |
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|---|---|---|---|---|---|
| 14 | 116 | P1<br><br><br><br>P1<br><br><br><br>A1<br><br>B1 | for setting up an equation,<br>eg $(x + 4)^2 = x^2 + 70$<br><br>for process to reduce equation down to a linear equation ready to solve eg $8x = 54$ oe<br><br>for 6.75 oe<br><br>ft (dep P2) for finding the area of B **or** for answer in range 115 to 116 | for setting up an equation,<br>eg $x^2 - (x - 4)^2 = 70$<br><br>for process to reduce equation down to a linear equation ready to solve eg $8x = 86$ oe<br><br>for 10.75 oe | Equation must be in a single variable.<br>If a candidate uses a trial and improvement method, it is either full marks or no marks.<br><br>Candidates must get as far as $ax = b$ |

| | | | | |
|---|---|---|---|---|
| 18 | $160\pi$ | P1 | for process to find curved surface area of cone,<br>eg $\pi \times 10 \times 25$ (= $250\pi$) (= 785…..) | |
| | | P1 | for process to find the radius or diameter of the smaller cone<br>eg $10 \times \frac{15}{25}$ (= 6) **or** $20 \times \frac{15}{25}$ (= 12) oe<br>**OR** uses area scale factor, eg "$250\pi$" $\times \left(\frac{15}{25}\right)^2$ (= $90\pi$) | 15 comes from 25 – 10<br>$\frac{15}{25}$ may be seen as 0.6 |
| | | P1 | for a complete process, eg "$250\pi$" – $\pi \times$ "6" $\times$ 15 (= 785… – 282…)<br>**or** answer in range 502 to 503 | |
| | | A1 | for $160\pi$ | Award 0 marks for an answer of $160\pi$ or an answer in range 502 to 503 with no supportive working.<br>If $160\pi$ seen but answer in range 502 to 503 given on answer line isw and award full marks |

| Paper: 1MA1/2H |
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**Paper: 1MA1/3H**

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 4 (a) | Yes<br>(supported) | P1 | for start of process,<br>eg 5 × 9 (= 45) **or** 10 × 14 (= 140) **or** 5 × 2 (= 10 (kg))<br>**or** 3 ÷ 2 (= 1.5 (boxes)) | Accept values rounded or truncated to 1dp in both (a) and (b).<br>Ignore units |
| | | P1 | for process using ratio of areas, eg "140" ÷ "45" (= 3.1...)<br>**or** for using ratio of amount of seed eg "10" ÷ 3 (= 3.3...)<br>**or** for finding coverage for 1 kg of grass seed, eg "45" ÷ 3 (= 15 ($m^2$)) | |
| | | P1 | for process to find amount of seed needed,<br>eg "140" ÷ "45" × 3 (= 9.3...kg)<br>**or** "140" ÷ "45" × "1.5" (= 4.6...(boxes)) oe<br>**or** "15" × 2 (= 30 ($m^2$ per box)) **and** "140" ÷ "30" (= 4.6...(boxes))<br>**or** for process to find area that can be seeded,<br>eg "10" ÷ 3 × "45" (= 150 ($m^2$))<br>**or** "140" ÷ "10" (= 14 ($m^2$)) oe | Accept 9.4<br><br>Accept 4.7 |
| | | C1 | for "Yes" supported by correct figures<br>eg 4.6...(and 5), **or** 9.3...and 10 **or** 150 and 140 (or 140 to 148.5)<br>**or** 15 and 14 | |
| (b) | Yes, (does not have enough)<br>(supported) | C1 | for reasoning supported with correct figures, eg does not have enough seed and compares 9 (kg) with 9.3…(kg) or 4.5 (boxes) with 4.6… (boxes)<br>or 135 ($m^2$) with 140 ($m^2$) ft from (a) | Values used in (a) do not need repeating in (b) as long as intention is clear |

**Paper: 1MA1/3H**

| | | | | | |
|---|---|---|---|---|---|
| 10 | (a) | 30 | P1 | for a start to the process,<br>eg 5406 ÷ 6 (= 901) **or** 5400 ÷ 6 (= 900) **or** 5000 ÷ 6 (= 833.33..)<br>**or** 5410 ÷ 6 (= 901.66..) | |
| | | | P1 | for a process to find the length of one side,<br>eg $\sqrt{"901"}$ **or** $\sqrt{"900"}$ **or** $\sqrt{"833.33.."}$ **or** $\sqrt{"901.66.."}$ | |
| | | | A1 | for 30 | |
| | (b) | Explanation | C1 | for a correct explanation based on their working in (a),<br>eg underestimate because I rounded the total area down | Must be based on the use of a rounded value in a calculation |

| Paper: 1MA1/1H |
| --- |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 11 | $\frac{30w}{6-21w}$ | P1 | for forming an equation,<br><br>eg $6(2w + y) = 7w(3y + 6)$ **or** $12w + 6y = 21wy + 42w$ oe | Condone missing brackets for this mark |
| | | P1 | for expanding brackets correctly and gathering $w$ terms or isolating $y$ terms in a correct equation,<br><br>eg $6y = 21wy + 30w$ **or** $6y - 21wy = 42w - 12w$ **or** $6y - 21wy = 30w$ | |
| | | P1 | (dep on two terms in $y$) for factorising out the $y$,<br><br>eg $y(6 - 21w) = 42w - 12w$ **or** $y(6 - 21w) = 30w$ **or** $3y(2 - 7w) = 30w$ | |
| | | A1 | for $(y =) \frac{30w}{6-21w}$ oe | |

| | | | | |
|---|---|---|---|---|
| 14 | Shown | M1 | for a start to the method, eg finds one correct area<br><br>$4(x + 1)$ **or** $(x + 7)(2x + 6)$ **or** $(x + 1)(x + 11)$ **or** $(x + 7)(x + 5)$ **or** $4(x + 5)$ **or** $(x + 11)(2x + 6)$ | |
| | | M1 | for a complete expression for the total area,<br><br>eg $4(x + 1) + (x + 7)(2x + 6)$ **or** $4x + 4 + 2x^2 + 14x + 6x + 42$<br>**OR**<br>$(x + 1)(x + 11) + (x + 7)(x + 5)$ **or** $x^2 + x + 11x + 11 + x^2 + 7x + 5x + 35$<br>**OR**<br>$(x + 11)(2x + 6) - 4(x + 5)$ **or** $2x^2 + 22x + 6x + 66 - 4x - 20$ | |
| | | A1 | for a complete chain of reasoning with fully correct algebra leading to $2x^2 + 24x + 46$ | $2x^2 + 24x + 46$ is given so need to see brackets expanded correctly |

**Paper: 1MA1/1H**

| | | | | |
|---|---|---|---|---|
| 18 | 17.6 | P1<br><br>P1<br><br>P1<br><br><br><br>P1<br><br><br>A1 | for correct trig statement, eg $\sin 30 = \frac{h}{6}$<br><br>for complete process to find $h$, eg $6 \times \frac{1}{2}$ (= 3)<br><br>for correct substitution into the area of a trapezium formula,<br>eg $\frac{1}{2}(a+b) \times "3" = 66$ **or** $a + b = 44$<br>**or** $\frac{1}{2}(2x+3x) \times h = 66$<br><br>for complete correct process to find the length of $AB$,<br>eg $\left[\frac{66 \times 2}{3} \div (2 + "3")\right] \times 2$<br><br>cao | An answer of $\frac{88}{5}$ gets P4 A0 |

**Paper: 1MA1/1H**

Paper: 1MA1/2H

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 5 | 41.6 | P1 | for start of process to find the length of the hypotenuse,<br>eg (hyp$^2$ =) $8^2 + 10^2$ (= 164) | Note lengths may be seen on the diagram |
| | | P1 | for complete process to find hypotenuse,<br>eg $\sqrt{8^2+10^2}$ **or** $\sqrt{64+100}$ **or** $\sqrt{164}$ (= 12.8…) | |
| | | P1 | (dep P2) for complete process to find the required perimeter,<br>eg 8 + 8 + 10 + "12.8" + "12.8 – 10" **or** $16 + 4\sqrt{41}$ | 8 + 8+ "12.8" + "12.8" oe is acceptable for this mark |
| | | A1 | for answer in the range 41 to 42 | If an answer in the range 41 to 42 is given in the working space then incorrectly rounded, award full marks. |

| | | | | |
|---|---|---|---|---|
| 7 | 18.3 | P1<br><br>P1<br><br>P1<br><br>A1 | for finding the area of the triangle eg $0.5 \times 8 \times 8$ (= 32)<br><br>for finding the area of the circle $\pi \times 8 \times 8$ ( = 201.06..)<br><br>for finding the area of the sector<br>eg $\frac{1}{4} \times \pi \times 8^2$ **or** "201.06.." ÷ 4 (= 50.26...)<br><br>for an answer in the range 18.2 to 18.3 | Accept rounded or truncated figures<br><br><br><br><br><br>If the answer is given within the range but then rounded incorrectly award full marks. |

| | | | | | |
|---|---|---|---|---|---|
| 21 | (a) | 19.1 | M1 | for a method to find an estimate for the area of at least 1 trapezium under the curve<br>eg $0.5 \times 1 \times (4 + 6)$ or $0.5 \times 1 \times (6 + 7.2)$ or $0.5 \times 1 \times (7.2 + 7.8)$ | |
| | | | M1 | for a complete method<br>eg $0.5 \times 1 \times (4 + 6) + 0.5 \times 1 \times (6 + 7.2) + 0.5 \times 1 \times (7.2 + 7.8)$<br>or $0.5\{(4 + 7.8) + 2(6 + 7.2)\}$ | Allow a maximum of 2 errors in $y$ values used |
| | | | A1 | cao | Ignore any reference to units |
| | (b) | Statement | C1 | eg distance (travelled) | If units are given they must be correct |

Paper: 1MA1/1H

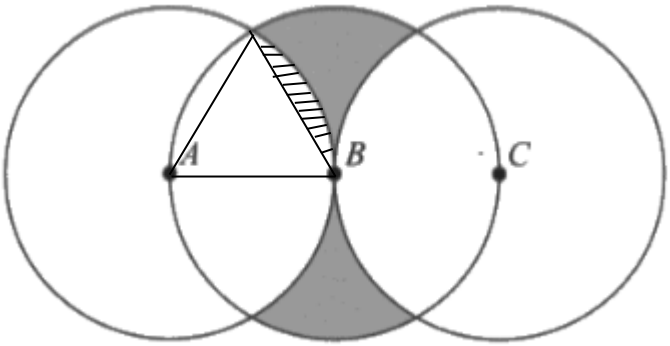
| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 13 | Relationship shown | M1 | for use of Pythagoras' theorem,<br>eg $d_A{}^2 = d_B{}^2 + d_C{}^2$ **or** $a^2 = b^2 + c^2$ **or** $(2x)^2 = (2y)^2 + (2z)^2$ **or** $a = \sqrt{b^2 + c^2}$<br>**or** uses a 3, 4, 5 triangle | May be seen at any stage<br>Where $d_A$, $a$, $2x$, etc are their diameters<br>Could be any Pythagorean triple |
| | | M1 | for forming correct expressions for the areas of at least 2 of the 3 semicircles,<br>eg at least two of $\frac{1}{2}\pi\left(\frac{a}{2}\right)^2$, $\frac{1}{2}\pi\left(\frac{b}{2}\right)^2$, $\frac{1}{2}\pi\left(\frac{c}{2}\right)^2$<br>or at least two of $\frac{1}{2}\pi x^2$, $\frac{1}{2}\pi y^2$, $\frac{1}{2}\pi z^2$<br>or at least two of $\frac{1}{2}\pi\left(\frac{5}{2}\right)^2$, $\frac{1}{2}\pi\left(\frac{3}{2}\right)^2$, $\frac{1}{2}\pi\left(\frac{4}{2}\right)^2$ | Where $a$, $b$, $c$ are their diameters<br>Where $2x$, $2y$, $2z$ are their diameters<br>Where 3, 4, 5 are their diameters |
| | | C1 | for a fully correct and convincing chain of reasoning, eg showing that<br>eg $\frac{1}{2}\pi\left(\frac{a}{2}\right)^2 = \frac{1}{2}\pi\left(\frac{b}{2}\right)^2 + \frac{1}{2}\pi\left(\frac{c}{2}\right)^2$ can be reduced to $a^2 = b^2 + c^2$<br>**or** that $(2x)^2 = (2y)^2 + (2z)^2$ is the same as $\frac{1}{2}\pi x^2 = \frac{1}{2}\pi y^2 + \frac{1}{2}\pi z^2$ | |

| | | | | |
|---|---|---|---|---|
| 14 (a) | 0.9 | M1 | for drawing a tangent at $t = 2$ | |
| | | M1 | for a complete method to find the gradient<br>eg tangent at $t = 2$ and "2.7" ÷ "3" | Use of change in $y$ over change in $x$<br>Working may be seen on the diagram |
| | | A1 | for answer in the range 0.7 to 1.1 | Accept answers in the form $\frac{a}{b}$ where $a$ and $b$ are integers |
| (b) | Statement | C1 | eg distance (travelled) | If units are given they must be correct |

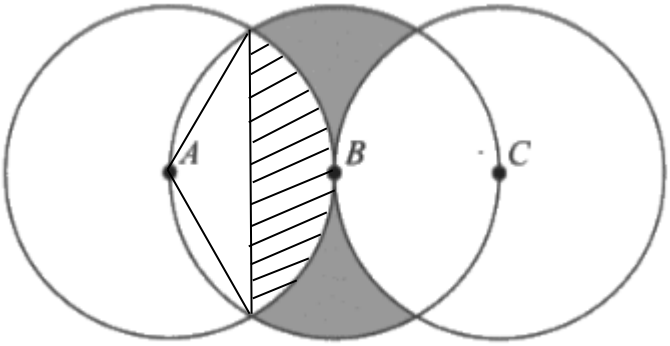
**Paper: 1MA1/1H**

Paper: 1MA1/1H

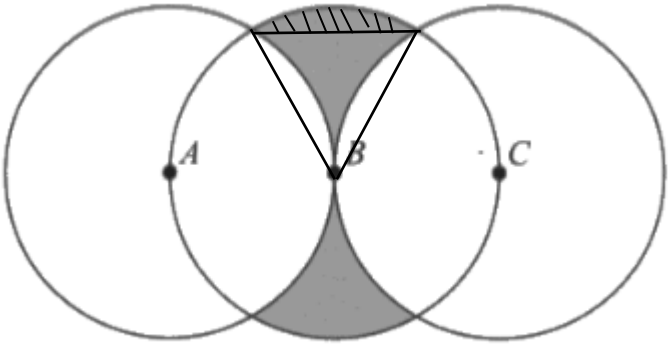
| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 21 | $16\sqrt{3}-\frac{16\pi}{3}$ | P1 | for identifying an angle of 60 or 120 | |
| | | P1 | for process to find the area of a sector of angle 60 or 120<br>eg $\pi 4^2\times\frac{60}{360}\left(=\frac{8\pi}{3}\right)$ or $\pi 4^2\times\frac{120}{360}\left(=\frac{16\pi}{3}\right)$ | |
| | | P1 | for process to find the area of an equilateral triangle<br>eg $\frac{1}{2}\times 4\times 4\times\sin 60\ (=4\sqrt{3})$ **or** $\frac{4\times\sqrt{4^2-2^2}}{2}\ (=2\sqrt{12}\text{ or }4\sqrt{3})$<br>**or** the area of an isosceles triangle **or** area of a right-angled triangle<br>eg $\frac{1}{2}\times 4\times 4\times\sin 120\ (=4\sqrt{3})$ **or** $\frac{2\times\sqrt{4^2-2^2}}{2}\ (=\sqrt{12}\text{ or }2\sqrt{3})$ | |
| | | P1 | for using area of sector – area of triangle to find area of a segment<br>eg $\pi 4^2\times\frac{60}{360}-\frac{1}{2}\times 4\times 4\times\sin 60\ \left(=\frac{8\pi}{3}-4\sqrt{3}\right)$<br>**or** $\pi 4^2\times\frac{120}{360}-\frac{1}{2}\times 4\times 4\times\sin 120\ \left(=\frac{16\pi}{3}-4\sqrt{3}\right)$ | |
| | | A1 | for $16\pi-4\left(\frac{16\pi}{6}-4\sqrt{3}+\frac{16\pi}{6}\right)$ or $16\sqrt{3}-\frac{16\pi}{3}$ oe | Does not need to be in simplest form |




area of segment = area of sector centre $A$ – area of equilateral triangle
Total shaded area = area of circle – 4 × area of sector – 4 × area of segment
**or** area of circle – 4 × area of triangle – 8 × area of segment




area of segment = area of sector centre $A$ – area of isosceles triangle
Total shaded area = area of circle – 4 × area of segment




area of segment = area of sector centre $B$ – area of equilateral triangle
Total shaded area = 2 × (area of sector – 2 × area of segment)
**or** 2 × (area of triangle – area of segment)

## Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 1H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 5 | | Wording added 'Look at the diagram for Question 5 in the Diagram Booklet. It shows a regular hexagon and a regular pentagon which share a common side.'.<br>Diagram enlarged. The angle moved outside of the angle arc and the angle arc made smaller.<br>For Braille the diagram has hexagon ABCDEF and pentagon GHICB with *x* outside the angle arc.<br>Wording now "The diagram is a regular hexagon, ABCDEF, and a regular pentagon, GHICB, joined at the common side, BC." "In the diagram, angle DCI is marked *x*." | Standard mark scheme |
| 6 | (a) | Wording added 'Complete the table below…'. The table turned vertical.<br>Wording added 'There are four spaces to fill.'<br>For Braille Add (i), (ii), (iii) & (iv) in the blank spaces and "Ans: (i) __ (ii) __ (iii) __ (iv) __" | Standard mark scheme |
| 6 | (b) | Wording added 'Look at the diagram for Question 6(b) in the Diagram Booklet. It shows a grid.'<br>Diagram enlarged. Open headed arrows. Small squares removed.<br>The axes labels moved to the top of the vertical axis and to the right of the horizontal axis. | Standard mark scheme |
| 7 | | Wording added 'Look at the diagram for Question 7 in the Diagram Booklet. It shows cube A and cube B.'<br>Wording added 'Cube A has sides of length 3 cm'; 'Cube B has sides of length 4 cm.'<br>Diagram enlarged. The diagrams relabelled as 'cube A' and 'cube B'.<br>Braille: have a model with the words "The models represent two cubes, A and B." | Standard mark scheme |
| 8 | | Wording added 'Look at the table for Question 8 in the Diagram Booklet. It shows…'.<br>The frequency column widened. | Standard mark scheme |

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 9 | | Wording added 'Look at the diagram for Question 9 in the Diagram Booklet. You may be provided with a model.'<br>Wording added 'A cube is placed on top of a cuboid, to form a solid, as shown by the diagram and the model.'<br>Diagram enlarged.<br>The dashed lines made longer and thicker. | Standard mark scheme |
| 10 | (a) | Wording added 'Look at the table for Question 10 in the Diagram Booklet. It shows…'.<br>The values changed so that the answers can be read on a grid line.<br>25 changed to 30. 30 changed to 15. 5 changed to 10. 15 changed to 20.<br>Wording added 'Complete the cumulative frequency table below.' 'There are six spaces to fill.' | B1 for 10, 25, 55, 70, 80, 100 |
| 10 | (b)<br>(c)<br>(d) | Wording added 'Look at the diagram for Question 10(b) in the Diagram Booklet. It shows a grid.<br>Diagram enlarged. Small squares removed. Open headed arrows. Right axis labelled.<br>The axes labels moved to the top of the vertical axis and to the left of the horizontal axis.<br>Intermediates added at intervals of 5 on the *y* axis. The grid cut at 300 on the *x* axis. | (b) Standard mark scheme<br>(c) B1 for answer of 40 **or** ft their graph (if possible)<br>(d) M1 for finding the difference between readings taken from the profit axis at points from a cf of 25 and a cf of 75 ft their graph (if possible)<br>A1 for answer in the range 120 to 130 **or** ft their graph (if possible) |
| 11 | | Wording added 'Look at the information for Question 11 in the Diagram Booklet. | Standard mark scheme |

| PAPER: 1MA1_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Mark scheme notes** |
| 13 | | Wording added 'Look at the diagram for Question 13 in the Diagram Booklet.'<br>Wording added 'three semicircular shaded'.<br>Diagram enlarged. The right angle made more obvious. Shading changed.<br>The regions labelled as 'region A', 'region B' and 'region C'. | Standard mark scheme |
| 14 | | Wording added 'Look at the diagram for Question 14 in the Diagram Booklet. It shows…'.<br>Diagram enlarged. Small squares removed. Open headed arrows. Right axis labelled.<br>The axes labels moved to the top of the vertical axis and to the left of the horizontal axis. | Standard mark scheme with leeway in part (a) |
| 21 | | Wording added 'Look at the diagram for Question 21 in the Diagram Booklet. It shows…'.<br>Diagram enlarged. Shading changed. Labels A, B and C moved to the left. | Standard mark scheme |

Paper: 1MA1/2H

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 4 (a) | 19 | P1 | for process to find area available at festival B,<br>eg 700 × 2000 (=1 400 000) | |
| | | P1 | for process to find the area available per person at one festival,<br>eg 80 000 ÷ 425 (= 188.23...) **or** [area] ÷ 6750 (= 207.40...) | Accept either number rounded eg 207 or 188 |
| | | P1 | for process to find the area available per person at both festivals,<br>eg 80 000 ÷ 425 (= 188.23...) **and** [area] ÷ 6750 (= 207.40...) | Accept either number rounded eg 207 or 188 |
| | | A1 | for an answer in the range 18.7 to 19.5 | |
| (b) | explanation | C1 | for a valid statement relating to scale factor for area,<br>**Acceptable examples**<br>There are 10000 ($cm^2$) in 1 ($m^2$)<br>Because 1 $m^2$ is the same as 100 × 100 = 10000 $cm^2$<br>There are 2 side lengths that change from 1 m to 100 cm<br>300 ÷ 3 is 100 should use $100^2$<br>300 ÷ 100 ÷ 100 = 0.03<br>3 × 100 × 100 = 30000<br>Because it's area not length.<br>Because it's in $m^2$ not just metres<br>He hasn't taken the squared sign into account<br>**Not acceptable examples**<br>There are 1000 cm in 1 m<br>Callum is correct because …….<br>300 ÷ 3 is 100<br>$3^2 = 9$<br>300 × 300 = 90000<br>You have to square the number | |

**Paper: 1MA1/2H**

Paper: 1MA1/3H

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 7 | Complete chain of reasoning | M1 | for (area of trapezium $TQRS$ =) $0.5 \times 4x \times (2x + 3x)$<br>or for (area of rectangle $TUVS$ =) $4x \times (3x + 5)$ $(= 12x^2 + 20x)$ | Evidence for the award of marks may be seen on the diagram |
| | | M1 | for (area of trapezium $QUVR$ =) $4x(3x + 5) - 0.5 \times 4x \times (2x + 3x)$ | Alternative methods may be seen. |
| | | C1 | for correct algebraic processing and simplification to the given form | |
| | | M1 | **Alternative 1**<br>for ($QU$ =) $3x + 5 - 2x$ $(= x + 5)$ | |
| | | M1 | for (area of trapezium $QUVR$ =) $0.5 \times 4x \times$ (("$x + 5$") + 5) or $0.5 \times 4x \times (x + 10)$ | |
| | | C1 | for correct algebraic processing and simplification to the given form | |
| | | M1 | **Alternative 2**<br>for (area of triangle =) $0.5 \times (3x - 2x) \times 4x$ or for (area of rectangle =) $4x \times 5$ | Accept $x$ for $(3x - 2x)$ |
| | | M1 | for (area of trapezium $QUVR$ =) "$0.5 \times (3x - 2x) \times 4x$" + "$4x \times 5$" | |
| | | C1 | for correct algebraic processing and simplification to the given form | |

**Paper: 1MA1/3H**

Paper: 1MA1/1H

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 7 | 1250 | P1 | for process to use area of base in the formula, eg $\frac{10000}{2\times 4}$ | |
| | | A1 | cao | |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 4 | 186.15 | P1 | for correctly finding the area of at least three sections,<br>eg 3 of<br>$11 \times 7$ (= 77), **or** $9 \times 7$ (= 63), **or** $\frac{1}{2} \times 11 \times 9$ (= 49.5), **or** $\frac{1}{4} \times \pi \times 7^2$ (= 38.4845..) | Note a trapezium for the rectangle and triangle should be classed as two areas.<br>Accept figures rounded or truncated to 1 dp or better throughout. |
| | | P1 | for a method to find the number of bags required for one area or a combination of areas<br>eg "77" ÷ 14 (= 5.5) **or** "227.9845.." ÷ 14 (= 16.2846…) | |
| | | P1 | for method to work out the total area for all four sections<br>eg "77" + "63" + "49.5" + "38.4845…" (= 227.9845…)<br>or adding the exact number of bags per section for all four sections<br>eg "5.5" + "4.5" + "3.53.." + "2.74.." (= 16.28...) | This mark is dependent upon correct processes seen for all four sections. |
| | | P1 | for method to find the cost, eg integer number of bags × 10.95 | integer number of bags must come from area ÷ 14 rounded up |
| | | A1 | cao | |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 5 | 1.25 | P1 | for finding an expression for the area of one shape,<br>eg $\frac{1}{2} \times 8 \times 6x$ (= $24x$) or $5(4x - 1)$ (= $20x - 5$) oe | Condone missing brackets for area of rectangle for all process marks |
| | | P1 | for finding an expression for the area of both shapes,<br>eg $\frac{1}{2} \times 8 \times 6x$ **and** $5(4x - 1)$ oe<br>**or** [area of triangle] – 10 or [area of rectangle] + 10 oe<br>or [area of triangle] – [area of rectangle] | |
| | | P1 | for writing a correct equation, eg $\frac{1}{2} \times 8 \times 6x = 5(4x - 1) + 10$ oe<br>**or** (dep on 1st P1)<br>eg, [area of triangle] – 10 = [area of rectangle]<br>or [area of triangle] = [area of rectangle] + 10<br>or [area of triangle] – [area of rectangle] = 10 | |
| | | A1 | for 1.25 oe | |

| | | | | |
|---|---|---|---|---|
| 12 | 40.2 | P1 | for start of process to find the diameter or the radius of the circle, eg $8^2+10^2(=d^2)$ oe or $4^2+5^2\ (=r^2)$ oe | |
| | | P1 | for complete process to find diameter, eg $\sqrt{8^2+10^2}$ (= 12.8...) or complete process to find radius, eg $\sqrt{4^2+5^2}$ (= 6.40...) | Accept $\sqrt{164}$ or $2\sqrt{41}$ or $\sqrt{41}$ |
| | | P1 | for process to find circumference, eg $\pi \times$ "12.8..." or $2\times\pi\times$ " 6.40..." | |
| | | A1 | answer in the range 40.2 to 40.24 | If an answer is given in the range in working and then rounded incorrectly award full marks. |

| Paper: 1MA1/2H |
| --- |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 24 | $4\left(2+\sqrt{2}\right)a^2$ | P1 | for process to find area required and identifying 135° or 45° or 90° angle(s), eg splitting shape into square and 4 triangles and an angle relevant to the triangle clearly identified. | 90° must be in a triangle to gain credit.<br>May be seen on diagram. |
| | | P1 | for process to find the area of a relevant triangle using 45°,<br>eg $\frac{1}{2}\times a\times\left(2\times\frac{a}{\sqrt{2}}\right)\times\frac{1}{\sqrt{2}}\left(=\frac{a^2}{2}\right)$<br>or using 90°, eg $\frac{1}{2}\times a\times a\left(=\frac{a^2}{2}\right)$<br>or process to find the area of a square made from 2 small triangles,<br>eg $a\times a\left(=a^2\right)$ | Accept $0.49...a^2$<br><br>May be seen as the area of 2 squares (from 4 small triangles) |
| | | P1 | for process to find the length of the square,<br>eg $a+a+\sqrt{a^2+a^2}\left(=2a+a\sqrt{2}\right)$ | Accept $3.41a$ |
| | | P1 | for process to find the total area,<br>eg $\left("2a+a\sqrt{2}"\right)^2+4\times"\frac{a^2}{2}"$ | Accept $(11.655+4\times0.49)\,a^2$ |
| | | A1 | (dep on P3) for $4\left(2+\sqrt{2}\right)a^2$ | Answer only award no marks.<br>If working in decimals accept $\frac{13.656}{2+\sqrt{2}}$ leading to 4<br>Accept $p=4$ if supported by correct working |

## Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| | | Modification | Mark scheme notes |
|---|---|---|---|
| 4 | (b) | Wording added 'Look at the diagram for Question 4(b) in the Diagram Booklet. It shows a number line'. Wording removed 'below'.<br>Diagram enlarged. Open headed arrow. Axis label moved to the right of the horizontal axis. | Standard mark scheme |
| 4 | (c) | Letter '$g$' changed to '$t$'. | Standard mark scheme but note letter change. |
| 5 | | Wording added 'Look at the diagram for Question 5 in the Diagram Booklet. It shows a triangle ABC and a rectangle PQRS.'<br>Wording removed 'Here is a triangle and a rectangle.' Triangle labelled ABC.<br>Rectangle labelled PQRS. Diagram enlarged. Diagrams stacked vertically.<br>Right angle made more obvious. Shape labels moved to the left and to above the rectangle.<br>Wording added 'In triangle ABC: AB is marked $6x$; BC is marked 8; Angle ABC is a right angle.<br>In rectangle PQRS: PQ is marked 5; PS is marked $4x - 1$' | Standard mark scheme |
| 7 | | Letter '$d$' changed to '$n$'. | Standard mark scheme but note letter change. |
| 9 | | Wording added 'Look at the diagram for Question 9 in the Diagram Booklet. It shows a grid.'<br>Wording added 'below' Table enlarged and left aligned.<br>Letter '$a$' changed to 'A'.<br>Values changed in the table: 48 changed to 50; 64 changed to 65<br>Wording removed 'opposite' and replaced with 'in the Diagram Booklet.'<br>Grid enlarged. No small squares. Black grid lines added. Open headed arrows. Right axis labelled.<br>Axes labels moved to the top of the vertical axis and to the left of the horizontal axis | (a) Standard mark scheme using the amended numbers n in the table.<br>(b) B1 for answer in the range 32.5 to 38.5 or ft their cf graph with a tolerance of ±2.5 (5 mm) |
| 10 | | Wording added 'Look at the table for Question 10 in the Diagram Booklet.'<br>Table enlarged and turned vertical. | Standard mark scheme |
| 12 | | Wording added 'Look at the diagram for Question 12 in the Diagram Booklet. It shows the'.<br>Wording removed 'The'; Wording removed 'lie'; Wording added 'the circumference of'.<br>Diagram enlarged. Cross changed to a solid dot. Wording 'BC' removed and replaced with 'AD'.<br>Labels moved to the left of the rectangle and inside the rectangle. | Standard mark scheme |

| | | Modification | Mark scheme notes |
|---|---|---|---|
| 13 | | Wording added 'Look at the diagram for Question 13 in the Diagram Booklet. It shows triangle ABC.'; Wording removed 'ABC is a triangle.'<br>Diagram enlarged and rotated so AC is horizontal.<br>Angle moved outside angle arc and angle arc made smaller.<br>Wording added 'AB = 15 cm; AC = 18 cm; Angle ABC = 70°' | Standard mark scheme |
| 16 | | Wording added 'Look at the diagram for Question 16 in the Diagram Booklet. It shows an incomplete histogram.'<br>Diagram enlarged.<br>Small squares removed.<br>Bar heights changed: 0-20 is now 3 cm high, 20-30 is now 7 cm high, 30-40 is now 6 cm high.<br>Open headed arrows. Shading changed. Right axis labelled.<br>Axes labels moved to the top of the vertical axis and to the left of the horizontal axis.<br>Value 28 changed to 30 and value 24 changed to 20.<br>(a) Wording added 'in the Diagram Booklet'. | (a) M1 for using area to represent frequency<br>eg 12 ($cm^2$) represents 30 (students) or showing a correct scale on fd axis<br>A1 Bar of height 2 cm drawn for interval 40 – 60 hours<br>(b) M1 for method to find total area under the histogram,<br>eg $(4 \times 3) + (2 \times 7) + (2 \times 6) + (4 \times 2)$ (= 46) oe<br>**or**<br>for method to find total frequency, eg 30 + 35 + 30 + 20 oe<br>A1 for 115 cao |
| 18 | | Letter '*a*' changed to '*p*'; Letter '*b*' changed to '*q*'; Letter '*c*' changed to '*r*'. | Standard mark scheme but note change of letters. |
| 19 | | Wording added 'Look at the diagram for Question 19 in the Diagram Booklet. It shows a right-angled triangle ABC.' Wording removed 'ABC is a right-angled triangle.'<br>Diagram enlarged. Right angle made more obvious.<br>Angle label moved outside angle arc and angle arc made smaller.<br>Wording added 'Angle ABC is a right angle. Angle ACB is marked *x*.' | Standard mark scheme |

| | | Modification | Mark scheme notes |
|---|---|---|---|
| 20 | | Wording added 'Look at the diagram for Question 20 in the Diagram Booklet. It shows a triangle ORT.' Wording removed 'ORT is a triangle.'<br>Diagram enlarged. Open headed arrows. Arrow heads enlarged.<br>Line at M changed to a solid circle. Dashed line added for MT. | Standard mark scheme |
| 21 | (a) | Wording removed 'Here is the graph of $y = f(x)$'. Diagram removed.<br>Wording added 'Look at the diagram for Question 21(a) in the Diagram Booklet. It shows the graph of $y = f(x)$' Wording 'grid below' removed and replaced with 'diagram'.<br>Axes labels moved to the top of the vertical axis and to the right of the horizontal axis.<br>Grid enlarged. $y = f(x)$ graph line added. | Standard mark scheme |
| 21 | (b) | Wording added 'Look at the diagram for Question 21(b) in the Diagram Booklet. It shows the graph of $y = f(x)$' Wording 'grid below' removed and replaced with 'diagram'.<br>Axes labels moved to the top of the vertical axis and to the right of the horizontal axis.<br>Grid enlarged. $y = f(x)$ graph line added. | Standard mark scheme |
| 23 | | Wording added 'Look at the diagram for Question 23 in the Diagram Booklet. It shows'.<br>Wording removed 'Here are'. Diagram enlarged. Arrow heads enlarged. | Standard mark scheme |
| 24 | | Wording added 'Look at the diagram for Question 24 in the Diagram Booklet. It'.<br>Wording removed 'The diagram'. Diagram enlarged. Shading changed. Letter '$a$' changed to '$t$'. | Standard mark scheme but note change of letters. |

| | | | | |
|---|---|---|---|---|
| 10 | $\frac{25}{\pi}$ | P1<br><br>P1<br><br>A1 | for showing $\pi d = 10$ **or** $2\pi r = 10$ **or** $r = \frac{10}{2\pi}$ **or** $d = \frac{10}{\pi}$<br><br>(dep P1) for using $r = \frac{5}{\pi}$ or $r = \frac{10}{2\pi}$ or $d = \frac{10}{\pi}$ in $\pi r^2$ eg $\pi \times \left(\frac{10}{2\pi}\right)^2$<br><br>oe | Need not be simplified but needs to show a single value of π |

| Paper: 1MA1/1H |
| --- |

| | | | | |
|---|---|---|---|---|
| 12 | 246 | P1 | for start of process to find angle inside sector<br>eg $\frac{x}{360} \times \pi \times 6.2^2 = 82.6$ or $\frac{82.6}{\pi \times 6.2^2} \times 360$<br><br>**or**<br><br>for an answer in the range 113 to 114 | The size of the angle in the unshaded sector is 114 |
| | | A1 | for answer in range 246 to 247 | If an answer is shown in the range in working and then incorrectly rounded award full marks. |

| Paper: 1MA1/3H |
| --- |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 15 | $15\pi$ | P2 | for process to find size of the angle<br>eg $\frac{5\pi \times 360}{2 \times \pi \times 6}$ oe (= 150)<br><br>or for working with proportion<br>eg $\frac{5\pi}{12\pi}$ (= $\frac{5}{12}$) or $\frac{12\pi}{5\pi}$ (= $\frac{12}{5}$) | |
| | | (P1 | for a first step eg $\frac{x}{360} \times 2 \times \pi \times 6 = 5\pi$) | |
| | | P1 | (dep on P2) for process to find the area<br>eg $\frac{"150"}{360} \times \pi \times 6^2$ **or** $\frac{5\pi}{12\pi} \times \pi \times 6^2$ | |
| | | A1 | cao | |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 8 | 35 | P1 | for one correct use of the given scale,<br>eg $40 \div 5$ (= 8)<br>**or** $28 \times 5^2$ (= 700) | Can award these marks in either order |
| | | P1 | for process to use area of triangle,<br>eg $28 = \frac{1}{2} \times PQ \times [QR]$<br>**or** $[\text{area}] = \frac{1}{2} \times PQ \times 40$ | [*QR*] must be clearly identified as the drawing length, and cannot be 40<br><br>[area] must be clearly identified as the real area, and cannot be 28 |
| | | A1 | cao | |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 8 | 4.5 | P1 | for process to find the area,<br>eg $80 = \frac{720}{A}$ **or** (area =) $\frac{720}{80}$ (= 9) **or** $80 = \frac{720}{2x}$ **or** $2x = \frac{720}{80}$ | |
| | | P1 | for complete process to find the length,<br>eg "9" ÷ 2 or 720 ÷ (2 × 80) | |
| | | A1 | for 4.5 oe | |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 7 | 240 | P1 | for forming an appropriate equation,<br>eg $2x + 11 = 4x - 4$ **or** $2x + 11 + 4x - 4 + 2x + 5 = 72$ **or** $8x + 12 = 72$ | |
| | | P1 | (dep P1) for process to isolate terms in $x$ for their equation,<br>eg $4x - 2x = 11 + 4$ **or** $2x + 4x + 2x = 72 - 11 + 4 - 5$ **or** $x = 7.5$ oe | $8x = 60$ **or** $2x = 15$ implies P2<br>A correct length stated or shown on diagram implies P2<br>Eg $AB = 20$, $AC = 26$, $CB = 26$<br>$[AC]$ $[BC]$ $[AB]$ $[ACB]$ $[CAB]$ and $[BAC]$ must be clearly identified if incorrect. May be on diagram. |
| | | P1 | for correct application of Pythagoras,<br>eg $("26")^2 - \left(\frac{"20"}{2}\right)^2$ **or**<br>$[AC]^2 - \left(\frac{[AB]}{2}\right)^2$ **or** height = 24<br>**or** a complete method to find the height<br><br>for a correct trig statement to find $CAB$ or $CBA$ or $ACB$, eg<br>$\cos CAB = \cos CBA = \frac{"20" \div 2}{"26"}$ **or**<br>$\cos CAB = \cos CBA = \frac{20^2 + 26^2 - 26^2}{2 \times 20 \times 26}$<br>**or** $\cos ACB = \frac{26^2 + 26^2 - 20^2}{2 \times 26 \times 26}$<br>**or** $CAB = 67.3\ldots$ **or** $CBA = 67.3\ldots$ **or** $ACB = 45.2\ldots$ | $AB = 2 \times "7.5" + 5 \ (= 20)$<br>$AC = 2 \times "7.5" + 11 \ (= 26)$<br>$CB = 4 \times "7.5" - 4 \ (= 26)$<br>Alternative scheme not expected on Foundation tier but may be seen. |
| | | P1 | for process to find area of triangle, eg "20" × "24" ÷ 2<br>**or** $[AB] \times [\text{height}] \div 2$<br><br>for process to find area of triangle, eg<br>$\frac{1}{2} \times "26" \times "20" \times \sin"67.3..."$<br>**or** $\frac{1}{2} \times "26" \times "26" \times \sin"45.2..."$<br>**or** $\frac{1}{2} \times [AB] \times [AC] \times \sin[BAC]$<br>**or** $\frac{1}{2} \times [BC] \times [AC] \times \sin[ACB]$ | ft incorrect figures providing at least one previous P1 awarded.<br>[height] is what they clearly think is the height of the triangle but not 26 or 20 or 10 |
| | | A1 | cao | |

| Paper: 1MA1/2H |
| --- |

| | | | | |
|---|---|---|---|---|
| 11 | 304 | P1<br><br><br><br><br><br>P1<br><br><br><br><br><br>A1 | for start of process to find the arc length<br>eg $34.3 - 2 \times 4.7$ (= 24.9)<br>**or** for forming a suitable equation<br>eg $\frac{\angle AOB}{360} \times \pi \times 2 \times 4.7 + 2 \times 4.7 = 34.3$<br><br>for process to isolate the arc length in an equation<br>eg $\frac{\angle AOB}{360} \times \pi \times 2 \times 4.7 = "24.9"$<br>**or** for complete process to find $AOB$<br>eg $\angle AOB = \frac{"24.9" \times 360}{\pi \times 2 \times 4.7}$<br><br>answer in the range 303 to 304 | Condone omission of the addition of 2 radii in the equation for this mark only<br>eg $\frac{\angle AOB}{360} \times \pi \times 2 \times 4.7 = 34.3$<br><br><br><br><br><br><br><br><br><br><br><br>If an answer is given in the range in working and then rounded incorrectly award full marks |

**Paper: 1MA1/3H**

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 13 | 18.9 | P1 | for using length scale factor to find *AB*,<br>eg (*AB* =) $10.8 \div \left(\frac{3}{2}\right)$ or (*AB* =) $10.8 \times \left(\frac{2}{3}\right)$ (= 7.2)<br>for using length scale factor to find *BC*,<br>eg (*BC* =) $10.8 \div \frac{6.3}{6.3-4.2}$ or (*BC* =) $10.8 \times \frac{6.3-4.2}{6.3}$ (= 3.6)<br>**or** finds area scale factor, eg $\left(\frac{3}{2}\right)^2$ or $\left(\frac{2}{3}\right)^2$ | Can use a combination of skills but must have a complete process to find *AB* or *BC* to score this mark |
| | | P1 | for a complete process to find the area of trapezium,<br>eg $\frac{6.3+4.2}{2} \times (10.8 - "7.2")$ or $\frac{(6.3-4.2) \times "3.6"}{2} + "3.6" \times 4.2$<br>or $\frac{10.8 \times 6.3}{2} - \frac{7.2 \times 4.2}{2}$<br>or $\frac{10.8 \times 6.3}{2} - \frac{10.8 \times 6.3}{2} \div \left("\frac{3}{2}"\right)^2$ or<br>$\frac{10.8 \times 6.3}{2} - \frac{10.8 \times 6.3}{2} \times \left("\frac{2}{3}"\right)^2$ | |
| | | A1 | accept trailing zeros eg 18.90 | |

| Paper: 1MA1/3H |
| --- |

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 3 (a) | 6 | P1 | for a process to find a relevant area, eg 16 × 14 ÷ 2 (= 112)<br>**or** $\pi \times \left(\frac{7}{2}\right)^2$ $(= 38.4...)$ | May be implied by $\frac{49}{4}\pi$ |
| | | P1 | for a process to find the shaded area,<br>eg "112" – "38.4..." (= 73.51...)<br>**or** "8.96" – "3.07…" (= 5.88…) | |
| | | P1 | for a complete process to find the number of bags required for a full or partial area, eg "73.51..." ÷ 12.5 (= 5.88...)<br>**or** "112" ÷ 12.5 (= 8.96) or "38.4…" ÷ 12.5 (= 3.07...)<br>**or** [area] ÷ 12.5<br>**or** uses12.5 in a build up method to exceed [area],<br>eg 12.5 × 6 (= 75) oe | [area] can be any area but cannot be a length. |
| | | A1 | cao | |
| (b) | Statement | C1 | for a valid statement relating to effect on number of bags needed, eg<br>**Acceptable examples**<br>Will need more bags<br>It will increase<br>Will need an extra bag or will now need 7 bags<br>He won't have enough<br>There is no change (ft their [area] but must be supported by calculation)<br><br>**Not acceptable examples**<br>Will cover less area<br>Needs to change the number of bags needed<br>There is no change (unsupported or incorrect ft their [area])<br>He may need more bags<br>A calculation using 11 with no supporting statement | |

| Paper: 1MA1/2H |
|---|

| Question | Answer | Mark | Mark scheme | Additional guidance |
|---|---|---|---|---|
| 8 | 44.9 | P1 | for process to find an expression for the area of the trapezium,<br>eg ½(12 + *CD*) 8 or 8 × 12 + ½ × 8 × *x*<br><br>**or** for process to find the area of the triangle,<br>eg 112 – 8 × 12 (= 16) | *x* is the length of the line from *C* to where perpendicular from *B* meets *CD*<br>Allow use of other letters in place of *CD* and *x* (do not have to be defined unless otherwise stated)<br>Award P1 for 112 – 8 × 12 (= 16) even if not used |
| | | P1 | for forming an equation and isolating terms in the unknown length,<br>eg 4*CD* = 112 – 48<br>**or** ½ × 8 × *x* = 112 – 8 × 12 **or** ½ × 8 × *x* = "16"<br>**or** *CD* = 16 **or** *x* = 4 | Award P2 for *CD* = 16 or *x* = 4 even if not used unless clearly from incorrect working eg 12 – 8 (= 4)<br>Only award P2 for 16 if it is clearly identified as *CD* |
| | | P1 | for start of process to find length of *BC*,<br>eg $8^2 + \text{"4"}^2$ (= 80) **or** $8^2 + [\text{their } x]^2$<br>**or** $\tan^{-1}\left(\frac{\text{"4"}}{8}\right)$ (= 26.5…) oe **or** $\tan^{-1}\left(\frac{8}{\text{"4"}}\right)$ (= 63.4…)<br>where "4" can be [their *x*] | [their *x*] can be any value less than 12 or clearly identified as the length of the line from *C* to where perpendicular from *B* meets *CD* (may be seen on the diagram) |
| | | P1 | for $\sqrt{8^2 + \text{"4"}^2}$ or $\sqrt{64 + \text{"16"}}$ or $\sqrt{80}$ or $4\sqrt{5}$ (= 8.9…) oe<br>or $\sqrt{8^2 + [\text{their } x]^2}$<br>**or** $\frac{\text{"4"}}{\sin\text{"26.5..."}}$ or $\frac{8}{\cos\text{"26.5..."}}$ or $\frac{8}{\sin\text{"63.4..."}}$<br>or $\frac{\text{"4"}}{\cos\text{"63.4..."}}$ where "4" can be [their *x*] | Award P4 for (*BC* =) $\sqrt{80}$ or $4\sqrt{5}$ or 8.9... unless *x* = 4 is clearly from incorrect working |
| | | A1 | for answer in the range 44.9 to 44.95 | If an answer is shown in the range in working and then incorrectly rounded award full marks |

**Paper: 1MA1/3H**

GCSE

# Mark Scheme

## Mathematics A (1387)

June 2003

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June 2003

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# NOTES ON MARKING PRINCIPLES

## NOTES ON MARKING PRINCIPLES

**1 Three types of mark are available**

M marks - awarded for correct working seen or implied.
A marks - conditional accuracy marks which are awarded for accurate working following the award of M marks.
B marks - unconditional accuracy marks (independent of M).

**2 Abbreviations**

cao - correct answer only.
ft - follow through.
√ - Denotes a "follow through" answer.

*SC* - special case.
isw - ignore subsequent working.
oe - or equivalent (and appropriate).
NB: a candidate cannot benefit from both isw and ft.

**3 If no working shown, then**

correct answers normally score full marks
incorrect (even though nearly correct) answers score no marks.

**4 Marking instructions**

Misread loses A marks (and sometimes B marks) on that part but ft can be allowed on subsequent parts. M marks can still be earned. If in doubt contact your team leader.
If there is a wrong answer in the answer space DO CHECK the working in the body of the script.

- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.
- If there is a wrong answer in the answer space DO CHECK the working in the body of the script.
- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.

**5 Style of marking**

Answer correct: tick and write part mark in margin NEXT TO BRACKETED MARK.
Answer incorrect: cross, but show M, A or B marks if any earned in body of script and transfer the total of these to the margin next to the bracket mark.
Total for each double page at bottom right page (except for back if used), FINAL TOTAL IN RELEVANT BOX ON FRONT COVER.
Nought in margin for fully incorrect question or page AND FOR NO ATTEMPT.
Where no attempt has been made a line should be put in the answer space and zero in the margin next to the bracketed mark
CHOICE OF METHOD – No marks unless one answer is in answer space – then mark that.
CROSSED OUT WORK - if not replaced this should be marked (if legible).
There must always be a mark next to bracketed mark in the margin/

**6 Follow Through Marks**

Follow throughs are guided by two principles:

(a) Follow throughs which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous, do not award.
(b) Follow throughs which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**7 Probability**

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least two decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

**8 Linear Equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

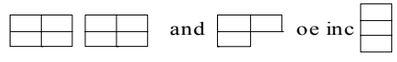
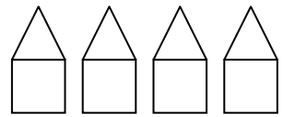
**9 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

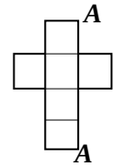
**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 (a) | | 46 | 1 | B1 cao |
| (b) | | 3.4 | 1 | B1 oe |
| (c) | | Arrow at 430 | 1 | B1 allow ± half graduation |
| (d) | | Arrow at 3.7 | 1 | B1 allow ± half graduation<br>Accept indications other than arrows as long as they are clear |
| 2 | | 1.60<br>2.05 | 2 | B1 ) Condone<br>B1 ) reversal |
| 3 (a) | $\frac{18}{24}$ or $\frac{9}{12}$ or $\frac{6}{8}$ | $\frac{3}{4}$ | 2 | B2 for $\frac{3}{4}$ cao<br>(B1 for $\frac{18}{24}$ or $\frac{9}{12}$ or $\frac{6}{8}$) SC B1 for $\frac{1}{4}$ only |
| (b) | | 16 squares shaded | 1 | B1 cao |
| 4 (a) | | line | 1 | B1 within overlay tolerance |
| (b) | | midpoint | 1 | B1 within overlay tolerance ft from (a) ± 0.2cm |
| (c) | | rectangle | 1 | B1 for rectangle 6 cm ± 0.2cm by 4 cm ± 0.2cm |
| 5 | | kilograms, kg<br>litre, *l* or cubic metres, $m^3$<br>inches, in | 3 | B1<br>B1<br>B1 |
| 6 (a) | | parallel lines marked | 1 | B1 |
| (b) | | right angle marked | 1 | B1 |
| (c)(i) | | acute | 1 | B1 |
| (ii) | | reflex | 1 | B1 |

**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 7 (i) | | sphere | 1 | B1 |
| (ii) | | cylinder | 1 | B1 Accept circular prism |
| (iii) | | pyramid | 1 | B1 Condone omission of "triangular" Accept tetrahedron |
| 8 (a)(i) | | 40 | 2 | B1 cao |
| (ii) | | 50 | | B1 cao |
| (b) | | 5 complete symbols | 1 | B1 cao |
| (c) | |  and  oe inc  | 1 | B1 |
| 9 (i) | | 9, 37, 56, 59, 75 | 5 | B1 cao |
| (ii) | | 0.067, 0.56, 0.6, 0.605, 0.65 | | B1 cao Ignore trailing zeros |
| (iii) | | –10, –6, –4, 2, 5 | | B1 cao |
| (iv) | | $\frac{2}{5}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ | | B2 for all 4 correct<br>(B1 for any 3 in correct order)<br>SC B1 for all 4 in reverse order (applies to(iv) only ) |
| 10 (a) | |  | 1 | B1 |
| (b) | | Plotting (4, 24) | 1 | B1 ft from their matchsticks |
| (c) | | 60 | 1 | B1 cao |
| (d) | | $m = 6n$ | 2 | B2 for $m = 6n$ oe<br>(B1 for $6n$ oe or $m$ = multiple of $n$ except $m = n$) |
| 11 (i) | | 6, 12 | 4 | B1 cao |
| (ii) | | 4, 16 | | B1 cao |
| (iii) | | 3, 4, 6 or 3, 4, 6, 12 | | B1 Condone omission of 12 |
| (iv) | | 8, 27 | | B1 cao |

**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 12 | | 2.43 | 4 | B1 for 36 or 0.36<br>B1 for 96 or 0.96<br>B1 for 125 or 1.25 If none of first 3 B1s awarded then<br>SC B1 for four 24s and five 25s seen OR 4 × 24 and 5 × 25 seen<br>B1 for 2.43 cao |
| 13 (a)(i) | | Edinburgh and Plymouth | 3 | B1 for Edinburgh or −7<br>B1 for Plymouth or 5 |
| (ii) | | 12 | | B1ft from (i) if one positive and one negative |
| (b) | | Cardiff and Belfast<br>London and Plymouth | 2 | B1 for Cardiff and Belfast OR −6 and −4<br>B1 for London and Plymouth OR 3 and 5 |
| 14 | | 5<br>9<br>8 | 3 | B1 cao<br>B1 cao<br>B1 cao |
| 15 (a) | |  | 2 | ✓ × : 2 0 B2; 1 0 B1; 1 1 B1; 2 1 B1 |
| (b) | $2 \times 2 \times 2$ | 8 | 2 | M1 for $2 \times 2 \times 2$<br>A1 for 8 cao |
| 16 (a) | | 30 | 1 | B1 cao |
| (b) | | 3 | 1 | B1 cao |
| (c) | $2 \times 29 = 58$<br>$5 \times 30 = 150$<br>$2 \times 31 = 62$<br>$1 \times 32 = 32$<br>$\frac{302}{10} = 30.2$ | 30.2 | 3 | M1 for freq × no pins<br>M1 (dep on 1st M1) for totalling and ÷ 10<br>A1 for 30.2 cao |

**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 17 | | 7<br>5<br>5 13 33<br>52 23 | 3 | B3 all correct<br>(B2 for 4, 5 or 6 correct<br>B1 for 2 or 3 correct) |
| 18 (a)(i)<br>(ii)<br>(iii)<br>(iv)<br>(b) | | $4c$<br>$p^4$<br>$8g$<br>$10pr$ OR $10rp$<br>$10y - 15$ | 4<br><br><br><br>1 | B1 oe<br>B1 cao<br>B1 oe<br>B1<br>B1 cao Accept $10y + - 15$ |
| 19 | | $\frac{2}{3}$ | 3 | M1 for 3 rows (9 squares) shaded<br>M1 for 2 columns (10 squares) shaded<br>A1 for $\frac{2}{3}$ |
| | $\frac{3}{5} = \frac{9}{15}$<br>$\frac{2}{3} = \frac{10}{15}$ | $\frac{2}{3}$ | 3 | M1 for $\frac{3}{5} = \frac{9}{15}$<br>M1 for $\frac{2}{3} = \frac{10}{15}$<br>A1 for $\frac{2}{3}$ |
| | $\frac{3}{5} = 0.6$<br>$\frac{2}{3} = 0.66$ or $0.67$ or better | $\frac{2}{3}$ | 3 | M1 for $\frac{3}{5} = 0.6$ ) Accept<br>M1 for $\frac{2}{3} = 0.66$ or $0.67$ or better ) percentages<br>A1 for $\frac{2}{3}$ |

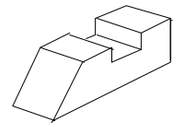
**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 20 (a) | 955 × 48<br>7640<br>38200<br>45840<br>OR<br>48 × 955<br>240<br>2400<br>43200<br>45840 | 458.40 | 3 | M1 for complete correct method (condone one computational error)<br>A2 for 458.40 cao<br>(A1 for digits 4584 OR ft if M1 awarded) |
| (b) | 14. 5<br>48 \| 696. 0<br>48<br>216<br>192<br>24 0<br>24 0 | 14.50 | 3 | M1 for 1 as first digit in answer and remainder 21<br>M1 (dep) 4 as second digit in answer<br>A1 for 14.50 (Accept 14.5) |
| 21 (a) | | $12x$ | 1 | B1 oe |
| (b) | | $12x + 10y$ | 2 | B2 oe ft from (a)<br>(B1 $12x$ + multiple of $y$ or $10y$ seen)<br>SC B1 for $x = 12x + 10y$ OR $y = 12x + 10y$ |

**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 22 | $\frac{1}{3}+\frac{1}{4}=\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$<br>$1-\frac{7}{12}=\frac{5}{12}$ | $\frac{5}{12}$ | 3 | M1 for $\frac{4}{12}$ **and** $\frac{3}{12}$ oe<br>A2 for $\frac{5}{12}$ oe<br>(A1 for $\frac{7}{12}$)<br>B1 for 1–"$\left(\frac{1}{3}+\frac{1}{4}\right)$" correctly evaluated |
| | $1-\frac{1}{3}=\frac{2}{3}$ , $1-\frac{1}{4}=\frac{3}{4}$<br>$\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$ or $\frac{9}{12}-\frac{4}{12}=\frac{5}{12}$ | $\frac{5}{12}$ | 3 | B1 for $\frac{2}{3}$ or $\frac{3}{4}$ seen<br>M1 for $\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$ or $\frac{9}{12}-\frac{4}{12}=\frac{5}{12}$<br>A1 for $\frac{5}{12}$ oe |
| | | $\frac{5}{12}$ | 3 | M1 for 0.25 and 0.33 or better<br>A1 for 0.58 or better<br>A1 for $0.41\dot{6}$ or recurring |
| 23 (a)<br>(b)(i)<br><br>(ii) | <br>180 – (54 + 54) | 54<br>72<br><br>Reason | 1<br>3 | B1 cao<br>M1 for 180 – (54 + 54)<br>A1 ft from (a) if $x < 90$<br>B1 for mentioning<br>isosceles and equal or base angles<br>or<br>equal sides and equal or base angles |

**Paper 5501**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 24 (a) | | Bryani | 2 | M1 for $4 \times 9$ or $4 \times 3 \times 3$ or $4 \times x \times x$ or square $x$ first or square 3 first<br>A1<br>SC $4 \times 3^2$ with Bryani scores B2 |
| (b) | | 64 | 1 | B1 cao |
| 25 (a) | |  dotted line may be solid | 3 | B2 for rectangle base 3 squares and height 4 squares<br>(B1 for rectangle with one correct dimension)<br>B1 for horizontal line 1 cm from top)<br>SC B2 for completely correct elevation on its side |
| (b) | |  | 2 | B2 for perspective drawing showing slant face and cutout<br>B1 for perspective drawing with either slant face cutout omitted |
| 26 (a) | $20 \times 2$ or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$ | 40 | 2 | M1 for $20 \times 2$ or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$<br>A1 cao |
| (b) | $\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes | line from (45, 20) to (65, 0) | 2 | M1 for $\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes seen<br>A1 for correct line<br>SC If M0, B1 for line from (45, 20) to ($t$, 0) where $t > 45$ or B1 for a line of the correct gradient. |

**Paper 5502**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 (a) | | $\frac{7}{100}$ | 1 | B1 cao accept 0.07 |
| (b) | | 0.18 | 1 | B1 cao |
| (c) | 20 in 100 oe | 40 | 2 | M1 for sight of 20 in 100 or 20 × 2<br>A1 cao |
| 2 (a) | | 6cm | 2 | B1 for 6 ± 0.2 or 60 ± 2<br>B1 indep for cm or mm consistent with 1st B1 |
| (b) | | At centre | 1 | B1 within overlay |
| (c) | | Circle drawn | 1 | B1 all within overlay |
| 3 | | See diagram | 3 | B3 all correct – see separate sheet<br>(B2 for 3 correct<br>B1 for 2 correct) |
| 4 (a) | | $\frac{1}{4}$ oe | 1 | B1 cao |
| (b) | | 0.75 | 1 | B1 cao |
| (c) | | 75% | 1 | B1 cao |
| (d)(i) | | 9 | 2 | B1 accept answer in range 9 - 9.2 |
| (ii) | | 15 - 16 | | B1 accept answers in range15 - 16 |
| 5 (a) | | 9:30 | 1 | B1 cao |
| (b) | | 2hrs 45 min | 2 | B2 for 2hr 45 min or 2 $\frac{3}{4}$ hr or 165 minutes<br>B1 2:45 or 2.45 or 165 or 45min + 1hr + 1hr oe |
| (c) | | 17 | 1 | B1 cao |
| 6 (a) | 96 × 4 | 3.84 | 2 | M1 for 96 × 4 or digits 384<br>A1 cao |
| (b) | 3 × 96 + 40 = 328 | (0).56 | 2 | M1 for 3 × 96 + 40 or digits 328 or digits 56<br>A1 cao accept 56p |

**Paper 5502**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 7 (a) | | 54 000 | 1 | B1 cao accept 54 thousand |
| (b) | | 50 000 | 1 | B1 (accept ten thousand or 10 000) oe |
| 8 (a) | | 14 | 1 | B1 cao |
| (b) | | 6 | 1 | B1 cao |
| (c) | | Correct reflection | 2 | B2 fully correct<br>(B1 correct reflection in a line parallel to the mirror line or condoning 1 block error in shape or position of shape) |
| 9 (a) | | Missing horiz label<br>1 (and 6) missing on vertical scale | 2 | B1<br>B1 |
| (b) | | Correct graph | 2 | B1 for bar up to 4 for yellow<br>B1 for bar up to 2 for green |
| (c) | | Blue | 1 | B1 cao |
| (d) | 3 + 5 + 4 + 2 | 14 | 1 | B1 ft from (b) |
| (e) | | $\frac{3}{14}$ | 1 | B1 ft on '14' |
| 10 | Barry (8) because you double<br>Kath (7) because you add, 1,2,3 | | 2 | B1 oe<br>B1 oe<br>SC: B1 for correct rules only |
| 11 (a) | | $2n$ | 1 | B1 for $2n$ or $n + n$ OR $2 \times n$ OR $n \times 2$ OR $n2$ |
| (b) | | $2n + 15$ | 1 | B1 for "$2n$" + 15 oe |
| (c) | | 20q | 1 | B1 cao |
| 12 (a) | 1 + 3 + 5 + 8 + 5 | 22 | 2 | M1 add frequencies<br>A1 cao |
| (b) | | No, is>no of cups of coffee in the table | 1 | B1 'average cannot be bigger than 6' oe OR 'Average must be less than 6 oe' |
| 13 (a) | | Trapezium | 1 | B1 cao ignore spelling |
| (b) | | (2, 3) | 1 | B1 cao |
| (c) | | Isosceles | 1 | B1 cao ignore spelling |
| (d) | | $Q$ correct | 1 | B1 cao |

**Paper 5502**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 14 (a) | | 250 000 | 1 | B1 cao |
| (b) | $\frac{28}{4}$ | 7 | 2 | M1 for $\frac{28}{4}$ oe or "250000" × 28<br>A1 cao<br>**SC** B1 for 7 000 000 |
| 15 (a) | | 10 | 1 | B1 cao |
| (b) | | 5.5 | 1 | B1 ±0.3 pounds |
| (c) | $\frac{110}{22}$ | 50 | 3 | M1 for use of graph at 11 or $\frac{110}{22}$<br>A1 for 5<br>A1 cao<br>**SC** B2 for 49.5 – 50.6 |

**Paper 5502**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 16 (a) | $269.30 - 56.80 = 212.50$<br>$\frac{212.50}{42.50}$ | 6 | 2 | M1 for $\frac{269.30 - 56.80}{42.50}$ or 5 seen<br>A1 cao |
| (b) | 5% of £269.30<br>£269.30 – "£13.465"<br><br>OR $\frac{95}{100} \times 269.30$ | 255.83 or 255.84 | 3 | M1 for $(5 \div 100) \times 269.30$<br>M1 for $269.30 - $ "13.465"<br>A1 cao<br>OR M2 for $\frac{95}{100} \times 269.30$<br>A1 cao<br>**Alternative Method:**<br>M1 for $\frac{5}{100} \times 56.80$ $(= 2.84)$<br>and $\frac{5}{100} \times 42.50$ (=2.12(5))<br>(OR 53.96 AND 40.38 (40.375) seen<br><br>M1 for $56.80 -$ "2.84" (= 53.96)<br>$42.50 -$ "2.12(5)" ( = 40.375 or 40.38)<br>"5" × "40.375" + "53.96"<br>A1 cao |
| 17 | $4.1^2 \times 1.07 = 16.81 \times 1.07$ | 17.9867 | 2 | M1 for ("4.1") followed by squaring, or sight of 16.81<br>A1 cao<br>SC: *B1 for 18 or better with no working* |
| 18 (a) | | 60 | 1 | B1 cao |
| (b) | $360 - 60 - 90 - 90$ | 120 | 2 | M1 for $360 -$ " 60 " $- 90 - 90$ or $180 -$ "60"<br>A1 cao |
| (c) | $6 \times 2$ | 12 | 2 | M1 for $6 \times 2$<br>A1 cao for 12 |

**Paper 5502**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 19 (a)(i) | $240 \times 5 = 1200$ | 1250 | 3 | B1 cao 1250 |
| (ii) | $\frac{50}{'1250'}$ | $\frac{1}{25}$ | | M1 cao $\frac{50}{'1250'}$<br>A1 for $\frac{1}{25}$ in its simplest form |
| (b) | $\frac{60}{100} \times 1000 = 600$ | 12:5 | 3 | M1 for $\frac{60}{100} \times 1000$ oe<br>A1 for 600<br>A1 cao |
| 20 (a) | | $x + 2$ | 1 | B1 accept $2 + x$ but not $x = x + 2$ |
| (b) | $x + 5 + x + 5 + x + 2 + x + 2$ | $4x + 14$ | 2 | M1 adding 4 sides, two of which are '$x + 2$' (all sides to be linear expressions in $x$)<br>**SC** $x + 5 + x + 2 \times 2$ gets M1<br>A1 for correct simplified answer or $(20 - 14) \div 4$ oe gets M1 |
| (c) | '$4x + 14$' = 20 | 1.5 oe | 2 | M1 for equation<br>A1 cao |
| 21 | $\sum f = 90$ | Angles drawn, labelled | 3 | M1 for 1 person = 4°or one angle correct in table or pie chart<br>A1 any 2 correctly drawn angles in pie chart<br>A1 fully correct chart labelled |
| 22 (a) | | $2p - q$ | 2 | B1 cao for $2p$<br>B1 cao for $-q$ accept $(-q + 2p)$, $2p - 1q$ and $2p + -q$ |
| (b) | $5x = 3 + 4$ | 1.4 | 2 | M1 for either (+3 or sight of 7) or (÷ 5 or sight of 0.8 and 0.6)<br>A1 cao accept $\frac{7}{5}$ or $1\frac{2}{5}$ |

**Paper 5502**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 23 (a) | | $\frac{4\times5}{2}$ | 1 | B1 cao |
| (b) | $1+2+3+4+5+6+7+8$ | $\frac{8\times9}{2}$ | 1 | B1 cao |
| (c) | $\frac{100\times101}{2}$ | 5050 | 1 | B1 cao |
| 24 | 0 \| 5 7 8 8<br>1 \| 0 0 0 0 2 5 5 5 6<br>2 \| 0 0 0 4 5<br>3 \| 3 5<br><br>Key 1 \| 2 = 12 (min) | See working | 3 | B1 for stem 0, 1, 2, 3 or 0, 10, 20, 30<br>B1 for accurate unordered leaves condone 1 error or omission<br>B1 for key and ordered leaves all correct |
| 25 | $3.2\times2.8=8.96$<br>$2\times4.5\times2.8=25.2$<br>$2\times4.5\times28.8=28.8$<br>$\frac{62.96}{2.5}\times2.99$ | £75.30 | 5 | M1 for area of any face found correctly<br>M1 for 2 areas found correctly<br>A1 for 62.96 or 54<br>M1 for $\frac{'62.96'}{2.5}\times2.99$<br>Al cao<br>Alternate method for candidates who round up $\frac{"62.92"}{2.5}$<br>M1 for "26" × 2.99<br>A1 for £77.74 cao<br>**SC**: *for top included B2 for 71.92 $m^2$ seen or*<br>B3 for £86.02 seen<br>**SC** B4 for £64.58 or £65.78 seen |
| 26 | $2.5\times10\,000$ | 25 000 | 2 | M1 for $2.5\times100\times100$<br>A1 cao |

**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 (a)(i) | | $8g$ | 2 | B1 oe |
| (ii) | | $10rp$ | | B1 for $10pr$ or $10\ rp$ |
| (b) | | $10y - 15$ | 1 | B1 cao accept $10y$ - + 15 |
| (c) | $6x + 8 - 12x + 15$ | $-6x + 23$ | 2 | M1 for 3 correct terms out of 4<br>A1 cao |
| 2 | | $m = 6n$ | 2 | B2 for $m = 6n$ oe accept $6 \times n$, $n$ 6<br>(B1 for $6n$ alone, or $6n$ +1 oe OR m = multiple of $n$ except $m = n$) |
| 3 (i) | | 0.067, 0.56, 0.6, 0.605, 0.65 | 1 | B1 cao Ignore trailing zeros |
| (ii) | | −10, −6, −4, 2, 5 | 1 | B1 cao |
| (iii) | | $\frac{2}{5}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ | 2 | B2 all four correct<br>(B1 any three in correct order)<br>SC: B1 all 4 in reverse order |
| 4 | | 7<br>5<br>5 13 33<br>52 23 | 3 | B3 all correct<br>(B2 for 4, 5 or 6 correct entries)<br>(B1 for 2, 3 correct entries) |

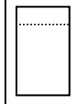
**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 5 | | $\frac{2}{3}$ | 3 | M1 for 3 rows (9 squares) shaded<br>M1 for 2 columns (10 squares) shaded<br>A1 |
| | OR<br>$\frac{3}{5} = \frac{9}{15}$<br>$\frac{2}{3} = \frac{10}{15}$<br>Therefore $\frac{2}{3} > \frac{3}{5}$ | $\frac{2}{3}$ | | M1 for $\frac{3}{5} = \frac{9}{15}$<br>M1 for $\frac{2}{3} = \frac{10}{15}$<br>A1 |
| | OR<br>$\frac{3}{5} = 0.6$ or percent<br>$\frac{2}{3} = 0.66$ or 0.67 or better<br>Therefore $\frac{2}{3} > \frac{3}{5}$ | $\frac{2}{3}$ | | M1 for $\frac{3}{5} = 0.6$ or percent<br>M1 for $\frac{2}{3} = 0.66$ or 0.67 or better<br>A1 |
| 6 | $2 \times 29 = 58$<br>$5 \times 30 = 150$<br>$2 \times 31 = 62$<br>$1 \times 32 = 32$<br>$\frac{302}{10} = 30.2$ | 30.2 | 3 | M1 for freq × no. pins (at least 3)<br>M1 for totalling and for ÷ 10<br>(dep on 1st M1)<br>A1 cao |
| 7 (a) | | | 2 | B1 for 180° rotation (wrong centre)<br>B1 cao |
| (b) | | | 3 | B1 for any enlargement sf other than 1<br>B1 for all sides halved<br>B1 for position |

**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 8 (a) | | $12x$ | 1 | B1 oe |
| (b) | | $12x + 10y$ | 2 | B2 oe or ft from (a)<br>(B1 for $12x$ + a multiple of $y$ or $10y$ seen)<br>**SC** B1 for $x = 12x + 10y$ or $y = 12x + 10y$ |
| 9 | $\frac{1}{3}+\frac{1}{4}=\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$<br><br>$1-\frac{7}{12}=\frac{5}{12}$<br>OR<br>$1-\frac{1}{3}=\frac{2}{3}, 1-\frac{1}{4}=\frac{3}{4}$<br>$\frac{9}{12}-\frac{4}{12}=\frac{5}{12}, \frac{8}{12}-\frac{3}{12}=\frac{5}{12}$ | $\frac{5}{12}$ | 3 | M1 for $\frac{4}{12}$ and $\frac{3}{12}$ oe<br>A2 for $\frac{5}{12}$ oe<br>(A1 for getting $\frac{7}{12}$)<br>(B1 for $1 - \frac{"1}{3} + \frac{1"}{4}$ correctly evaluated)<br>OR<br>B1 for $\frac{2}{3}$ or $\frac{3}{4}$ seen<br>M1 for $\frac{3}{4}-\frac{1}{3}=\frac{9}{12}-\frac{4}{12}$ or $\frac{2}{3}-\frac{1}{4}=\frac{8}{12}-\frac{3}{12}$<br>A1 for $\frac{5}{12}$ oe<br>OR<br>M1 0.25 and 0.33 or better<br>A1 for 0.58 or better<br>A1 for 0.416 *recurring* |
| 10 (a) | | 54 | 1 | B1 cao |
| (b)(i) | 180 – (54 +54) | 72 | 3 | M1 for 180 – (“54” + “54”)<br>A1 for 72° ft from (a) if $x < 90°$ |
| (ii) | | | | B1 for mentioning isosceles and equal or base angles or equal sides and equal or base angles |

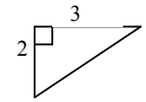
**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 11 (a) | Bryani was correct<br>$4 \times 3^2 = 4 \times 9 = 36$ | Bryani | 2 | M1 for $4 \times 9$ or $4 \times 3 \times 3$ or "square the three/$x$ then multiply by four"<br>A1 Bryani<br>**SC** $4 \times 3^2$ with Bryani gets B2 |
| (b) | | | 1 | B1 cao |
| 12 (a) | |  | 3 | B2 for rectangle height 4 squares, base 3 squares<br>(B1 for rectangle with one correct dimension)<br>B1for line 1 square from the top<br>**SC** B2 for completely correct elevation on its side |
| (b) | | | 2 | B2 for perspective drawing showing slant face and cut out<br>(B1 for perspective drawing with either slant face or cut out omitted or one aspect incorrect) |
| 13 (a) | $20 \times 2$ or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$ | 40 | 2 | M1 for $20 \times 2$ or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$<br>A1 cao |
| (b) | $\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes seen | Line from<br>(45, 20) to (65, 0) | 2 | M1 for $\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes seen<br>A1 for correct line<br>**SC** If M0, B1 for line from (45, 20) to ($t$, 0) where $t > 45$ or a line of the correct gradient |
| 14 (i) | | 119.31 | 3 | B1 cao |
| (ii) | | 119 310 | | B1 cao |
| (iii) | | 1.23 | | B1 cao |

**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 15 | $\frac{10}{100}\times 12000$<br>12 000 – 1200 = 10 800<br>$\frac{10800}{10}=1080$<br>10 800 – 1080 = £9720 | £9720 | 3 | M1 for $\frac{10}{100}\times 12000$ or sight of 1200 or 2400 or 10 800 or 9600<br>M1 (dep) for $\frac{10}{100}\times(12\,000-\frac{10}{100}\times 12000)$ or sight of 1080<br>A1 cao<br>Alternative mark scheme<br>M2 for $12000\times(1-\frac{10}{100})^2$<br>(M1 for $12000\times(1-\frac{10}{100})$<br>A1 cao |
| 16 (a) | $2p = 6$ | $p = 3$ | 2 | M1 for $7p - 5p = 8 - 2$ or $2p$ or 6<br>A1 cao |
| (b) | $7r - 5r = -20 - 2$ | $-11$ | 2 | M1 for $7r + 2 = 5r - 20$ or $\frac{7r}{5} + \frac{2}{5} = r - 4$ or $7r - 5r = 20 - 2$ or $\frac{7r}{5} - r = -4 - \frac{2}{5}$<br>A1 cao |
| 17 | | $5n + 1$ | 2 | B2 oe<br>(B1 for $5n$ seen)<br>NB: $n$ = gets B1 max |

**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 18 (a) | –1, 0, 1 | | 2 | B2 for –1, 0, 1<br>(B1 for –1, 0 or 0,1 or –1,1 or –2, -1, 0, 1 only) |
| (b) | (–1, –1), (0, –1), (1, –1), (0, 0), (1, 0), (1, 1) | | 3 | B3 for 6 points correct<br>B2 for 3 points correct<br>B1 for 1 point correct<br>**NB** –B1 each additional point over six |
| 19 (a) | Triangle with vertices at (0,0) (0,–2) and (3,0) | | 2 | M1 for correct orientation<br>A1 cao<br><br> |
| (b) | Rotation, 180°, centre (0,1)<br>Enlargement sf - 1 centre (0,1) | | 2 | B2 for 180° 'rotation' centre (0, 1)<br>B2 for Enlargement sf - 1 centre (0,1)<br>(B1 for any two of the three parts)<br>NB: B0 if additional transformation is included |
| 20 | Bisector of $\angle BAC$<br>Arc around $A$<br>Region | | 3 | B3 cao<br>(B2 for either two correct boundaries, no shading/ wrong shading or one correct boundary, one incorrect boundary with valid shading)<br>(B1 for either two incorrect boundaries but one drawn from $A$ and one intersection, with valid shading or one correct boundary)<br>Ignore shading outside the triangle |
| 21 | | Length<br>Volume<br>Area | 3 | B1 for Length<br>B1 for Volume<br>B1 for Area |
| 22 (a) | Unbiased question with choices | | 2 | B1 for unbiased question<br>B1 for at least 2 choices |
| (b) | | | 2 | Classification 1: A biased question<br>Classification 2: A restricted sample of people<br>Classification 3: Not specifying a range of foods<br>Classification 4: Nothing to do with eating habits<br>B2 reasons which satisfy 2 different classifications<br>(B1 a reason which satisfies one classification) |

**Paper 5503**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 23 (a) | $6 \times 10^2 \times 8 \times 10^4$<br>$48 \times 10^6$ | $4.8 \times 10^7$ | 3 | M1 for $6 \times 10^a \times 8 \times 10^b$ oe, $a$ and $b$ integers including 0<br>A1 for $48 \times 10^6$ oe<br>A1 cao |
| (b) | 200 000 + 30 000 | 230000 | 2 | B2 cao<br>(B1 for sight of 200 000 or 30 000 or $2.3 \times 10^5$ or $23 \times 10^4$) |
| 24 (i) | | 64 | 4 | B1 cao |
| (ii) | | 3 | | B1 cao |
| (iii) | $\sqrt{16 \times 9} = \sqrt{144}$ | 12 | | B2 cao<br>(B1 for sight of $\sqrt{2^4} \times \sqrt{9}$ or better, or 144 seen) |
| 25 (i) | Tangent 90° to diameter /radius/ line from (through) centre | 27° | 4 | B1 for 27° cao<br>B1 for reason |
| (ii) | 180 –(90+ "27")<br>angle in semicircle (is 90°)/Alternate segments /angle at centre twice at circumference | 63° | | B1 ft for 90–"27" if not 63°<br>B1 for reason |
| 26 (a)(i) | | 152 | 2 | B1 cao |
| (ii) | | 177 | | B1 cao |
| (b) | | | 3 | B1 for median marked at 167<br>B1 ft for postion of box with its ends at "152" and "177"<br>B1 for position of whiskers with ends at 132 and 182<br>NB: For any points plotted between 141 and 149 give a tolerance of an extra ± 1 square |
| 27 | $x^2 + xy + xy + y^2$ | $x^2 + 2xy + y^2$ | 2 | M1 for at least 3 of the 4 terms correct<br>A1 cao |
| | | 25 | 2 | M1 for recognising 3.47 + 1.53 (= 5)<br>A1 cao |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 (a) | $4.1^2 \times 1.07 = 16.81 \times 1.07$ | 17.9867 | 2 | M1 for (4.1) followed by squaring, or sight of 16.81<br>A1 cao<br>SC: B1 for 18 or better with no working |
| (b) | | $(1.6 + 3.8 \times 2.4) \times 4.2$ | 1 | B1 cao<br>Allow additional brackets if they give an expression with value 45.024 |
| 2 (a) | 269.30 – 56.80 = 212.50 | 6 | 2 | M1 for $\frac{269.30 - 56.80}{42.50}$ or 5 seen<br>A1 cao |
| (b) | 5% of £269.30<br>£269.30 – "£13.465"<br><br>OR $\frac{95}{100} \times 269.30$ | 255.83 or 255.84 | 3 | M1 for (5 ÷ 100) × 269.30<br>M1 (dep) for 269.30 – "13.465"<br>A1 cao<br>OR M2 for $\frac{95}{100} \times 269.30$<br>A1 cao<br>**Alternative Method:**<br>M1 for $\frac{5}{100} \times 56.80$ (= 2.84)<br>and $\frac{5}{100} \times 42.50$ (=2.12(5))<br>(OR 53.96 AND 40.38 (40.375) seen<br><br>M1 for 56.80 – "2.84" (= 53.96)<br>42.50 – "2.12(5)" ( = 40.375 or 40.38)<br>"5" × "40.375" + "53.96"<br>A1 cao |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 3 (a) | | 60 | 1 | B1 cao |
| (b) | 360 – 60 – 90 – 90 | 120 | 2 | M1 for 360 – "60" – 90 – 90 or 180 – "60"<br>A1 cao |
| (c) | 6 × 2 | 12 | 2 | M1 for 6 × 2<br>A1 cao 12 |
| (d) | | Correct drawing | 2 | B2 for triangle and construction lines (see overlay)<br>(B1 for 1 line of length 4cm and correct arcs crossing OR for correct triangle with either no arcs or incorrect arcs)<br>SC: B1 similar triangle drawn with construction lines |
| 4 a(i) | 240 × 5 = 1200 | 1250 | 3 | B1 cao 1250 |
| (ii) | $\frac{50}{1250}$ | $\frac{1}{25}$ | | M1 $\frac{50}{"1250"}$<br>A1 oe in its simplest form |
| (b) | $\frac{60}{100} \times 1000 = 600$<br>600: 250 | 12:5 | 3 | M1 for $\frac{60}{100} \times 1000$ oe<br>A1 for 600<br>A1 cao |
| 5 (a) | | $x + 2$ | 1 | B1 |
| (b) | $x + 5 + x + 5 + x + 2 + x + 2$ | $4x + 14$ | 2 | M1 adding 4 sides, two of which must be '$x + 2$' (all sides to be linear expressions in $x$)<br>A1 for correct simplified answer |
| (c) | "$4x + 14$" = 20 | 1.5 | 2 | M1 for equation "$4x + 14$" = 20 OR $\frac{20-14}{4}$ oe<br>A1 cao |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 6 (a) | | $2p - q$ | 2 | B1 cao for $2p$<br>B1 cao for $-q$ accept $-q + 2p$ and $2p - 1q$ |
| (b) | $5x = 3 + 4$ | 1.4 | 2 | M1 for either (+3 or sight of 7) or (÷ 5 or sight of 0.8 and 0.6)<br>A1 cao accept $\frac{7}{5}$ or $1\frac{2}{5}$ |
| 7 (a) | | $\frac{4\times5}{2}$ | 1 | B1 cao |
| (b) | $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8$ | $\frac{8\times9}{2}$ | 1 | B1 cao |
| (c) | $\frac{100\times101}{2}$ | 5050 | 1 | B1 cao |
| (d) | | $\frac{n(n+1)}{2}$ | 2 | B2 cao<br>(B1 for any quadratic in $n$) |
| 8 | $3.2 \times 2.8 = 8.96$<br>$2 \times 4.5 \times 2.8 = 25.2$<br>$2 \times 4.5 \times 3.2 = 28.8$<br>$\frac{62.96}{2.5} \times 2.99$ | 75.30 | 5 | M1 for area of any face found correctly<br>M1 for 2 areas seen<br>A1 for 62.96 or 54<br>M1 for $\frac{'62.96'}{2.5} \times 2.99$<br>A1 cao<br>Alternate method for candidates who round up $\frac{"62.96"}{2.5}$<br>M1 for "26" $x$ 2.99<br>A1 for £77.74 cao<br>SC: for top included B2 for 71.92 $m^2$ seen or<br>B3 for £86.02 or £86.71<br>SC: B4 for £64.58 or £65.78 seen |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 9 | 2.5 × 10000 | 25000 | 2 | M1 for 2.5 × 10000 or 2.5.× 100 ×100<br>A1 cao |
| 10 (a) | ∑f = 90<br>(88), 144, 32, 96 | Angles drawn, labelled | 3 | M1 for 1 person = 4°or one angle correct in table or pie chart<br>A1 any 2 angles correctly drawn in pie chart<br>A1 fully correct chart labelled |
| (b) | 0.38 + 0.27 + 0.15 | 0.20 | 2 | M1 1 – sum<br>A1 cao |
| 11 | 0 \| 5 7 8 8<br>1 \| 0 0 0 0 2 5 5 5 6<br>2 \| 0 0 0 4 5<br>3 \| 3 5<br>Key 1 \| 3 = 13 (min) | See working column | 3 | B1 for stem 0, 1, 2, 3 or 0, 10, 20, 30<br>B1 for accurate unordered leaves condone 1 error or omission<br>B1 for key and ordered leaves all correct |
| 12 (a) | $V = \pi \times 4^2 \times 10$ | 502 – 503 | 2 | M1 for $\pi \times 4^2 \times 10$<br>A1 502 – 503 |
| (b) | $P^2 = 10^2 + 8^2$<br>$P = \sqrt{164}$ | $\sqrt{164} < 13$ | 3 | M1 for sight of a correct right-angled triangle<br>M1 for $10^2 + 8^2$<br>A1 for conclusion based on a correct calculation or 12.8 seen |
| 13 (a) | 2 × 30 | 2 × 2 × 3 × 5 | 4 | M1 for systematic method, eg division, factor trees (at least one prime)<br>A1 cao |
| | 2 × 48 | $2^5 \times 3$ | | M1 for systematic method, eg division, factor trees (at least one prime)<br>A1 cao |
| (b) | | 12 | 1 | B1 cao |
| (c) | $2^5 \times 3 \times 5$ | 480 | 2 | B2 cao<br>B1 for $2^5 \times 3 \times 5$ or any correct common multiple |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 14 (a) | | $150 < C \leq 200$ | 2 | M1 use of cum freq to find the cost of the $20^{th}$ or $20.5^{th}$ car<br>OR $\frac{1}{2}\Sigma f$ or $\frac{1}{2}(\Sigma f + 1)$<br>A1 eg 150 to 200 |
| (b) | | No, because the $21^{st}$ value is in the same interval | 1 | B1 $20.5^{th}$ or $21^{st}$ in same interval or an alternative correct explanation |
| (c) | 80% = 5200<br>$\frac{5200}{80} \times 100$ | 6500 | 3 | M1 for (100 – 20) % = 5200<br>M1 for $\frac{5200}{"80"} \times 100$<br>A1 cao |
| 15 (a) | $x^2(x + 1) = 230$ | AG | 2 | M1 for $x \times x \times (x+1)$ or $x \times x \times x + 1$ oe<br>A1 cao from $x \times x \times (x+1)$ |
| (b) | '5 – 150<br>5.1 – 158.7<br>5.2 – 167.6<br>5.3 – 177.0<br>5.4 – 186.6<br>5.5 – 196.6<br>5.6 – 207.0<br>5.7 – 217.7<br>5.8 – 228.8<br>5.9 –240.2<br>5.85 – 234.4 | 5.8 | 4 | B 2 for trial between 5.8 and 5.9 inclusive<br>(B1 for different trial between 5 and 6 inclusive)<br>B1 for different trial between 5.8 and 5.85 (not including 5.8)<br>B1 (dep on at least one previous B1) cao for 5.8, 5.81, 5.811 |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 16 | $\pi \times \left(\frac{15}{2}\right)^2 = 176.715$ | $88.4\text{cm}^2$ | 3 | M1 for $\pi \times \left(\frac{15}{2}\right)^2$<br>A1 88.3 – 88.4<br>B1(ind) for cm² |
| 17 (a) | $5 = 0.5x + 1$ | 8 | 2 | M1 for $5 = 0.5x + 1$<br>A1 cao |
| (b) | | $y = \frac{1}{2}x + c$ | 1 | B1 $y = \frac{1}{2}x + c$, c ≠ 1, oe |
| (c) | | $x = 2y - 2$ OR $x = 2(y - 1)$ | 2 | M1 for correctly multiplying both sides by 2 or correctly isolating $\frac{x}{2}$<br>A1 for $x = 2(y - 1)$, $x = \frac{y-1}{0.5}$, $x = \frac{y-1}{\frac{1}{2}}$ oe<br>SC: B1 for $x = 2y - 1$ |
| 18 | $4x - 6y = 22$<br>$15x + 6y = 54$<br>$19x = 76$ | $x = 4,\ y = -1$ | 4 | M1 for coefficients of $x$ or $y$ the same followed by correct operation , one arithmetical error<br>A1 cao<br>M1(dep on previous M mark) for sub for other variable<br>A1 cao<br>Trial and improvement –0 unless both $x$ and $y$ correct values found |

**Paper 5504**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 19 (a) | $SF = \frac{10}{6}$<br>$\frac{10}{6} \times 4.8 = 8$ | 8 | 2 | M1 for sight of $\frac{10}{6}$ or $\frac{6}{10}$ or 1.67 or better or $\frac{CD}{10} = \frac{4.8}{6}$<br>A1 cao |
| (b) | $\frac{10}{6} \times 4.5 - 4.5 = 3$ | 19.8 | 2 | M1 for use of SF from (a) to find *BC* or *AC* and adding 4 sides<br>A1 cao |
| 20 | $\frac{6 \times 10^{15}}{3.2 \times 10^{8}}$<br>$1.875 \times 10^{7}$ | $4.3 \times 10^{3}$ | 3 | B3 for $4.3 \times 10^{3}$ to $4.34 \times 10^{3}$<br>(B2 for $1.875 \times 10^{7}$ oe or 4300 to 4340 or final answer of $1.9 \times 10^{7}$)<br>(B1 for sight of $6 \times 10^{15}$ oe or $3.2 \times 10^{8}$ oe) |
| 21 | $8.5 \times \tan 38 = 8.5 \times 0.7813$ | 6.64 | 3 | M1 for correct use of trig, eg $\tan 38 = \frac{opp}{8.5}$<br>M1 for 8.5 × tan38<br>A1 6.64 – 6.641 |

**Paper 5504**

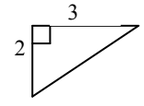
| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 22 (a) | | No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice | 1 | B1 for a consistent answer |
| (b) | $\frac{1}{6}, \frac{5}{6}$ + labels | | 3 | B1 for $\frac{5}{6}$ on the red dice, *not six* branch<br>B1 for a fully complete tree diagram with all branches labelled<br>B1 for $\frac{1}{6}$, $\frac{5}{6}$ on all remaining branches as appropriate |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 (i)<br>(ii)<br>(iii) | | 119.31<br>119310<br>1.23 | 3 | B1 cao<br>B1 cao<br>B1 cao |
| 2 | $\frac{10}{100}\times 12000 = 1200$<br>12 000 – 1200 = 10 800<br>10 800 ÷ 10 =1080<br>10 800 – 1080 = £9720 | 9720 | 3 | M1 for $\frac{10}{100}\times 12\,000$ or sight of 1200 or 2400 or 10 800 or 9600<br>M1 (dep) for $\frac{10}{100}\times(12\,000 - \frac{10}{100}\times 12\,000)$ or sight of 1080<br>A1 cao<br>Alternative markscheme<br>M2 for $12000\times\left(1-\frac{10}{100}\right)^2$<br>(M1 for $12000\times\left(1-\frac{10}{100}\right)$ )<br>A1 cao |
| 3 | $7r - 5r = -20 - 2$ | –11 | 2 | M1 for $7r + 2 = 5r - 20$ or $\frac{7r}{5} + \frac{2}{5} = r - 4$<br>or $7r - 5r = -20 - 2$ or $\frac{7r}{5} - r = -4 - \frac{2}{5}$<br>A1 cao |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 4 (a) | | –1, 0, 1 | 2 | B2 for –1, 0, 1 only<br>(B1 for –1, 0 or 0,1 or –1, 1 or –2, -1, 0, 1 only) |
| (b) | | (–1,–1)(0,–1)<br>(1,–1) (0, 0)<br>(1, 0) (1, 1) | 3 | B3 for 6 points correct<br>(B2 for 3 points correct)<br>(B1 for 1 point correct)<br>*NB: –B1 for each additional point over six* |
| 5 | | $5n + 1$ | 2 | B2 oe<br>(B1 for $5n$ seen)<br>NB: $n$ = gets B1 max |
| 6 (a) | Triangle with vertices at (0,0) (0,–2) and (3,0) | | 2 | M1 for correct orientation<br>A1 cao |
| (b) | Rotation, 180°, centre (0,1)<br>Enlargement sf –1 centre (0,1) | | 2 | B2 for 180° 'rotation' centre (0, 1) or for Enlargement sf - 1 centre (0,1)<br>(B1 for any two of the three parts)<br>NB: B0 if additional transformation is included |
| 7 | Bisector of $\angle BAC$<br>Arc around $A$<br>Region | See overlay | 3 | B3 cao<br>(B2 for either two correct boundaries, no shading/ wrong shading or one correct boundary, one incorrect boundary with valid shading)<br>(B1 for either two incorrect boundaries but one drawn from $A$ and one intersection, with valid shading or one correct boundary)<br>Ignore shading outside the triangle |
| 8 | | Length<br>Volume<br>Area | 3 | B1 for Length<br>B1 for Volume<br>B1 for Area |



**Paper 5505**

| No | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 9 | (a) | Unbiased question with choices | | 2 | B1 for unbiased question<br>B1 for at least 2 choices |
| | (b) | Leading question and a restricted sample | | 2 | Classification 1: A biased question<br>Classification 2: A restricted sample of people<br>Classification 3: Not specifying a range of foods<br>Classification 4: Nothing to do with eating habits<br>B2 reasons which satisfy 2 different classifications<br>(B1 a reason which satisfies one classification) |
| 10 | (a) | $6 \times 10^2 \times 8 \times 10^4$<br>$48 \times 10^6 = 4.8 \times 10^7$ | $4.8 \times 10^7$ | 3 | M1 for $6 \times 10^a \times 8 \times 10^b$ oe, $a$ and $b$ integers including 0<br>A1 for $48 \times 10^6$ oe<br>A1 cao |
| | (b) | 200 000 + 30 000 = 230 000 | 230 000 | 2 | B2 cao<br>(B1 for sight of 200 000 or 30 000 or $2.3 \times 10^5$ or $23 \times 10^4$) |
| 11 | (a) | $x^2 + xy + xy + y^2$ | $x^2 + 2xy + y^2$ | 2 | M1 for at least 3 of the 4 terms correct<br>A1 cao |
| | (b) | | 25 | 2 | M1 for recognising 3.47 + 1.53 (= 5)<br>A1 cao |
| 12 | (i) | Tangent 90° to diameter /radius/ line from (through) centre | 27° | 4 | B1 for 27° cao<br>B1 for reason |
| | (ii) | 180 –(90+ "27")<br>angle in semicircle (is 90°)/Alternate segments /angle at centre twice at circumference | 63° | | B1 ft for 90–"27" if not 63°<br>B1 for reason |
| 13 | (i) | | $p^9$ | 1 | B1 cao |
| | (ii) | | $6q^6$ | 2 | B2 for $6q^6$<br>(B1 for sight of $\frac{6q^9}{q^3}$ or $3q \times 2q^5$ or $3q^4 \times 2q^2$ or $6 \times q \times q \times q \times q \times q \times q$ or final answer of the form $kq^6$, $k > 0$) |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 14 (a)(i) | | 152 | 2 | B1 cao |
| (ii) | | 177 | | B1 cao |
| (b) | | | 3 | B1 for median marked at 167<br>B1 ft for postion of box with its ends at "152" and "177"<br>B1 for position of whiskers with ends at 132 and 182<br>NB: For any points plotted between 141 and 149 give a tolerance of an extra ± 1 square |
| 15 | (arc = ) $\frac{40}{360} \times 2\pi \times 9$<br>$= 2\pi$ | $2\pi + 18$ | 4 | M1 for $\frac{40}{360} \times$<br>M1 for $2\pi \times 9$<br>M1 (dep) for $\frac{40}{360} \times 2\pi \times 9$ oe<br>A1 for $\frac{18 \times \pi}{9} + 18$ oe exact form |
| 16 (i) | | 1 | 1 | B1 cao |
| (ii) | | $\frac{1}{16}$ | 1 | B1 cao accept 0.0625 |
| (iii) | | 64 | 1 | B1 cao condone ± 64 |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 17 (a) | $F \propto 1/x^2$<br>$F = k/x^2$<br>$4 = k / 3^2$<br>$F = 36/x^2$ | $F = \frac{36}{x^2}$ | 3 | M1 for $F = k/x^2$ seen or implied. ($k \neq 1$)<br>M1 (dep) for subst. or sight of $k = 36$<br>A1 for $F = 36/x^2$ |
| (b) | | 9 | 1 | B1 ft for 9 (ft on $F = kx^n$, $n \neq 0$) |
| (c) | $64 = \frac{36}{x^2}$<br>$x^2 = \frac{36}{64}$<br>$x = \pm\frac{3}{4}$ | $\frac{6}{8}$ | 2 | M1 for $x^2 = \frac{"36"}{64}$<br>A1 for $\frac{6}{8}$ oe (condone $\pm$)<br>*SC: Use of $F = kx^2$ max M1 M1 A0 B1 ft M0 A0*<br>*SC: Use of* $F = \frac{k}{\sqrt{x}}$<br>*max M1 M1 A0 B0 M1* ($\sqrt{x} = \frac{4\sqrt{3}}{64}$) *A0* |
| 18 | $(5+\sqrt{3})(5-\sqrt{3}) = 5\times5 - 5\sqrt{3} + 5\sqrt{3} - \sqrt{3}\sqrt{3}$<br>$= 5\times5 - 3$<br>$\frac{22}{\sqrt{22}} = \frac{22\sqrt{22}}{22}$ | $\sqrt{22}$ | 3 | B1 for correct expansion 25 - $5\sqrt{3}$ + $5\sqrt{3}$ - $\sqrt{3}$ $\sqrt{3}$ with 1st three terms reducing to 25 **without** any errors seen<br>B1 (indep) for $\sqrt{3}$ $\sqrt{3}$ = 3<br>B1 for $\sqrt{22}$ coming from $\frac{22}{\sqrt{22}}$<br>(S.C $\frac{(5+\sqrt{3})(5-\sqrt{3})\sqrt{22}}{22}$ gets B1) |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 19 (a) | | 60<br>40 | 2 | B1 cao<br>B1 cao |
| (b) | | correct bars | 2 | B1 for $30 < x \leq 40$ with an area of 2½ squares<br>B1 for $40 < x \leq 70$ with an area of 3 squares<br>*SC:* $\frac{0}{4}$ *give M1 if clearly using area or frequency density* |
| 20 (a) | $6x + 8 - 12x + 15$ | $-6x + 23$ | 2 | M1 for 3 of the 4 terms $6x$, $+8$, $-12x$, $+15$ correct<br>A1 cao |
| (b) | | $32x^5y^{15}$ | 2 | B2 cao<br>(B1 for two of 32, $x^5$, $y^{15}$) |
| (c) | $\frac{(n+1)(n-1)}{n+1} \times \frac{2}{n-2}$<br>$\frac{2(n-1)}{n-2}$ | $\frac{2(n-1)}{n-2}$ | 3 | M1 for $k(n + 1)(n - 1)$<br>M1 dep for $\frac{(n+1)(n-1)}{(n+1)} = n - 1$<br>A1 for $\frac{2(n-1)}{n-2}$ |
| 21 | Vertices at<br>$(-3, -1\frac{1}{2}), (-4\frac{1}{2}, -1\frac{1}{2}), (-3, -4\frac{1}{2})$ |  | 3 | B1 for all sides $\times 1\frac{1}{2}$<br>B1 for correct orientation with 2 vertices almost correct<br>B1 cao |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 22 | Total = 3 + 5 + 2 (=10)<br>$\frac{3}{10}\times\frac{3}{10}\times\frac{5}{10}\left(=\frac{45}{1000}\right), \frac{3}{10}\times\frac{3}{10}\times\frac{2}{10}\left(=\frac{18}{1000}\right)$<br>$\frac{5}{10}\times\frac{5}{10}\times\frac{3}{10}\left(=\frac{75}{1000}\right), \frac{5}{10}\times\frac{5}{10}\times\frac{2}{10}\left(=\frac{50}{1000}\right)$<br>$\frac{2}{10}\times\frac{2}{10}\times\frac{3}{10}\left(=\frac{12}{1000}\right), \frac{2}{10}\times\frac{2}{10}\times\frac{5}{10}\left(=\frac{20}{1000}\right)$<br>$3\times\left(\frac{"45"}{1000}+\frac{"18"}{1000}+\frac{"75"}{1000}+\frac{"50"}{1000}+\frac{"12"}{1000}+\frac{"20"}{1000}\right)$<br>$\frac{660}{1000}$ | $\frac{660}{1000}$ oe | 5 | M3 for all six expressions seen OR their combined equivalents<br>(M2 for four expressions seen OR their combined equivalents)<br>(M1 for two expressions seen OR their combined equivalents)<br><br>M1 sum of 18 relevant products condone 1 slip<br><br>A1 for $\frac{660}{1000}$ oe<br>*SC: without replacement maximum M4 A0*<br>SC: Just 2 beads: Answer either $\frac{38}{100}$ oe OR $\frac{28}{90}$ oe B1 |

**Paper 5505**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 23 (a)(i) | | $6\mathbf{b} - 6\mathbf{a}$ | 2 | B1 for $6\mathbf{b} - 6\mathbf{a}$ oe |
| (ii) | | $6\mathbf{a}$ | | B1 for $6\mathbf{a}$ oe |
| (b) | $\overrightarrow{EX} = \overrightarrow{EB} + \overrightarrow{BX}$<br>$= 12\mathbf{b} + \frac{1}{2}\overrightarrow{BC}$ | $12\mathbf{b} - 3\mathbf{a}$ | 2 | M1 for $\overrightarrow{EX} = \overrightarrow{EB} + \overrightarrow{BX}$ oe vector journey in a form ready for straightforward substitution<br>A1 for $12\mathbf{b} - 3\mathbf{a}$ oe |
| (c) | $\overrightarrow{AY} = \frac{5}{3}\overrightarrow{AB}$ or $\overrightarrow{BY} = \frac{2}{3}\overrightarrow{AB}$<br>$\overrightarrow{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\overrightarrow{XY} = 4\mathbf{b} - \mathbf{a}$<br>$\overrightarrow{EY} = 4\overrightarrow{XY}$ or $\overrightarrow{EX} = 3\overrightarrow{XY}$ or $\overrightarrow{EY} = \frac{4}{3}\overrightarrow{EX}$ | Printer Answer | 3 | B1 for either $\overrightarrow{AY} = \frac{5}{3}\overrightarrow{AB}$ or $\overrightarrow{BY} = \frac{2}{3}\overrightarrow{AB}$ oe<br>B1 ft for either $\overrightarrow{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\overrightarrow{XY} = 4\mathbf{b} - \mathbf{a}$<br>ft only on parts (*a*) and (*b*)<br>B1 for either $\overrightarrow{EY} = 4\overrightarrow{XY}$ or $\overrightarrow{EX} = 3\overrightarrow{XY}$ or $\overrightarrow{EY} = \frac{4}{3}\overrightarrow{EX}$ oe **plus** conclusion of *E*, *X*, *Y* on the same straight line |
| 24 (a)(i) | | $(5, -4)$ | 4 | B1 cao |
| (ii) | | $(2, -9)$ | | B1 cao |
| (iii) | | $(2, 4)$ | | B1 cao |
| (iv) | | $(1, -4)$ | | B1 cao |
| (b) | | $(x-2)^2 - 4$ | 4 | B4 for $(x-2)^2 - 4$ oe eg. $x^2 - 4x$<br>(B3 for $(x+2)^2 - 4$ or $(x-2)^2 + 4$)<br>(B2 for $x^2 - 4$ or $(x-2)^2$ OR $x^2 + bx$, $b \neq 0$ OR $(x+2)^2 + 4$ OR $f(x-2) - 4$)<br>(B1 for $x^2 + 4$ or $(x+2)^2$ or $ax^2 + bx$ or $x^2 + bx + c$ OR $x - 2 - 4$ or $x^2 - 2 - 4$, $a, b, c \neq 0$) |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 1 (a) | $V = \pi \times 4^2 \times 10$ | 502 – 503 cm$^3$ | 2 | M1 for $\pi \times 4^2 \times 10$<br>A1 502 – 503 |
| (b) | $P^2 = 10^2 + 8^2$<br>$P = \sqrt{164}$ | $\sqrt{164} < 13$ | 3 | M1 for sight of correct right angled triangle<br>M1 for $10^2 + 8^2$<br>A1 for conclusion based on a correct calculation<br>Or 12.8 seen |
| 2 (a)(i) | $2 \times 30$ | $2 \times 2 \times 3 \times 5$ | 4 | M1 for systematic method, eg division, factor trees (at least one prime)<br>A1 cao |
| (ii) | $2 \times 48$ | $2^5 \times 3$ | | M1 for systematic method, division, factor trees (at least one prime)<br>A1 cao |
| (b) | | 12 | 1 | B1 cao |
| (c) | $2^5 \times 3 \times 5$ | 480 | 2 | B2 cao<br>B1 for $2^5 \times 3 \times 5$ or any correct common multiple |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 3 (a) | | $150 < C \leq 200$ | 2 | M1 use of cum freq to find the cost of the $20^{th}$ or $20.5^{th}$ car<br>OR $\frac{1}{2}\Sigma f$ th or $\frac{1}{2}(\Sigma f + 1)$ th car.<br>A1 eg 150 to 200, 150 – 200 |
| (b) | | No, because the $21^{st}$ value is in the same interval | 1 | B1 for $20.5^{th}$ or $21^{st}$ value in the same internal consistent with 'a'<br>OR<br>Refers to the median value being low in the interval (statement to be mathematically correct)<br>See additional sheet |
| (c) | 80% = 5200<br>$\frac{5200}{80} \times 100$ | 6500 | 3 | M1 for (100 – 20)% = 5200<br>M1 for $\frac{5200}{"80"} \times 100$<br>A1 cao |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 4 (a) | $x^2(x + 1) = 230$ | AG | 2 | M1 for $x \times x \times (x+1)$ or $x \times x \times x + 1$ oe, $x^2(x+1)$, $x^2 \times x + 1$<br>A1 cao from $x \times x \times (x+1)$, no need to see 230 |
| (b) | 5 – 150 6 – 252<br>5.1 – 158.7<br>5.2 – 167.6<br>5.3 – 177.0<br>5.4 – 186.6<br>5.5 – 196.6<br>5.6 – 207.0<br>5.7 – 217.7<br>5.8 – 228.8<br>5.9 –240.2<br>5.85 – 234.4 | 5.8 | 4 | B2 for trial between 5.8 and 5.9 inclusive evaluated<br>(B1 for trial between 5 and 6 inclusive evaluated)<br>B1 for different trial between 5.8 and 5.85 (not including 5.8)<br>B1 dep on at least are previous B1 5.8, 5.81, 5.811 |
| 5 | $\pi \times \left(\frac{15}{2}\right)^2 = 176.715$ | 88.4 $cm^2$ | 3 | M1 for $\pi \times \left(\frac{15}{2}\right)^2$ seen<br>A1 88.3 – 88.4<br>B1 for cm² (independent) |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 6 (a) | $5 = 0.5x + 1$ | 8 | 2 | M1 for $5 = 0.5x + 1$<br>A1 cao |
| (b) | | $y = \frac{1}{2}x + c$ | 1 | B1for $y = \frac{1}{2}x + c$, $c \neq 1$, oe |
| (c) | | $x = 2y - 2$ OR<br>$x = 2(y - 1)$ | 2 | M1for correctly multiplying both sides by 2 or correctly isolating $\frac{x}{2}$<br>A1 for $x = 2(y - 1)$, $x = \frac{y-1}{0.5}$, $\frac{y-1}{\frac{1}{2}}$ oe<br>SC B1 for $x$= 2y -1 |
| 7 | $4x - 6y = 22$<br>$15x + 6y = 54$<br>$19x = 76$ | $x = 4$, $y = -1$ | 4 | M1 for coefficients of $x$ or $y$ the same followed by correct operation, allow one arithmetical error<br>A1 cao<br>M1 (dep) for correct sub for other variable<br>A1 cao<br>Trial and improvement 0 marks unless both correct values of $x$ and $y$ found |
| 8 (a) | SF = $\frac{10}{6}$<br>$\frac{10}{6} \times 4.8 = 8$ | 8 | 2 | M1 for sight of $\frac{10}{6}$ or $\frac{6}{10}$ or 1.67 or better or $\frac{CD}{10} = \frac{4.8}{6}$<br>A1 cao |
| (b) | $\frac{10}{6} \times 4.5 - 4.5 = 3$ | 19.8 | 2 | M1 for use of SF from "a" to find AC or BC or $\frac{BC}{4.5} = \frac{4}{6}$ and adding 4 sides<br>A1 cao |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 9 | $\frac{6\times10^{15}}{3.2\times10^{8}}$<br><br>$1.875\times10^{7}$ | $4.3\times10^{3}$ | 3 | B3 for $4.3\times10^{3}$ to $4.34\times10^{3}$<br>(B2 for $1.875\times10^{7}$ oe or 4300 to 4340, final answer of $1.9\times10^{7}$<br>B1 for sight of $6\times10^{15}$ oe or $3.2\times10^{8}$ oe) |
| 10 | $8.5\times\tan38$<br>$=8.5\times0.7813$<br>$\frac{8.5}{\sin(90-38)}=\frac{AB}{\sin38}$<br>$AB=\frac{8.5\times\sin38}{\sin(90-38)}$<br>$=\frac{5.2331}{0.788}=6.64$ | 6.64 | 3 | M1 for correct use of trig, eg $\tan 38=\frac{opp}{8.5}$<br>M1 for $8.5\times\tan38$<br>A1 6.64 – 6.641<br>OR<br>M1 for correct substitution into the sine rule<br>M1 (dep) for correct rearrangement for $AB$=<br>A1 6.64 – 6.641 |
| 11 (a) | | No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice | 1 | B1 for a consistent answer<br>See additional sheet |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| (b) | $\frac{1}{6}, \frac{5}{6}$ + labels | | 3 | B1 for $\frac{5}{6}$ on the red dice, *not six* branch<br>B1 for a fully complete tree diagram with all branches labelled<br>B1 for $\frac{1}{6}$ and $\frac{5}{6}$ on all remaining branches as appropriate |
| (c)(i) | $\left(\frac{1}{6}\right)^2$ | $\frac{1}{36}$ | 2 | M1 $\left(\frac{1}{6}\right)^2$ or $\frac{1}{6}\times\frac{1}{6}$ only or 0.28<br>A1 $\frac{1}{36}$ or 0.03 or better |
| (ii) | $1-\left(\frac{5}{6}\right)^2$<br>OR<br>$\frac{1}{6}\times\frac{5}{6}+\frac{5}{6}\times\frac{1}{6}+\frac{1}{6}\times\frac{1}{6}$ | $\frac{11}{36}$ | 3 | M2 for $1-\left(\frac{5}{6}\right)^2$ or $1-\frac{5}{6}\times\frac{5}{6}$<br>A1 cao<br>OR<br>M1 for $\frac{1}{6}\times\frac{5}{6}$ oe<br>M1 for 2 or 3 only of $\frac{1}{6}\times\frac{5}{6}, \frac{5}{6}\times\frac{1}{6}$, "a"<br>A1 for $\frac{11}{36}$ or 0.31 or better |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 12 (a) | $\pi \times 30 \times \frac{7.5^2}{3} - \pi \times 10 \times \frac{2.5^2}{3} = 1767 - 65$ | 1700 | 3 | M1 for either $\pi \times 30 \times \frac{7.5^2}{3}$ or $\pi \times 10 \times \frac{2.5^2}{3}$<br>M1 (dep) for difference<br>A1 1700 – 1702<br>**SC** B1 Using d instead of r, 6800 – 6808 |
| (b) | $\frac{S}{2\pi d} = \sqrt{h^2 + d^2}$<br>$\left(\frac{S}{2\pi d}\right)^2 = h^2 + d^2$ | $h = \sqrt{\frac{S^2 - 4\pi^2 d}{4\pi^2 d^2}}$ | 3 | M1 for correctly isolating $\sqrt{h^2 + d^2}$ or $h^2 + d^2$ or $h + d$ or $kh^2$ or $kh$<br>M1(indep) squaring both sides<br>A1<br>$h = \sqrt{\frac{S^2 - 4\pi^2 d^4}{4\pi^2 d^2}}$, $h = \frac{\sqrt{S^2 - 4\pi^2 d^4}}{2\pi d}$<br>$h = \sqrt{\left(\frac{S}{2\pi d}\right)^2 - d^2}$ |
| (c) | $\left(\frac{30}{20}\right)^2 \times 450$ or $450 \div \left(\frac{20}{30}\right)^2$ | 1012.5 | 2 | M1 for sight of correct $SF^2$ including 4:9<br>A1 1010 to 1013 |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 13 (a) | $\frac{2x(x+20)}{2} = 400$ | As given | 2 | M1 $\frac{2x(x+20)}{2}$ or $\frac{2x \times x + 20}{2}$ or $2x(x + 20) = 800$<br>A1 cao following correct working, no need for = 400<br>*SC B1* $2x \times x + \frac{1}{2} \times 2x(10 - \frac{x}{2}) \times 2$ |
| (b) | $\frac{-20 \pm \sqrt{20^2 - 4 \times 1 \times (-400)}}{2}$<br>$= \frac{-20 \pm 44.721}{2}$ | 12.361 | 3 | M1 for correct sub, up to signs, in the quad formula<br>A1 for 44.7 or $\sqrt{2000}$<br>A1 for 12.3606 – 12.361, ignore negative solution<br>T.I B3 for 12.361<br><br>OR<br>Completing the square<br>M1 for $(x+10)^2$ seen<br>A1 for $-10 \pm \sqrt{500}$<br>A1 for 12.3606 – 12.361 ignore negative solution |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 14 (a) | $0.5\times 8\times 15\times \sin 70^0$ | 56.4 | 2 | M1 for correct sub into area formula<br>A1 56.38 – 56.4 |
| (b) | $AB^2 = 8^2 + 15^2 - 2\times 8\times 15\times \cos 70^0 = 206.9$<br><br>EITHER<br>$0.5\times AB\times CX$ ='56.38'<br><br>OR<br>$\frac{\sin B}{8} = \frac{\sin 70}{\sqrt{'206.9'}}$<br>$B = 31.5$<br>15 sin '31.5' | 7.84 | 4 | M1 for correct sub into cos rule<br>A1 for 206.9 - 207 or 14.38 – 14.4<br><br>EITHER<br>M1 for use of area rule to find CX<br>A1 7.83 – 7.84<br>OR<br>M1 for correct use of sine rule to find sin B or sin A and then sight of 15sin B *or* 8 sin A<br>A1 7.83 – 7.84 |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 15 (a) | $4a^2 - 4a + 1 - (4b^2 - 4b + 1) =$<br><br>$4(a^2 - b^2) - 4(a - b)$<br>$4(a - b)(a + b - 1)$<br><br>OR<br>$((2a - 1) - (2b - 1))((2a - 1) + (2b - 1))$<br>$(2a - 2b)(2a + 2b - 2)$ | AG | 3 | Expansion Method<br>M1 for a correct expansion of any one of the three terms<br>M1(dep) on an attempt to expand all 3 terms and show LHS = RHS<br>A1 fully correct algebra<br>RHS exp is $4(a^2 + ab - a - ba - b^2 + b)$<br><br>OR Factorisation Method<br>M1 for attempt to use difference of 2 squares on LHS<br>M1 for one bracket correctly simplified<br>A1 fully correct |
| (b) | Any 2 odd square numbers have the above form<br><br>If $a$ and $b$ are both even or odd then $a - b$ is even, so $4(a - b)$ is a multiple of 8<br>If one of $a$,$b$ is odd, then $a + b - 1$ is even, so $4(a + b - 1)$ is a multiple of 8 | | 3 | B1 'any 2 square nos have the above form' (may be implied by sight of $(2a - 1)^2 - (2b - 1)^2$ in part (b))<br>B1 first reason<br>B1 second reason<br><br>SC B1 for $(2r + 1)^2 - (2r - 1)^2$<br>B1 for 8r |
| 16 (a) | $g_L = \frac{2 \times 4.495}{1.35^2 \times \sin 30.5}$<br><br>$g_u = \frac{2 \times 4.505}{1.25^2 \times \sin 29.5}$ | 9.719<br><br>11.710 | 4 | B2 for any 4 of 4.505, 1.25, 29.5, 4.495, 1.35, 30.5 seen (B1 for any two or three seen)<br>B1 for 11.710 – 11.7103<br>B1 cao 9.719 – 9.71904 |
| (b) | Round, until lower and upper bounds agree | 10 | 1 | B1 for 10 + reason " they agree to this level of accuracy" |

**Paper 5506**

| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 17 (a)(i) | | $xy$ | 3 | B1 cao |
| (ii) | | $y^2$ | | B1 for $y^2$ or $y \times y$ |
| (iii) | | $\frac{x}{2}$ | | B1 for $\frac{x}{2}$ or $0.5x$ or $2^{-1}x$ |
| (b) | Divide to get $2y = 1$ | $q = -1$ | 2 | M1 for $2y = 1$ or $\frac{x}{2} = 32$ or $p + q = 5$ or $1 + p + 2q = 5$ |
| | | $p = 6$ | | A1 cao |
| 18 (a) | $x^2 - 2mx + m^2 - k$ | $k = m^2$ | 2 | M1 for correct exp of $(x - m)^2$ or correct completion of the square eg $\left(x - \frac{2m}{2}\right)^2 - \left(\frac{2m}{2}\right)^2$ |
| | | | | A1 cao |
| | | | | SC B1 for $k = -m^2$ |
| (b)(i) | Min value is $-m^2$ | $-m^2$ | 3 | M1 for recognition that min value occurs when $(x - m)^2 = 0$ (either (b)(i) or (b)(ii) correct implies this M1) |
| (ii) | $x = m$ | $m$ | | A1 ft on '$k$', " $-k$" gets M1 A0 |
| | | | | A1 cao |
| 19 | $0.06 \times 0.05 = 0.003$ | No | 2 | M1 for $0.06 \times 0.05$ |
| | | | | A1 correct conclusion based on 0.003 or 0.06 x 0.05 stated as $\neq 0.0011$ |
| | | | | OR M1 for statement that for the two events to be independent P (BL and CL) = P(BL) × P(CL) |

| Paper 5506 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | | 50<br><br>50<br>4 | 3 | B1 50 or $\frac{100}{2}$<br>B1 for 50 or "$a$"<br>B1 4 or $\frac{360}{90}$ oe |

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# NOTES ON MARKING PRINCIPLES

## NOTES ON MARKING PRINCIPLES

**1 Three types of mark are available**

M marks - awarded for correct working seen or implied.
A marks - conditional accuracy marks which are awarded for accurate working following the award of M marks.
B marks - unconditional accuracy marks (independent of M).

**2 Abbreviations**

cao - correct answer only.
ft - follow through.
$\surd$ - Denotes a "follow through" answer.

*SC* - special case.
isw - ignore subsequent working.
oe - or equivalent (and appropriate).
NB: a candidate cannot benefit from both isw and ft.

**3 If no working shown, then**

correct answers normally score full marks
incorrect (even though nearly correct) answers score no marks.

**4 Marking instructions**

Misread loses A marks (and sometimes B marks) on that part but ft can be allowed on subsequent parts. M marks can still be earned. If in doubt contact your team leader.
If there is a wrong answer in the answer space DO CHECK the working in the body of the script.

- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.
- If there is a wrong answer in the answer space DO CHECK the working in the body of the script.
- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.

**5 Style of marking**

Answer correct: tick and write part mark in margin NEXT TO BRACKETED MARK.
Answer incorrect: cross, but show M, A or B marks if any earned in body of script and transfer the total of these to the margin next to the bracket mark.
Total for each double page at bottom right page (except for back if used), FINAL TOTAL IN RELEVANT BOX ON FRONT COVER.
Nought in margin for fully incorrect question or page AND FOR NO ATTEMPT.
Where no attempt has been made a line should be put in the answer space and zero in the margin next to the bracketed mark
CHOICE OF METHOD – No marks unless one answer is in answer space – then mark that.
CROSSED OUT WORK - if not replaced this should be marked (if legible).
There must always be a mark next to bracketed mark in the margin/

**6 Follow Through Marks**

Follow throughs are guided by two principles:

(a) Follow throughs which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous, do not award.
(b) Follow throughs which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**7 Probability**

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least two decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

**6 Linear Equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**8 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

| PAPER 5501 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | | K: 1020<br>L: 8.06 | 2 | B1 for 1020 or 1,020<br>B1 for 8.06 Accept £8.06p and £8,06 |
| 2 | (a) | | 28, 33 | 2 | B1, B1<br>(B1 ft for "28" + 5 if both numbers >25) |
| | (b) | | | 1 | B1 for add 5, +5, for going up in 5's the difference is 5 oe |
| | (c) | | | 1 | B1 for they end in 3 and 8, it ends in 7;<br>or refers to 383 and 388 are in sequence |
| 3 | (a)(i) | | $\frac{1}{2}$ | 2 | B2 for ½ accept half<br>(B1 for an equivalent unsimplified fraction eg 4/8 or 50% or 0.5) |
| | (ii) | | 2 rectangles shaded | 1 | B1 for correct shading (any 2 rectangles) |
| | (b)(i) | | 40 | 4 | B1 for 40 cao |
| | (ii) | | 150 000 | | B1 for 150 000 cao (accept 150,000 not 150.000) |
| | (iii) | | 6.55 | | B1 for 6.55 cao not $6.5^{½}$ |
| | (iv) | | $\frac{3}{8}$ | | B1 for $\frac{3}{8}$ oe accept 0.375 |
| | (c) | | Cross 3cm from *A* | 1 | B1 mark a cross 3 cm (±2 mm) from *A* |
| 4 | (a)(i) | | metres | 2 | B1 for metres (m) |
| | (ii) | | grams | | B1 for grams (g) |
| | (b) | | miles | 1 | B1 for miles |
| 5 | (a) | | (3, 2) | 1 | B1 for (3, 2) |
| | (b)(i) | | *Q* at (0, 3) | 1 | B1 for *Q* plotted correctly on *y*-axis at (0, 3) ±2mm |
| | (ii) | | *R* at (−2, −3) | 1 | B1 for *R* plotted correctly at (−2, −3) ±2mm |
| 6 | (a)(i) | | 30 | 2 | B1 for 30 |
| | (ii) | | 25 | | B1 for 25 |
| | (b)(i) | | 4 shapes | 2 | B1 for drawing 4 shapes |
| | (ii) | | 1½ shapes | | B1 for drawing 1½ shapes |

| PAPER 5501 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 7 | (a) | | 30 | 1 | B1 for 30 |
| | (b) | $20 \times 3 + 5$ | 65 | 2 | M1 for $20 \times 3 + 5$ oe<br>A1 for 65 |
| 8 | (a) | | Draws perp. | 1 | B1 for correctly drawing perp must touch line or cut line *AB* ± 2mm |
| | (b) | | Sketches a cylinder | 1 | B1 for sketching cylinder |
| 9 | (a) | 1974<br>6580<br>8554 | 855.4 | 3 | M1 for complete method with relative place value correct, condone 1 error in multiplication<br>A2 cao<br>(A1 for digits 8554 seen or A1 for "855.4" dependent on 1 arithmetic error) |
| | (b) | 990 ÷ 69 = 14.3…. or 14 rem 24 | 14 | 4 | Method 1 - Everything excluding long division<br>M2 for a valid method with no errors …need to see 966 or 1035<br>(M1 for a valid method, including estimation, that reaches an answer between 901 and 1099 inclusive. Ignore errors.)<br>A2 for 14 with a fully correct method<br>(A1 (dep on 1st M1) for an answer between 14 and 15 inclusive. Ignore errors. Cannot have used estimation.)<br>Note: Estimation can only score a maximum of M1 unless accompanied by another method or 966 or 1035 see (award M2)<br>Method 2 – long division method<br>M2 for 990 ÷ 69 = integer answer between 12 and 19 inclusive and rem 30 seen<br>(M1 for 990 ÷ 69 with 1 in tens column.)<br>A2 for 14 with fully correct method<br>(A1 (dep on 1st M1) for an answer between 14 and 15 inclusive.) |

| PAPER 5501 | | | | | |
|---|---|---|---|---|---|
| | **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | (a)(i) | | 7 | 2 | B1 for 7 |
| | (ii) | | −10 | | B1 for −10 |
| | (b)(i) | | 6 | 2 | B1 for 6 (accept −6) |
| | (ii) | | 8 | | B1 for 8 (accept −8) |
| | (c) | | −7 | 1 | B1 for −7 cao |
| 11 | (a) | | B and D | 2 | B1, B1 (–1 each extra) |
| | (b)(i) | | A | 2 | B1 for A |
| | (ii) | | 3 | | B1 for 3 |
| 12 | (a) | 800 − 144 | 656 | 2 | M1 for at least 1 digit correct and in correct position<br>needs to be 3 digit number<br>A1 for 656 |
| | (b) | 144 is less than 200 so Trudy is wrong | | 2 | B1 for 200<br>B1ft for 'correct' explanation based on cand's "200" |
| | (c) | $\frac{45\times800}{100}$ | 360 | 2 | M1 for 45 × 800 ÷ 100 oe<br>A1 for 360 |
| | (d) | $\frac{176}{800}\times100$ | 22 | 2 | M1 for $\frac{176}{800}\times100$ oe<br>A1 for 22 |
| 13 | (a)(i) | | 25 | 4 | B1 for 25 |
| | (ii) | | 28 | | B1 for 28 |
| | (iii) | | 5 and 20 | | B1 for 5 and 20 |
| | (iv) | | 26 and 33 | | B1 for 26 and 33 |
| | (b) | $2^3 = 8$<br>or $2^3 = 2 \times 2 \times 2$<br>(which is not 6) | | 1 | B1 for valid 'explanation' |
| 14 | | | 10<br>$m^2$ | 2 | B1 for 10<br>B1 indep for $m^2$. |

| PAPER 5501 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | (a) | $\frac{11}{12}-\frac{10}{12}$ | $\frac{1}{12}$ | 2 | M1 for correctly writing both fractions to a common denominator<br>A1 for $\frac{1}{12}$ oe |
| | (b) | $\frac{70\times400}{200}$ | 140 | 2 | B2 for 140 (accept 136)<br>(B1 for sight of any two of 70, 400 or 200) |
| 16 | (a) | | $2y$ | 1 | B1 for $2y$ or $2\times y$, $y2$, $y\times2$ |
| | (b) | | $3p^2$. | 1 | B1 for $3p^2$ or $3\times p^2$ or $p^2\times3$ or $p^2 3$ |
| | (c) | | $x(x-3)$ | 2 | B2 for $x(x-3)$<br>(B1 for $x$ ($x$…….))<br>$\frac{25}{60}$ wrongly cancelled gets B1 ISW |
| 17 | (a) | | 2 23 9 34<br>15 2 9 26<br>17 25 18 60 | 3 | B3 for all correct<br>(B2 for 4 or 5 entries correct)<br>(B1 for 2 or 3 entries correct) |
| | (b) | | $\frac{25}{60}$ | 1 | B1 for $\frac{25}{60}$ or $\frac{5}{12}$ oe<br>$\frac{25}{60}$ wrongly cancelled gets B1 ISW |

| PAPER 5501 | | | | | |
|---|---|---|---|---|---|
| | **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | (a)(i) | | 60 | 2 | B1 for 60 |
| | (ii) | | | | B1 for all **angles equal** so equilateral triangle oe |
| | (b)(i) | | 130 | 3 | B1 for 130 |
| | (ii) | | | | B1 for isosceles triangle oe or 2 angles equal accept $\angle Q = \angle R$<br>B1 for angles on a straight **line** add up to **180°**oe (180° could be in working) |
| | (c) | | 64 | 1 | B1 for 64 |
| 19 | (a) | | 1 | 1 | B1 for 1 |
| | (b) | | 3 | 1 | B1 for 3 |
| | (c) | $9\times1+3\times2+5\times3+3\times4$ (= 42)<br>"42" ÷ 20 | 2.1 | 3 | M1 for $9\times1$, $3\times2$, $5\times3$, $3\times4$ or for 42 seen<br>M1 (dep) for "42" ÷ 20<br>A1 for 2.1 or $2\frac{1}{10}$ or $2\frac{2}{20}$ |
| 20 | (a) | | 09 05 | 1 | B1 for 09 05 oe |
| | (b) | | 7 | 1 | B1 for 7 |
| | (c) | | 10 | 1 | B1 for 10 |
| | (d) | 7km in 20 mins | 21 | 3 | B1 for 20 (minutes) oe or $\times3$ seen<br>M1 for $\frac{"7"}{"20"}$<br>A1 cao<br>[SC: "7" × 3 seen gets B1 M1] |

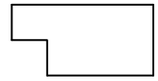
| PAPER 5501 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 21 | Vertices of new triangle at<br>(2, −2) (2, 6) and (6, −2) | Correct triangle drawn | 3 | B3 cao<br>(B2 for either correct triangle in wrong translated position or<br>for 2 vertices correct)<br>(B1 a right angled triangle with horizontal length 4 or vertical length 8 in the same orientation as the shaded triangle)<br>SC B2 for s + 3 totally correct |
| 22 (a)<br>(b)<br>(c) | <br><br>8560 ÷ (10 × 10) | 8<br>Pentagon<br>85.6 | 1<br>1<br>2 | B1 for 8<br>B1 for pentagon<br>M1 for 8560 ÷ (10 × 10) oe<br>A1 for 85.6 |
| 23 | $2x + x + 100 + 47 = 360$<br>$2x + x = 360 - 100 - 47$<br>$x = 71$<br>Largest angle = $2x$ = | 142 | 4 | M1 for $2x + x + 100 + 47 = 360$ or 360 – 147 or 213 seen<br>M1 dep for correctly separating $x$-terms and non $x$ terms or "360 – 147" ÷ 3<br>A1 for $x = 71$provided M2 awarded<br>A1 ft for 142 |

| PAPER 5502 | | | | | |
|---|---|---|---|---|---|
| | **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | | Diagram | 1 | B1 cao |
| | (b) | | 22, 26 | 1 | B1 cao |
| | (c) | | 46 | 1 | B1 cao |
| 2 | (a) | £5.95 + £1.62 + 25p + 2 × 48p = £8.78 | 1.22 | 3 | M1 for 3 of £5.95, £1.62, 25p, 48p seen with intention to add or 170 seen<br>A1 for £8.78<br>A1 ft from " 8.78" |
| | (b) | 160 ÷ 12 = 13.(333…) | 14 | 2 | M1 for 160 ÷ 12, or 13 or better or 12 × 13 or 12 × 14<br>A1 14 cao |
| | (c) | "14" × £12.20 = £170.8**0** | 170.80 | 2 | M1 for "14" × 12.20<br>A1 for 170.8**0** or 158.6**0** if 13 in (b)<br>NB: 170.8 or 158.6 gets M1 A0 |
| 3 | (a)(i) | | 1459 | 1 | B1 cao |
| | (ii) | | 9541 | 1 | B1 cao |
| | (b) | | 9 + 5 = 14 | 1 | B1 cao |
| | (c) | | 0 | 1 | B1 cao |
| 4 | (a) | | 1123 | 1 | B1 cao |
| | (b) | | 1125 | 1 | B1 cao |
| | (c) | | 43 | 1 | B1 cao |
| | (d) | 67 – "43" | 24 | 2 | M1 for 67 – "43"<br>A1 ft from "43" |
| | (e)(i) | | 80 | 2 | B1 cao |
| | (ii) | | 56 – 58 | | B1 answer in range 56 to 58 inc |
| | (f) | | Completes graph | 2 | B2 for (Apr , 70) and (May , 60 < p < 65) plotted and joined (B1 for one point plotted) |

| PAPER 5502 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | (a)(i) | | 4 | 1 | B1 cao |
| | (ii) | | 10 | 1 | B1 cao |
| | (b) | | 28 | 2 | B2 for 28<br>(B1 for 29 or $14 \times 2$) |
| 6 | (a) | | $\frac{3}{4}$ | 1 | B1 accept 0.75, 75% |
| | (b) | $\frac{3}{4} \times 28 = 21$ | 15.54 | 3 | M1 for $\frac{3}{4} \times 28$ or 21 seen<br>M1 for "21" $\times$ 74 or $28 \times 74$ or $7 \times 74$<br>A1 cao |
| | (c)(i) | | 44 – 46 | 2 | B1 44 – 46 inc |
| | (ii) | | 5.2 – 5.4 | | B1 5.2 – 5.4 inc |
| 7 | (a) | | Correct shape | 1 | B1 |
| | (b) | | Correct shape | 1 | B1 |
| 8 | (a) | | Hexagon | 1 | B1 |
| | (b) | | Right | 1 | B1 cao |
| | (c) | | Drawing | 2 | B2 for 7 additional hexagons with at least 2 points at which 3 hexagons meet<br>(B1 for one point at which 3 hexagons meet) |
| 9 | (a) | | $\frac{3}{4}$ | 2 | M1 $\frac{80-20}{80}$ or $\frac{60}{80}$ or 0.75 (oe)<br>A1 cao Do not accept equivalents |
| | (b) | | 15 | 1 | B1 cao |
| | (c) | | Iron and Cook set | 1 | B1 for both Accept mixer and fryer |
| | (d) | | Microwave | 1 | B1 cao |
| | (e) | | Bar chart | 2 | B1 one column (mixer): 70, 90<br>B1 second column (fryer): 70, 85<br>[SC: B1 columns correct but reversed] |

| PAPER 5502 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | (a) | | Acute | 1 | B1 |
| | (b) | | Reflex | 1 | B1 |
| | (c) | | reason | 1 | B1 reason eg 120 + 230 = 350 ≠ 360 |
| 11 | (a) | | $\frac{1}{2}$ | 1 | B1 for $\frac{1}{2}$ oe |
| | (b) | | reason | 1 | B1 for reason e.g could get 30 heads |
| 12 | (a) | $7.5 \times 4$ | 30 | 2 | M1 for $7.5 \times 4$ or $7\frac{1}{2} \times 4$<br>A1 cao |
| | (b) | $\sqrt{(42.25)}$ | 6.5 | 2 | B2 for 6.5 (B1 for 42.25) |
| 13 | (a) | | $6x$ | 1 | B1 accept $6 \times x$, $x6$ oe |
| | (b) | | $x - 4$ | 1 | B1 cao |
| | (c) | | $12(x - 4)$ | 1 | B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe |
| | (d) | | $18x - 48$ | 2 | M1 for "$6x$" + "$12(x-4)$" or "$6x$" + "$12x - 48$" oe<br>A1 ft $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$ |
| 14 | (a) | | 90 | 2 | B2 for $90 \pm 2$ (B1 for $9 \pm 0.2$) |
| | (b) | | 317 | 1 | B1 for $317 \pm 4$ |
| 15 | (a) | Accurate drawing of triangle | | 2 | B1 cao for 38° (±2°)<br>B1 cao (indep) for BC drawn 7.3 cm (±2mm) and completing the triangle. |
| | (b) | Measure angle A | 63° | 1 | B1 for 63° (±2°) or ft their diagram (±2°) |

| PAPER 5502 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 16 | (a) | 0 × 1 = 0<br>1 × 1 = 1<br>2 × 4 = 8<br>3 × 8 = 24<br>4 × 8 = 32<br>5 × 7 = 35 | 100 | 3 | M1 col 1 × col 2 (at least 3 shown)<br>M1 (dep) sum of totals<br>A1 cao<br>SC: M1 M1 A0 for 101 |
| | (b) | Either<br>35.50 ÷ 1.42 = 25; 26.99 – 25 = 1.99<br>Cheaper in the USA<br>Or<br>26.99 × 1.42 = 38.33; 38.33 – 35.50 = 2.83<br>Cheaper in the USA | | 3 | M1 35.50 ÷ 1.42<br>A1 25 seen<br>B1 ft (dep on M1) £1.99 with conclusion (must have units)<br>**OR**<br>M1 26.99 × 1.42<br>A1 38.32 or 38.33… seen<br>B1 ft (dep on M1) $2.83 or $2.82 with conclusion (must have units) must be to 2dp |
| 17 | (a) | | -1, (1), (3), 5, 7, 9 | 2 | B2 cao<br>(B1 for 2 values) |
| | (b) | | Graph | 2 | B1 ft for plotting points ±1/2 square<br>B1 cao for line between $x = -2$ and $x = 3$ |
| | (c)(i) | | 0.4 | 2 | B1 for 0.4 or ft from single straight line with positive gradient |
| | (ii) | | 1.2 | | B1 for 1.2 or ft from single straight line with positive gradient |

| PAPER 5502 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 18 | (a) | | Plots | 1 | B1 cao |
| | (b) | | description | 1 | B1 dynamic relationship or "positive" (correlation) |
| | (c) | | line of best fit | 1 | Line within overlay region, and to the extent of. |
| | (d)(i) | 280 g → | reading | 2 | B1 ft from single straight line of positive gradient (±1/2 square) |
| | (ii) | 120 pages → | reading | | B1 ft from single straight line of positive gradient (±1/2 square) |
| 19 | | | 200<br>150<br>225<br>150<br>10 | 3 | B3 cao<br>(B2 for three correct, or B1 for one correct) |
| 20 | (a) | |  | 2 | B1 B1 for correct sketch – ignore additional internal lines<br>B1 B0 for rectangle or right-angled triangle or correct shape without line<br>NB 3-D sketch gets B0 B0 |
| | (b) | |  | 2 | B1 B1 for correct plan – ignore internal lines – accept a rotated plan, not reflected<br>B1 B0 for a single rectangle drawn<br>NB 3-D sketch gets B0 B0 |
| 21 | (a) | 163.25 – 35.50 = 127.75<br>127.75 ÷ 18.25 = 7 | 8 | 3 | M1 163.25 – 35.50 (or sight of 127.75)<br>M1 (dep) "127.75" ÷ 18.25<br>A1 cao<br>SC: M2 for 7 days |
| | (b) | 1.175 × £64 or $\frac{17.5}{100}$ × 64 or £11.20 seen | 75.20 | 2 | M1 1.175 × 64, 0.175 × 64 oe or 11.20 or 75.2 seen or 6.40, 3.20 and 1.60 seen<br>A1 cao |

| PAPER 5502 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 22 | (a) | | 6 | 1 | B1 cao |
| | (b) | | $t^2 - 2t$ | 1 | B1 oe |
| | (c ) | | $3(y - 4)$ | 1 | B1 Accept $3 \times (y - 4)$ or $3(y - 4$ |
| 23 | (a) | | Reason | 1 | B1 Makes some mention of bias either directly or making reference to an insufficient or biased range of responses |
| | (b) | | Reason | 1 | B1 (a) an insufficient range of responses<br>(b) No mention of money<br>(c) No time frame in the question<br>(d) Misunderstanding of "A lot" and "Not much" |

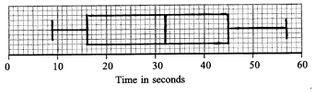
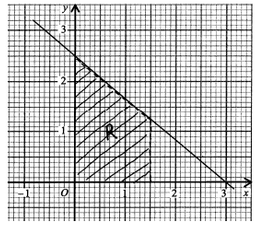
| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | | 10. | 1 | B1 for 10 |
| 2 | (a)(i) | | $3e + 2f$ | 2 | B1 for $3e + 2f$ |
| | (ii) | | $3p^2$ | | B1 for $3p^2$ |
| | (b) | $5 \times -3 + 1$ | $-14$ | 2 | M1 for $5 \times -3 + 1$<br>A1 for $-14$ |
| 3 | | 1974<br>$\frac{6580}{8554}$ | 855.4 | 3 | M1 for complete correct method with relative place value correct, condone 1 error in multiplication.<br>A2 cao<br>(A1 for digits 8554 seen or A1 ft for "855.4" dependent on one arithmetic error only) |
| 4 | (a) | | 2 23 9 34<br>15 2 9 26<br>17 25 18 60 | 3 | B3 all correct<br>(B2 for 4 or 5 entries correct)<br>(B1 for 2 or 3 entries correct) |
| | (b) | | $\frac{25}{60}$ | 1 | B1 for $\frac{25}{60}$ or $\frac{5}{12}$ oe |
| 5 | (a) | $\frac{45}{100} \times 800$ | 360 | 2 | M1 for $\frac{45}{100} \times 800$ oe<br>A1 for 360 |
| | (b) | $\frac{176}{800} \times 100$ | 22 | 2 | M1 for $\frac{176}{800} \times 100$ oe<br>A1 for 22 |

| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 6 | (a) | $\frac{11}{12}-\frac{10}{12}$ | $\frac{1}{12}$ | 2 | M1 for correctly writing both fractions to a common denominator<br>A1 for $\frac{1}{12}$ oe |
| | (b) | $\frac{70\times400}{200}$ | 140 | 2 | B2 for 140 (accept 136)<br>(B1 for sight of any two of 70, 400 or 200) |
| 7 | (a)(i) | | 60 | 2 | B1 for 60 |
| | (ii) | | | | B1 for all angles equal so equilateral triangle oe |
| | (b)(i) | | 130 | 3 | B1 for 130 |
| | (ii) | | | | B1 for isosceles triangle oe<br>B1 for angles on a straight line add up to 180°oe |
| | (c) | | 64 | 1 | B1 for 64 |
| 8 | | $9\times1+3\times2+5\times3+3\times4$ (=42)<br>"42" ÷ 20 | 2.1 | 3 | M1 for $9\times1$, $3\times2$, $5\times3$, $3\times4$ or for 42 seen<br>M1 (dep) "42" ÷ 20<br>A1 for 2.1 or $2\frac{1}{10}$ or $2\frac{2}{20}$ |
| 9 | (a) | | 09 05 | 1 | B1 for 09 05 oe |
| | (b) | | 7 | 1 | B1 for 7 |
| | (c) | | 10 | 1 | B1 for 10 |
| | (d) | 7 km in 20 minutes | 21 | 3 | B1 for 20 (minutes) oe or $\times3$ seen<br>M1 for $\frac{"7"}{"20"}$<br>A1 cao<br>SC: "7" $\times3$ gets B1 M1 |

| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | | Vertices of new triangle at<br>(2, −2) (2, 6) and (6, −2) | Correct triangle drawn | 3 | B3 cao<br>(B2 for either correct triangle in wrong translated position or<br>for 2 vertices correct)<br>(B1 for a right-angled triangle with horizontal length 4 or vertical length 8 in the same orientation as shaded triangle)<br>SC B2 for scale factor 3, totally correct |
| 11 | | $2^2 + 3 =$ | 7 which is not even | 2 | B2<br>(B1 for correctly evaluating $n^2 + 3$ with a prime number value for $n$.) |
| 12 | (a) | 360 ÷ 5 | 72 | 2 | M1 for 360 ÷ 5 oe<br>A1 for 72 |
| | (b) | 8560 ÷ (10 × 10) | 85.6 | 2 | M1 for 8560 ÷ (10 × 10) oe<br>A1 for 85.6 |
| | (c)(i) | Least length = 100.5 | 100.5 | 2 | B1 for 100.5 |
| | (ii) | Greatest length = 101.5 | 101.5 | | B1 for 101.5 or 101.499 or better |
| 13 | | $2x + x + 100 + 47 = 360$<br>$2x + x = 360 - 100 - 47$<br>$x = 71$<br>Largest angle = $2x$ = | 142 | 4 | M1 for $2x + x + 100 + 47 = 360$ or 360 – 147 or 213 seen<br>M1 (dep) for correctly separating $x$-terms and non $x$ terms or $\frac{"360-147"}{3}$<br>A1 for $x = 71$<br>A1 ft (provided M2 awarded) for "142" |
| 14 | (a)(i) | | 2.21 | 2 | B1 for 2.21 |
| | (ii) | | 0.013 | | B1 for 0.013 |
| | (b) | LCM = 3 × 13 × 17 = 3 × 221 | 663 | 2 | M1 for 3 × 13 × 17 oe<br>A1 for 663 |

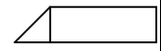
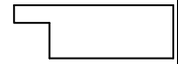
| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | | | Tick boxes 1,3 & 6 | 3 | B1 for $\frac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2\left(c^2+d^2\right)$<br>(−B1 for each additional expression ticked (>3) to a minimum of 0) |
| 16 | | $200 \times 0.2$ | 40 | 2 | M1 for $200 \times 0.2$ or $\frac{40}{200}$ seen<br>A1 for 40 |
| 17 | (a) | eg 2 \| 108<br>2 \| 54<br>3 \| 27<br>3 \| 9<br>3 | $2^2 \times 3^3$ | 3 | M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error<br>(M1 for 108 written as a correct product(s) with only one non-prime or equivalent division or a full process with 2 calculation errors.)<br>A1 for $2^2 \times 3^3$ (accept $2 \times 2 \times 3 \times 3 \times 3$) |
| | (b) | | 12 | 1 | B1 for 12 |
| 18 | | Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2cm long | | 2 | M1 relevant pair of arcs crossing within tramlines<br>A1<br>SC M1 AO for a full construction of a perpendicular to AB not passing through P. |
| 19 | | $15 \times 10$ | 150 $cm^3$. | 3 | M1 for $15 \times 10$<br>A1 for 150<br>B1 for $cm^3$. |

| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | | | $y = 2x + 6$ | 2 | B2 for $y = 2x + 6$<br>(B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, m $\neq 0$ or for $2x + 6$) |
| 21 | | $6\frac{2}{5} = \frac{32}{5}$<br>Area of triangle = $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ (=2)<br>Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6)<br>Perimeter of square = 4 × 6 | 24 | 5 | B1 for $6\frac{2}{5} = \frac{32}{5}$ oe or $3\frac{1}{5} = \frac{16}{5}$ or $\frac{30}{8} + \frac{2}{8}$ oe (or implied by area of triangle=2)<br>M1 for $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ oe<br>M1 for area of square = 18 × product of two lengths<br>A1 for $\sqrt{18 \times "2"}$<br>A1 for 24 |
| 22 | (a) | | $x(x-3)$ | 2 | B2 for $x(x-3)$<br>(B1 for $x$ (…….)) |
| | (b) | | $k^3$. | 1 | B1 for $k^3$. |
| | (c)(i) | $4x + 20 + 3x - 21$ | $7x - 1$ | 4 | M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better)<br>A1 for $7x - 1$ |
| | (ii) | $x^2 + 3yx + 2xy + 6y^2$ | $x^2 + 5xy + 6y^2$ | | M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$<br>A1 for $x^2 + 5xy + 6y^2$ |
| | (d) | | $(p+q)(p+q+5)$ | 1 | B1 for $(p+q)(p+q+5)$ |

| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 23 | (a) | | 32 | 1 | B1 for 32 (accept 31.5 to 33.5 inclusive) |
| | (b) |  | | 3 | B1 for ends of whiskers at 9 and 57, (with a box)<br>B1 for ends of box at 16 and 45 ($\pm 0.5$)<br>B1 for median marked at 32 or a complete box and whisker diagram drawn with a median inside the box |
| | | Median(B)>Median(G); on average boys take longer | | | |
| | (c) | IQR(B)>IQR(G); times for boys have a greater spread | | 2 | B1 eg for comparison of medians<br>B1 eg for comparison of (interquartile) ranges |
| 24 | (a) | $6y = 15 - 5x$ | $y = \frac{15-5x}{6}$ | 2 | M1 for either $6y = 15 - 5x$ or -6 $y = 5x - 15$ or for $\frac{5x}{6} + y = \frac{15}{6}$ or a correct ft on sign error to $y=$<br>A1 for $y = \frac{15-5x}{6}$ oe |
| | (b) | $6k + 5(-21) = 15$ | 20 | 2 | M1 for substitution of $x = -21$ (or $x = 21$) into given equation or candidate's answer to (a)<br>A1 for $k = 20$ |
| | (c)(i) |  | Region R indicated | 3 | B2 correct region shaded (accept unshaded if R clear)<br>(B1 shaded or R region satisfies 3 of the 4 given inequalities with same boundaries) |
| | (ii) | | (1,1) | | B1 for (1,1) |

| PAPER 5503 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 25 | (a) | | 60 | 1 | B1 for 60<br>B1 for *BDC* = 25 |
| | (b) | eg Angle *BDC* = 25<br>*ADB* = 60 − 25 | 35 | 2 | [Award the mark for equivalent approaches]<br>B1 ft for (a) − 25 |
| | (c) | Ben is correct; angle *DAB* = 65 + 25 = 90 and since angle in a semi-circle is 90°, *BD* must be a diameter | | 1 | B1 for full valid justification |

| PAPER 5504 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 1 | (a) | Accurate drawing of triangle | | 2 | B1 cao for 38º (±2º)<br>B1 cao (indep) for BC drawn 7.3 cm (±2mm) and completing the triangle. |
| | (b) | Measure angle A | 63º | 1 | B1 for 63º (±2º) or ft their diagram (±2º) |
| 2 | (a) | 0 × 1 = 0<br>1 × 1 = 1<br>2 × 4 = 8<br>3 × 8 = 24<br>4 × 8 = 32<br>5 × 7 = 35 | 100 | 3 | M1 col 1 × col 2 (at least 3 shown) could be implied by answers.<br>M1 (dep) sum of totals<br>A1 cao<br>SC: M1 M1 A0 for 101 |
| | (b) | Either<br>$35.50 ÷ 1.42 = £25; £26.99 - £25 = £1.99<br>Cheaper in the USA<br>Or<br>£26.99 × 1.42= $38.33; $38.33 - $35.50 = $2.83<br>Cheaper in the USA | | 3 | M1 35.50 ÷ 1.42<br>A1 25 seen<br>B1 ft (dep on M1) £1.99 with conclusion; units needed<br>OR:<br>M1 26.99 × 1.42<br>A1 38.33 or 38.32…seen<br>B1 ft (dep on M1) $2.83 or $2.82 with conclusion; units needed |
| 3 | (a) | | -1, (1), (3), 5, 7, 9 | 2 | B2 cao<br>(B1 for 2 values) |
| | (b) | | Graph | 2 | B1 ft for plotting points ±1/2 square<br>B1 cao for line between $x = -2$ and $x = 3$ |
| | (c)(i) | | 0.4 | 2 | B1 0.4 or ft single straight line with positive gradient |
| | (ii) | | 1.2 | | B1 1.2 or ft single straight line with positive gradient |

| PAPER 5504 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 4 | (a) | |  | 2 | B1 Rectangle drawn<br>B1 Triangle attached<br>Ignore additional internal lines; 3D sketch gets B0 |
| | (b) | |  | 2 | B1 single Rectangle drawn<br>B1 Attached smaller rectangle drawn<br>Accept rotated plan, Ignore internal lines down; Nets get B0 |
| 5 | (a) | £163.25 - £35.50 = £127.75<br>£127.75 ÷ £18.25 = 7 | 8 | 3 | M1 163.25 – £35.50 (or sight of £127.75)<br>M1 (dep) "127.75" ÷ 18.25<br>A1 cao<br>SC: M2 for 7 days |
| | (b) | 1.175 × £64 or $\frac{17.5}{100}$ × 64 or £11.20 seen | 75.20 | 2 | M1 1.175 × 64.00 0.175 × 64 oe or 11.20 or 75.2 seen<br>OR<br>6.40, 3.20, and 1.60 seen<br>A1 cao |
| | (c) | 54 × £2.38 = | 128.52 | 2 | M1 54 × £2.38<br>A1 cao |
| 6 | | Tessellation | Drawing | 2 | B2 seven additional hexagons, with at least 2 points at which 3 hexagons meet<br>(B1 one point at which 3 hexagons meet). |
| 7 | | | 200<br>150<br>225<br>150<br>10 | 3 | B3 cao<br>(B2 for three correct, or B1 for one correct) |
| 8 | (a)(i) | Bearing measured | 70 | 2 | B1 70 ± 4 |
| | (ii) | Bearing measured | 317 | | B1 317 ± 4 |
| | (b) | Locus (circle) drawn & shaded | | 2 | B1 circle ±2 mm centre Manchester<br>B1 shading with accurate or approximate circle within tolerance |

| PAPER 5504 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 9 | (a) | | Plots | 1 | B1 cao |
| | (b) | | Description | 1 | B1 dynamic relationship or "positive" (correlation) |
| | (c) | | Line of best fit | 1 | Line within overlay region, and to the extent of. |
| | (d)(i) | 280 g → | Reading | 2 | B1 ft from single straight line of positive gradient (±1/2 square)<br>B1 ft from single straight line of positive gradient (±1/2 square) |
| | (ii) | 120 pages → | Reading | | |
| 10 | (a) | $\frac{1}{6}, \frac{3}{8}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ | | 2 | B2 for all correct<br>(B1 for 1 error or all correct but wrong order, or use of a common denominator decimals). |
| | (b) | 3/5, 65%, 2/3, 0.72, 3/4 | | 2 | B2 for all correct<br>(B1 for 1 error or all correct but wrong order or conversions to decimals oe) |
| 11 | (a) | | 182, 178, 180, 184 | 2 | M1 mean of any three consecutive months, eg (147 + 161 + 238) ÷ 3 oe<br>A1 cao |
| | (b) | Sale price = 80%<br>Fun Friday price = 70% of 80% = 56% (oe) | | 2 | B1 B1 for a fully correct explanation involving a worked example (oe)<br>B1 a partially complete explanation |

| PAPER 5504 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 12 | (a) | | Reason | 1 | B1 makes a mention of bias, either directly, or making reference to an insufficient or biased range of responses. |
| | (b)(i) | | Reason | 1 | B1 make some mention of any one of (a) an insufficient range of responses (b) no mention of money (c) no time frame in the question (d) misunderstanding of "a lot" or "not much" |
| | | | | | B2 |
| | (ii) | | Question | 2 | B1 for each of the following upto B2<br>(a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors<br>OR<br>For suggesting a generally improved question<br>(a) a question clearly in the context of changes to the canteen<br>(b) at least 3 boxes showing a full range of responses |
| 13 | (a) | $20y - 18y = 16 - 9$ oe<br>$2y = 7$ | $3\frac{1}{2}$ oe | 3 | M1 $20y - 18y = 16 - 9$ oe<br>M1 $2y = 7$<br>A1 cao |
| | (b) | $40 - x = 3(4 + x)$<br>$40 - x = 12 + 3x$<br>$40 - 12 = x + 3x$<br>$4x = 28$ | 7 | 3 | M1 multiplying through by 3: $3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$<br>A1 $40 - 12 = x + 3x$<br>A1 cao |
| 14 | (a) | | $12(x\text{-}4)$ | 1 | B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe<br>$x = 12\ (x - 4)$ gets B0 |
| | (b) | | $18x\text{-}48$ | 2 | M1 $6x +$ "$12(x - 4)$" or $6x +$ "$12x - 48$"<br>A1 ft a linear expression $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$ |

| PAPER 5504 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | | $x$ $x^3 - 2x$<br>4.1 60.7(21)<br>4.2 65.6(88)<br>4.3 70.9(07) Accept answer to 1 dp<br>4.22 66.7(114) or more<br>4.23 67.2(269)<br>4.24 67.7(45)<br>4.25 68.2(656) | 4.2 | 4 | B2 for trial $4.1 \leq x \leq 4.3$ evaluated<br>(B1 for trial $4 < x < 5$ evaluated)<br><br>B1 for different trial $4.225 \leq x \leq 4.25$ evaluated<br><br>B1 (dep on at least one previous B1) for 4.2 cao |
| 16 | (a) | | $1.0 \times 10^{-9}$ | 1 | B1 accept $1 \times 10^{-9}$ or just $10^{-9}$ |
| | (b) | $1 \div 5 \times 10^{-9}$ | $2 \times 10^{8}$ | 2 | M1 for $1 \div$ ("$5 \times 10^{-9}$") or digit 2 with zeros only seen<br>Condone omission of bracket for M1.<br>A1 cao |
| 17 | (a) | $\frac{6.27 \times 4.52}{4.81 + 9.63} = \frac{28.3404}{14.44} = 1.962631579$ | 1.9626… | 2 | B2 for 1.9626…<br>(B1 for 28.34 or 14.44) |
| | (b) | | 1.96 | 1 | B1 ft from (a) as rounded to 1dp or 2dp.<br>Do not accept 2, 2.00, but accept 2.0 |
| 18 | | | $d = 4n + 6$ | 2 | B2 $d = 4n + 6$ oe<br>(B1 $d = 4n + k$, $k$ an integer or 0, $4n + 6$, $n = 4n + 6$) |
| 19 | | Vol = $\pi \times 3.8^2 \times 2.5 = \pi \times 14.44 \times 2.5$<br>= 45.36… × 2.5 = 113.411<br>Mass = "113" × 1.5 = 170.1165 | 170 | 4 | M1 for $\pi \times r^2 \times 2.5$ where $r$ = is 3.8 or 7.6<br>A1 if $r = 3.8$<br>M1 for "113" × 1.5<br>A1 for 169.5 – 170.3 cao |

| PAPER 5504 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 20 | (a) | $10^2 + 6^2$ or 136<br>$\sqrt{(100+36)}$ or $\sqrt{136} = 11.66\ldots$ | 11.7 | 3 | M1 $10^2 + 6^2$ or 136 seen<br>M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$<br>A1 11.66 – 11.7 |
| | (b) | $\cos x = \frac{8}{10}$ or 0.8<br>$x = \cos^{-1} 0.8 = 36.869^o$ | 36.9 | 3 | M1 for $\cos = \frac{8}{10}$, cos = 0.8 (oe)<br>M1 (dep) for $\cos^{-1}$ (oe)<br>A1 for 36.86 – 36.9 |
| 21 | | $18x - 6y = 99$ $\quad 12x - 4y = 66$<br>$8x + 6y = 18$ $\quad 12x + 9y = 27$<br>$26x = 117$ $\quad -13y = 39$ | $x = 4\frac{1}{2}$<br>$y = -3$ | 4 | M1 correct process to eliminate either $x$ or $y$ (condone one error)<br>A1 cao for non – eliminated one.<br>M1 (dep on 1st M1) for correct substitution of their found value.<br>A1 cao (need both) |
| 22 | | $\frac{133}{72} = 1.8472, \frac{160}{82} = 1.9512$<br>OR<br>$\frac{72}{133} = 0.54135, \frac{82}{160} = 0.5125$<br>OR<br>$\frac{160}{133} = 1.203...., \frac{82}{72} = 1.1388....$<br>OR<br>$\frac{133}{160} = 0.83125...., \frac{72}{82} = 0.878$ | 1.84..≠ 1.95..<br>1.20..≠ 1.13.. | 3 | M1 for $\frac{133}{72}$ (= 1.8472…) oe Accept 1.8, 1.85<br>M1 for $\frac{160}{82}$ (=1.9512…) oe consistent pairing Accept 2.0, 1.9<br>**OR** M1 for $\frac{160}{133}$ (= 1.203…) oe<br>M1 for $\frac{82}{72}$ (=1.1388) oe<br>A1 for enough decimal places to show that the ratios are not equal; since the scale factors are different the shapes cannot be similar.<br>NB Do Not need conclusion |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 23 | (a) | | 0.4, 0.6<br>0.4, 0.6,<br>0.4 | 2 | B1 for LHS: (0.6), 0.4<br>B1 for RHS: 0.6, 0.4, 0.6, 0.4 |
| | (b) | (30 × 42) – (25 × 42.8) = 1260 – 1070 = 190<br>190 ÷ 5 = | 38 | 3 | M1 for (30 × 42) – (25 × 42.8) or 1260 – 1070 or 190 seen<br>M1 (dep) for "190" ÷ 5<br>A1 cao |
| 24 | (a) | £12000 × 0.25 = £3000; £12000 – £3000 = £9000<br>£9000 × 0.25 = £2250; £9000 – £2250 = £6750<br>£6750 × 0.25 = £1687.50; £6750 – £1687.50 = | £5062.50 | 3 | M1 for 12000 × 0.75 (=9000) oe or £3000 or £23437.50 seen<br>M1 (dep) for at least two further depreciation calculations (complete steps)<br>A1 cao<br>**OR** M2 for $12000 \times (0.75)^3$ or 5062.50 seen<br>(M1 for $12000 \times (0.75)^n$, $n = 2$ or 4) |
| | (b) | 0.8 × 0.8 × 0.8 × 0.8 (oe) | 0.4096 | 2 | M1 $0.8^4$ (oe)<br>A1 cao |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 1 | (a)(i)<br>(ii)<br>(b) | <br><br>LCM = 3 × 13 × 17 = 3 × 221 | 2.21<br>0.013<br>663 | 2<br><br>2 | B1 for 2.21<br>B1 for 0.013<br>M1 for 3 × 13 × 17 oe<br>A1 for 663 |
| 2 | | | Tick boxes 1,3 & 6 | 3 | B1 for $\frac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2(c^2 + d^2)$<br>(−B1 for each additional expression ticked (>3) to a minimum of 0) |
| 3 | (a)<br><br><br>(b) | 200 × 0.2<br><br><br>0.2 + 0.4 | 40<br><br><br>0.6 | 2<br><br><br>2 | M1 for 200 × 0.2 or $\frac{40}{200}$ seen<br>A1 for 40<br>M1 for 0.2 + 0.4<br>A1 for 0.6 |
| 4 | (a)<br><br><br><br><br><br>(b) | eg 2 \| 108<br>2 \| 54<br>3 \| 27<br>3 \| 9<br>3<br><br><br><br>12 | $2^2 \times 3^3$<br><br><br><br><br><br>12 | 3<br><br><br><br><br><br>1 | M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error<br>(M1 for 108 written as a correct product with only one non-prime or equivalent division or a full process with 2 calculation errors.)<br>A1 for $2^2 \times 3^3$ (accept 2 × 2 × 3 × 3 × 3)<br><br>B1 for 12 |
| 5 | | Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2 cm long | | 2 | M1 relevant pair of arcs crossing within tramlines<br>A1<br>SC M1A0 for full construction of a line perpendicular to AB not through P |
| 6 | | 15 × 10 | 150 $cm^3$. | 3 | M1 for 15 × 10<br>A1 for 150<br>B1 for $cm^3$ |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 7 | (a) | | $k^3$. | 1 | B1 for $k^3$. |
| | (b)(i) | $4x + 20 + 3x - 21$ | $7x - 1$ | 4 | M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better)<br>A1 for $7x - 1$ |
| | (ii) | $x^2 + 3yx + 2xy + 6y^2$ | $x^2 + 5xy + 6y^2$ | | M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$<br>A1 for $x^2 + 5xy + 6y^2$ |
| | (c) | | $(p+q)(p+q+5)$ | 1 | B1 for $(p+q)(p+q+5)$ |
| | (d) | | $m^8$ | 1 | B1 for $m^8$. |
| | (e) | | $6r^3t^6$ | 2 | B2 for $6r^3t^6$<br>(B1 for $.....r^3t^6$ or for $6....t^6$ ) |
| 8 | (i) | Least length = 100.5 | 100.5 | 2 | B1 for 100.5 |
| | (ii) | Greatest length = 101.5 | 101.5 | | B1 for 101.5; ACCEPT 101.499 or better |
| 9 | | $6\frac{2}{5} = \frac{32}{5}$<br>Area of triangle = $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ (= 2)<br>Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6)<br>Perimeter of square = 4 × 6 | 24 | 5 | B1 for $6\frac{2}{5} = \frac{32}{5}$ oe or $3\frac{1}{5} = \frac{16}{5}$ oe or $\frac{30}{8} + \frac{2}{8}$ oe (or implied by area of triangle=2)<br>M1 for $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ oe<br>M1 for (area of square) = 18 × product of two lengths<br>A1 = $\sqrt{18 \times "2"}$<br>A1 for 24 |

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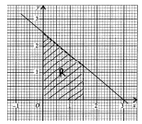
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 10 | (a) | $6y = 15 - 5x$ | $y = \frac{15-5x}{6}$ | 2 | M1 for either $6y = 15 - 5x$ or for $\frac{5x}{6} + y = \frac{15}{6}$ or $-6y = 5x - 15$ or a correct ft on sign error to $y =$<br>A1 for $y = \frac{15-5x}{6}$ oe |
| | (b) | $6k + 5(-21) = 15$ | 20 | 2 | M1 for subst. of $x = -21$ (or $x = 21$) into given eq$^n$ or answer to (a)<br>A1 for $k = 20$ |
| | (c)(i) |  | Region R indicated | 3 | B2 correct region shaded (accept unshaded if R clear)<br>(B1 shaded (R) region satisfies 3 of the 4 given inequalities with same boundaries) |
| | (ii) | | (1,1) | | B1 for (1,1) |
| 11 | (a) | | $y = 2x + 6$ | 2 | B2 for $y = 2x + 6$<br>(B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, $m \neq 0$ or for $2x+6$) |
| | (b) | Grad of $AB = 2$; Grad of $BC = \frac{-1}{"2"}$ | $y = -\frac{1}{2}x + 6$ | 2 | M1 for Grad of $BC = \frac{-1}{"2"}, -\frac{1}{2}$<br>or grad of $BC = -\frac{1}{\text{grad of AB}}$<br>A1 ft for $y = -\frac{1}{2}x + 6$ oe ft on wrong coeff. of $x$ in (a) |
| | (c) | Eg A rectangle is always a cyclic quadrilateral because the opposite angles of a rectangle always add up to 180° (90+90) | | 1 | B1 for valid explanation. (eg lines from the pt of int. of diagonals of rect to all 4 vertices are equal(radii)) |
| 12 | | Vertices of new triangle at<br>$(-1, -4)$ $(-4, 2)$ and $(2, 2)$ | Correct triangle drawn | 3 | B3 cao<br>(B2 for 3 correct vertices no triangle or triangle with 2 correct vertices<br>(B1 for triangle with two of six co-ordinates correct from using P as centre or any isosceles triangle with base 6 and height 6) |

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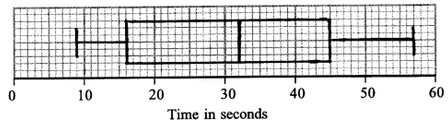
| | No | Working | Answer | Mark | Notes |
| 13 | (a) | | 32 | 1 | B1 for 32 (accept 31.5 to 33.5 inclusive) |
| | (b) |  | | 3 | B1 for ends of whiskers at 9 and 57 (with a box)<br>B1 for ends of box at 16 and 45/46 ($\pm$ 0.5)<br>B1for median marked at "32"or complete box and whisker diagram drawn with a median inside the box |
| | (c) | Median(B)>Median(G); on average boys take longer<br>IQR(B)>IQR(G); times for boys have a greater spread | | 2 | B1 eg for comparison of medians (ft on diagrams)<br>B1 eg for comparison of (interquartile) ranges (ft on diagram) |
| 14 | | Reading top to bottom frequencies are 20; 18; 45; 52 | | 2 | B2 all correct<br>(B1 for one frequency correct) |
| 15 | (a) | $1600 = p\,q^0$.; $400 = pq^2$<br>$q^2 = 0.25$ | $p = 1600$<br>$q = 0.5$ | 3 | M1 for either $400 = pq^2$ or $1600 = pq^0$<br>B1 for $p = 1600$<br>A1 for $q = 0.5$ |
| | (b) | $V = pq^{-2}$ | 6400 | 2 | M1 for recognition that t = –2<br>A1 for 6 400 |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | (a) | (I) $AB = AC$ (triangle $ABC$ is isosceles)<br>(II) PB = PC tangents (from a point to a circle are) equal<br>(III) AP = AP (common side)<br>so the 2 triangles are congruent ,SSS. | | 3 | B3 for I, II, III with congruency reason<br>(B2 for any two of I, II or III)<br>(B1 for any one of the I, II or III) |
| | (b) | $BPC = 20°$<br>$PBC$ (or $PCB$) = 90-1/2 "20" (= 80°)<br>$BAC = PBC$ = "80" | 50° | 4 | B4 for 50°<br>(B3 for $BAC = 80°$)<br>(B2 for $PBC = 80°$ or $PCB = 80°$)<br>(B1 for $APC = 10°$ or $BPC = 20°$ or a middle angle = 90°)<br>SC if clear numerical slip seen eg "$PBC$ = 180 – 90 – 10 = 70" then goes on to get correct ft angle $ABC = 55$ deduct 1 from total so this cand would get B4–1 = B3 |
| 17 | (a) | $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$<br>$= \overrightarrow{OA} + \frac{2}{3}(6\mathbf{c} - 6\mathbf{a})$<br>$= 6\mathbf{a} + 4\mathbf{c} - 4\mathbf{a}$ | $2\mathbf{a} + 4\mathbf{c}$ | 3 | M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ or any correct vector journey involving $\overrightarrow{OP}$<br>M1 for $\overrightarrow{AP} = \frac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ oe or $\overrightarrow{CP} = \frac{1}{3}(-6\mathbf{c} + 6\mathbf{a})$ oe or reverse vectors<br>A1 for $2\mathbf{a} + 4\mathbf{c}$ oe (accept unsimplified) |
| | (b) | Eg $\overrightarrow{OM} = \overrightarrow{OC} + \overrightarrow{CM} = 6\mathbf{c} + 3\mathbf{a}$<br>$\overrightarrow{OM} = 1.5\overrightarrow{OP}$ | $\overrightarrow{OM} = 1.5\overrightarrow{OP}$ so $OPM$ is a straight line | 2 | B1 for $\overrightarrow{OM} = 6\mathbf{c} + \frac{1}{2}(6\mathbf{a})$ or $\overrightarrow{PM} = 2\mathbf{c} + \mathbf{a}$ unsimplified or reverse vectors<br>B1 for a fully correct proof. |

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| | **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | (a) | | 4 | 1 | B1 for 4 condone $\pm$ 4 |
| | (b) | | 2 | 1 | B1 for 2 condone $\pm 2$ |
| | (c) | $\sqrt{160} = 4\sqrt{10}$ ;<br>$\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]\times 100$<br>$\left[\frac{6\sqrt{10}-\sqrt{10}}{6\sqrt{10}}\right]\times 100$ | $\frac{500}{6}$ | 4 | B1 for **either** $\sqrt{160} = 4\sqrt{10}$ or $\sqrt{8} = 2\sqrt{2}$ **or** $\sqrt{20} = 2\sqrt{5}$<br>M1 for $\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]$ oe $(\times 100)$<br>B1 for either $6\sqrt{10} - \sqrt{10}$ or $6\sqrt{10}$<br>A1 for $\frac{500}{6}$ (accept 83.3 if no obvious earlier error) |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 19 | (a)(i) | | $(2x-7)(x-14)$ | 3 | M1 $x^2$ term and constant term $(\pm 98)$ obtained<br>or $2x(x-14) - 7(x-14)$ or $x(2x-7) - 14(2x-7)$<br>A1 for $(2x-7)(x-14)$ |
| | (ii) | | $x = \frac{7}{2}$; $x = 14$ | | B1ft ft (i) provided of form $(2x\pm a)(x\pm b)$ |
| | (b)(i) | | $\frac{7}{n+7}$ | 3 | B1 for $\frac{7}{n+7}$ oe |
| | (ii) | $\frac{7}{n+7} = \frac{2}{5} \Rightarrow 2(n+7) = 5 \times 7$<br>$2n = 21$ | $n=10.5$ is not possible since $n$ has to be an integer | | M1 for $2(n+7) = 5\times 7$ or $n+7=5\times 3.5$ (can be implied) ft (b)(i) fractional in terms of n and < 1<br>A1 ft for $n=10.5$ not possible (since $n$ not integer) oe |
| | (c) | $2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right) = \frac{4}{9}$<br>$14n\times 9 = 4(n+7)^2$<br>$14n\times 9 = 4(n^2+14n+49)$<br>$4n^2+56n+196-126n = 0$ | $2n^2 - 35n + 98 = 0$ | 5 | M1 for $\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ seen<br>M1 for $2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ oe $(=\frac{4}{9})$<br>M1(dep on 1st M) elimination of fractions within an equation<br>B1 3 terms correct in expansion of $(n+7)^2 = n^2 + 7n + 7n + 49$<br>A1 full valid completion to printed answer |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| | (d) | $\frac{7}{n+7}\times\frac{7}{n+7}=\frac{7}{21}\times\frac{7}{21}=$ | $\frac{1}{9}$ | 2 | M1 for $\frac{7}{n+7}\times\frac{7}{n+7}$ or better or ft [answer (b)(i)]$^2$<br>or $1-\frac{4}{9}-(\frac{n}{n+7})^2$<br>A1 for $\frac{1}{9}$ oe cao |
| 20 | (a)(i) | | $y=1+\sin x$ | 2 | B1 for $y=1+\sin x$ |
| | (ii) | | $y=2\sin x$ | | B1 for $y=2\sin x$<br>SC both (i) f($x$) + 1, (ii) 2f($x$) B1 |
| | (b) | Stretch parallel to $y$-axis scale factor 3<br>Stretch parallel to $x$-axis scale factor $\frac{1}{2}$ | | 3 | M1 for 'stretch'<br>A1 for Stretch parallel to $y$-axis scale factor 3 oe<br>A1 for Stretch parallel to $x$-axis scale factor $\frac{1}{2}$ oe<br>SC if M0 award BI for "sf 3 vertically" **and** "sf $\frac{1}{2}$ horizon." |

| PAPER 5506 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | Question | 2 | B1 for each of the following upto B2<br>(a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors<br>OR<br>For suggesting a generally improved question<br>(a) a question clearly in the context of changes to the canteen<br>(b) at least 3 boxes showing a full range of responses |
| 2 | Locus (circle) drawn & shaded | | 2 | B1 circle centre Manchester ±2mm<br>B1 shading with accurate or approximate circle within tolerance |
| 3 (a) | | 182, 178, 180, 184 | 2 | M1 mean of any three consecutive months, eg (147 + 161 + 238) ÷ 3 oe<br>A1 cao |
| (b) | Sale price = 80%<br>Fun Friday price = 70% of 80% = 56% (oe) | | 2 | B1 B1 for a fully correct explanation involving a worked example (oe)<br>B1 a partially complete explanation |
| 4 | $x$ $x^3 - 2x$<br>4.1 60.7(21)<br>4.2 65.6(88)<br>4.3 70.9(07)<br>4.22 66.7(114)<br>4.23 67.2(269)<br>4.24 67.7(45)<br>4.25 68.2(656) | 4.2 | 4 | B2 for trial $4.1 \leq x \leq 4.3$ evaluated<br>(B1 for trial $4 < x < 5$ evaluated)<br><br>B1 for different trial $4.225 \leq x \leq 4.25$ evaluated<br><br>B1 (dep on at least one previous B1) for 4.2 cao |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 5 | (a) | | $1.0 \times 10^{-9}$ | 1 | B1 accept $1 \times 10^{-9}$ or just $10^{-9}$ |
| | (b) | $1 \div (5 \times 10^{-9})$ | $2 \times 10^{8}$ | 2 | M1 for $1 \div$ ("$5 \times 10^{-9}$") or digit 2 with zeros only seen<br>Condone omission of bracket for M1.<br>A1 cao |
| 6 | (a) | $\frac{6.27 \times 4.52}{4.81 + 9.63} = \frac{28.3404}{14.44} = 1.962631579$ | 1.9626… | 2 | B2 for 1.9626…<br>(B1 for 28.34… or 14.44) |
| | (b) | | 1.96 | 1 | B1 ft from (a) as rounded to 1dp or 2dp.<br>Do not accept 2, 2.00, but accept 2.0 |
| 7 | | | $d = 4n + 6$ | 2 | B2 $d = 4n + 6$ oe<br>(B1 $d = 4n + k$, $k$ an integer $\neq 6$, $4n + 6$, $n = 4n + 6$) |
| 8 | | Vol = $\pi \times 3.8^2 \times 2.5 = \pi \times 14.44 \times 2.5$<br>$= 45.36\ldots \times 2.5 = 113.411$<br>Mass = "113" × 1.5 = 170.1165 | 170 | 4 | M1 for $\pi \times r^2 \times 2.5$ where $r$ = is 3.8 or 7.6<br>A1 if $r = 3.8$<br>M1 for "113" × 1.5<br>A1 for 169.5 – 170.3 cao |

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|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 9 | (a) | $10^2 + 6^2$ or 136<br>$\sqrt{(100 + 36)}$ or $\sqrt{136} = 11.66\ldots$ | 11.7 | 3 | M1 for $10^2 + 6^2$ or 136 seen<br>M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$<br>A1 11.66 – 11.7 |
| | (b) | Cos $x$ = 8/10 or 0.8<br>$x = \cos^{-1} 0.8 = 36.869^o$ | 36.9 | 3 | M1 for cos = $\frac{8}{10}$, cos = 0.8(oe)<br>M1 (dep) for $\cos^{-1}$ (oe)<br>A1 for 36.86 – 36.9<br><br>M1 Use of sine rule and $x$ found<br>M1 for $x = 90 - \sin^{-1}$("0.8")<br>A1 for 36.86 – 36.9 |
| 10 | | $18x - 6y = 99$ $\quad 12x - 4y = 66$<br>$8x + 6y = 18$ $\quad 12x + 9y = 27$<br>$26x = 117$ $\quad -13y = 39$ | $x = 4\ ½$<br>$y = –3$ | 4 | M1 correct process to eliminate either $x$ or $y$ (condone one error)<br>A1 cao for non – eliminated one.<br>M1 (dep on 1st M1) for correct substitution of their found value.<br>A1 cao (need both) |

| PAPER 5506 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 11 | | $\frac{133}{72} = 1.8472\,,\ \frac{160}{82} = 1.9512$<br>OR<br>$\frac{72}{133} = 0.54135, \frac{82}{160} = 0.5125$<br>OR<br>$\frac{160}{133} = 1.203...., \frac{82}{72} = 1.1388....$<br>OR<br>$\frac{133}{160} = 0.83125...., \frac{72}{82} = 0.878$ | 1.84..≠ 1.95..<br>1.20..≠ 1.13.. | 3 | M1 for $\frac{133}{72}$ (= 1.8472…) oe Accept 1.8, 1.85<br>M1 for $\frac{160}{82}$ (=1.9512…) oe consistent pairing Accept 2.0, 1.9<br><br>**OR** M1 for $\frac{160}{133}$ (= 1.203…) oe<br>M1 for $\frac{82}{72}$ (=1.1388) oe<br>A1 for enough decimal places to show that the ratios are not equal; since the scale factors are different the shapes cannot be similar.<br>NB Do Not need conclusion |
| 12 | (a) | £12000 × 0.25 = £3000; £12000 – £3000 = £9000<br>£9000 × 0.25 = £2250; £9000 – £2250 = £6750<br>£6750 × 0.25 = £1687.50; £6750 – £1687.50 = | £5062.50 | 3 | M1 for 12000 × 0.75 (=9000) oe or £3000 or £23437.50 seen<br>M1 (dep) for at least two further depreciation calculations (complete steps)<br>A1 cao<br>**OR** M2 for 12000 × $(0.75)^3$ or 5062.50 seen<br>(M1 for 12000 × $(0.75)^n$, $n = 2$ or 4) |
| | (b) | 0.8 × 0.8 × 0.8 × 0.8 (oe) | 0.4096 | 2 | M1 $0.8^4$ (oe)<br>A1 cao |

| PAPER 5506 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 13 | | $r^2 = \frac{3\times10}{\pi h} = \frac{3\times10}{\pi 1.5} = \frac{3\times10}{4.712..} = 6.36, 6.37$<br>$r = \sqrt{6.366\ldots}$ | 2.52-2.54 | 3 | M1 for correct rearrangement to give $r^2 = \frac{3V}{\pi h}$<br>or $30 \div 4.712..$ or $6.36 - 6.37$<br>*Allow 0.3, 0.33 for* $\frac{1}{3}$<br>M1 (dep) for $\sqrt{}$<br>A1 cao 2.52 – 2.54 |
| 14 | (a) | | 0.4<br>0.6,0.4,<br>0.6,0.4 | 2 | B1 for LHS: (0.6), 0.4<br>B1 for RHS: 0.6, 0.4, 0.6, 0.4 |
| | (b) | $0.6 \times 0.6$ | 0.36 | 2 | M1 $0.6 \times$ "0.6" [0 < "0.6" < 1]<br>A1 cao |
| | (c) | $(30 \times 42) - (25 \times 42.8) = (1260 - 1070 = 190$<br>$190 \div 5 =$ | 38 | 3 | M1 for $(30 \times 42) - (25 \times 42.8)$ or $1260 - 1070$ or 190 seen<br>M1(dep) for "190" ÷ 5<br>A1 cao 38 |

| PAPER 5506 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 15 | (a) | $S = \frac{k}{f^2};\ 125 = \frac{k}{8^2};\ k = 8000$ | $S = \frac{8000}{f^2}$ | 3 | M1 for $S = \frac{k}{f^2}$<br>M1 for $125 = \frac{k}{8^2}$<br>A1 cao<br>These marks can be awarded if the full formula appears in part (b), rather than in part (a).<br>[SC: $S = \frac{125}{64} f^2$ M1 M0 A0, $S = 1.95(3125) f^2$ M1 M0 A0 $S = \frac{1000}{f}$ M1 M0 A0] |
| | (b) | | 500 | 1 | B1 cao |

| PAPER 5506 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | $0.5 \times 3.2 \times 8.4 \times \text{Sin } B = 10$<br>sin $B = 0.74404\ldots$<br>48.077<br>$AC^2 = 3.2^2 + 8.4^2 - 2 \times 3.2 \times 8.4 \times \cos B$<br>$AC^2 = 44.8815\ldots..$<br>$AC = 6.69\ (936\ldots)$<br>Perimeter = 18.3<br><br>Use the altitude $AD$, $\frac{h \times 8.4}{2} = 10 \Rightarrow h = (2.381)$<br><br>$BD = \sqrt{3.2^2 - h^2} = 2.139$<br>$DC = 6.261$<br><br>$AC = \sqrt{2.38^2 + '6.261'^2} = 6.69(936)$<br><br>Perimeter = 18.3 | 18.3 | 6 | M1 for $0.5 \times 3.2 \times 8.4 \times \sin B$ ( = 10)<br>A1 for sin B = 0.74(404…) or B = 47.7 – 48.1<br>M1 for $3.2^2 + 8.4^2 - 2 \times 3.2 \times 8.4 \times \cos$ "48.077"<br>M1(dep) for $AC^2$ = "44.8(815)"….. with correct order of evaluation<br>A1 $AC = 6.69 - 6.7$<br>A1 18.29 – 18.3<br><br>**for** $\frac{h \times 8.4}{2} = 10 \Rightarrow h = (2.381)$<br><br>M1 for $BD^2 = 3.2^2 - "2.381"^2$<br>A1 $BD = 2.1 - 2.2$<br><br>M1 (dep) $AC^2 = "2.381"^2 + "6.261"^2$<br>A1 $AC = 6.69 - 6.7$<br>A1 18.29 – 18.3 |

| PAPER 5506 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 17 | (a) | $(x + 8)^2 = x^2 + (x + 5)^2$<br>$x^2 + 16x + 64 = 2x^2 + 10x + 25$ | | 4 | B1 for angle $OTA = 90°$ (implied by use of Pythagoras with $OA$ as hypotenuse)<br>M1 $(x + 8)^2 = x^2 + (x + 5)^2$ oe<br>M1 for correct squaring of $x$+8 or $x$+5<br>A1 for completion following correct working |
| | (b) | $(+6 + \sqrt{(6^2 - - 4\times39)})/2$<br>$= (6 \pm \sqrt{(36 + 156)})/2$<br>$= (6 \pm \sqrt{192})/2 = (6 + 13.856)/2$ | 9.93 | 3 | M1 for substitution into quadratic formula, allow sign errors in $b$ and $c$<br>M1 for $x = (6 \pm \sqrt{192})/2$ [+ alone will do]<br>A1 for 9.92 – 9.93<br><br>M1 for $(x-3)^2-9-39$<br>M1 for $x = 3 \pm \sqrt{48}$ [+ alone will do it]<br>A1 for 9.92 – 9.93<br>T&I= 9.93 gets M1,M0,A0 |
| 18 | | $EB = 60 \times \tan 30°$<br>$BD = \sqrt{(60^2 + 60^2)}$<br>$\tan BDE = 34.64 \div 84.85$<br><br>$EB = 60 \times \tan 30°$ (= 34.64)<br><br>$ED^2 = 60^2 + (\frac{60}{\cos 30})^2$<br>$ED = \sqrt{8400} = (91.65)$<br>$\text{Angle} = \sin^{-1}\left(\frac{EB}{\sqrt{8400}}\right) = 22.2$ | 22.2° | 4 | M1 for $EB = 60\times\tan30$<br>M1 for $BD = \sqrt{(60^2 + 60^2)}$<br>M1 for $\tan BDE$ = "34.64" ÷ "84.85"<br>A1 22.17 – 22.21<br><br>M1 for $EB = 60 \times \tan 30°$ oe<br>M1 for fully correct method for $ED$<br><br>M1 for $\sin BDE = \left(\frac{'34.84'}{'\sqrt{8400}'}\right)$ (oe)<br>A1 22.17 – 22.21 |

| PAPER 5506 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 19 | (a) | $x^2 + 6^2 = 25$<br>$x^2 = -11$ | | 2 | M1 substitutes $y$=6 to get $x^2$+36 = 25<br>A1 deduces $x^2$=25-36<0; impossible, (so line does not intersect curve) |
| | (b) | $y^2 = (2x - 2)^2$<br>$x^2 + (2x - 2)^2 = 25$<br>$x^2 + 4x^2 - 8x + 4 = 25$<br>$5x^2 - 8x + 4 - 25 = 0$<br>$5x^2 - 8x - 21 = 0$<br>$(5x + 7)(x - 3) = 0$ or<br>$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4 \times 5 \times (-21)}}{10} = \frac{8 \pm \sqrt{484}}{10}$<br>So $x = 3$, or $x = -1.4$<br>Subs into either equation gives:<br>$y = 4$, or $y = -4.8$ | $x = 3$<br>$y = 4$<br><br>$x = -1.4$<br>$y = -4.8$ | 6 | M1 $y^2=(2x-2)^2$ seen or implied<br>A1 $x^2 + 4x^2 - 8x + 4 = 25$ (oe expanded form)<br>M1 correct attempt to solve 3 term quadratic equation<br>A1 $x = 3$, $x = -1.4$<br><br>M1 (dep on previous Ms) Sub one value of $x$ into either equation gives:<br>A1 $y = 4$, $y = -4.8$<br>NB: incorrectly matched pairs loses the final A1. |

| PAPER 5506 | | | | | |
|---|---|---|---|---|---|
| | No | Working | Answer | Mark | Notes |
| 20 | (a) | 400.005 ÷ 59.95 = 6.672310<br>6.672310 ÷ 1000 × 3600 = 24.02032<br>399.995 ÷ 60.05 = 6.661032<br>6.661032 ÷ 1000 × 3600 = 23.97972 | 24.020<br>23.980 | 5 | B1 for 400.005 or 59.95 seen oe<br><br>M1 for "400.005" ÷ "59.95" where "400.005" ∈ [400.005,400.5] and "59.95" ∈ [59.5,59.95] oe<br><br>B1 for 399.995 or 60.05 seen oe<br><br>M1 for "399.995" ÷ "60.05" where "399.995" ∈ [399.5,399.95] and "60.05" ∈ [60.05,60.5] oe<br><br>A1 23.979-23.980 and 24.020-24.0204 |
| | (b) | 24.0 because to 1dp the answers are the same | | 1 | B1cao for 24.0 with reason |
| | (c) | 177 × 50/477 = 18.553 → 19 → 18<br>111 × 50/477 = 11.635 → 12<br>86 × 50/477 = 9.0147 → 9<br>82 × 50/477 = 8.595 → 9<br>21 × 50/477 = 2.201 → 2 | 18<br>12<br>9<br>9<br>2 | 3 | M1 for $\frac{50}{"477"} \times 177$ or 111 or 86 or 82 or 21<br>A1 for all integers or better answers, at least 3 correct<br>A1 cao |
| 21 | (a) | $40 - x = 3(4 + x)$<br>$40 - x = 12 + 3x$<br>$40 - 12 = x + 3x$<br>$4x = 28$ | 7 | 3 | M1 multiplying through by 3:<br>$3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$<br>A1 $40 - 12 = x + 3x$<br>A1 cao |
| | (b) | $\frac{2x(2x - 3)}{(2x - 3)(2x + 3)} = \frac{2x}{2x + 3}$ | $\frac{2x}{2x + 3}$ | 3 | B1 for $(2x-3)(2x+3)$<br>B1 for $2x(2x-3)$ or $(2x + 0)(2x + 3)$<br>B1 cao |

| PAPER 5506 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 22 | Distance from $x$ axis is $y$.<br>Distance from (0, 2) is $\sqrt{(x^2+(y-2)^2)}$<br>$y^2 = x^2 + (y-2)^2$<br>$y^2 = x^2 + y^2 - 4y + 4$<br>$0 = x^2 - 4y + 4$<br>$4y = x^2 + 4$ and finish | | 4 | B1 for $(x-0)^2 + (y-2)^2$ or $\sqrt{((x-0)^2+(y-2)^2)}$ oe seen<br>B1 for $y = \sqrt{(x-0)^2+(y-2)^2}$<br>or $y^2 = (x-0)^2 + (y-2)^2$ oe<br>B1 $(y-2)^2 = y^2 - 4y + 4$ seen<br>B1 for $4y = x^2 + 4$ and finish |

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# GCSE

## Edexcel GCSE

## Mathematics A 1387

Summer 2005
Mark scheme

Edexcel GCSE
Mathematics A 1387

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# NOTES ON MARKING PRINCIPLES

**1 Types of mark**

- M marks: method marks
- A marks: accuracy marks
- B marks: unconditional accuracy marks (independent of M marks)

**2 Abbreviations**

cao – correct answer only
ft – follow through
isw – ignore subsequent working
SC: special case
oe – or equivalent (and appropriate)
dep – dependent
indep - independent

**3 No working**

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

**4 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.
If there is no answer on the answer line then check the working for an obvious answer.

**5 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**6 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**7 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**8 Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**9 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 1 | (a) | | 17252 | 1 | B1 cao |
| | (b) | | 5400 | 1 | B1 cao |
| | (c) | | thousands, 1000, 4000 | 1 | B1 |
| 2 | (a) | | grams, g | 3 | B1 oe spelling |
| | | | centimetres, cm | | B1 oe spelling |
| | | | millilitres, m*l*, $cm^3$ | | B1 oe spelling |
| | (b) | | 5 | 1 | B1 cao |
| 3 | (a) | | 106, 102 | 1 | B1 cao ignore extras |
| | (b) | | eg take away 4 | 1 | B1 could be indicated on the diagram |
| | (c) | | 46 | 1 | B1 cao |

**Paper 5521/01**

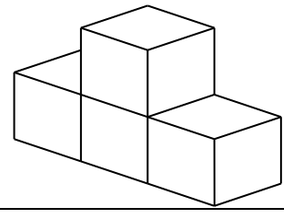
| No | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| 4 | 286 × 43 = 11440 + 12298 = 12298<br><br>43 × 286 = 258 + 3440 + 8600 = 12298<br><br>286 × 40 = 1140<br>286 × 3 = 858<br>1140+858=12298<br><br>x \| 40 \| 3 \| <br>200 \| 8000 \| 600 \| 8600<br>80 \| 3200 \| 240 \| 3440<br>6 \| 240 \| 18 \| 258<br>\| \| \| 12298<br><br>2 8 6<br>1 \| 08 \| 32 \| 24 \| 4<br>2 \| 06 \| 24 \| 18 \| 3<br>2 9 8 | 12298 | 3 | M2 for complete correct method (condone one computational error)<br>(M1 for complete correct method with two computational errors)<br>A1 cao<br><br>OR<br><br>B2 inside of grid completed (condone missing zeros and one error)<br>(B1 2 or 3 errors)<br>B1 cao |
| 5 (a) | | 18, 69 | 1 | B1 |
| (b)(i) | | 18 or 36 | 1 | B1 |
| (ii) | | 16 or 36 | 1 | B1 |
| (c) | | factor | 1 | B1 |
| (d)(i) | | 18 | 3 | B1 cao |
| (ii) | | 11 or 88 | | B1 |
| (iii) | | 69 | | B1 cao |

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 6 | (a) | | April & May | 1 | B1 for both |
| | (b) | | Daffodil | 1 | B1 |
| | (c) | | Feb | 1 | B1 |
| | (d) | | Crocus | 1 | B1 |
| | (e)(i) | | $\frac{1}{5}$ | 2 | B1 for $\frac{1}{5}$ oe |
| | (ii) | | × from 56 mm to 64 mm from 0 | | B1 A single mark on the line, between 56 mm and 64 mm measured from end 0 |
| 7 | (a) | $\frac{40}{100}$ | $\frac{2}{5}$ | 2 | B2 for $\frac{2}{5}$<br>B1 for $\frac{40}{100}$ or $\frac{4}{10}$ or $\frac{20}{50}$ or $\frac{8}{20}$ |
| | (b) | | 0.98 | 1 | B1 cao |
| | (c) | | 7 500 000 | 1 | B1 cao |
| | (d) | | 25 | 1 | B1 cao |
| | (e) | | 60 | 1 | B1 cao |

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 8 | (a)(i) | | (0, 2) | 2 | B1 cao |
| | (ii) | | (4, 1) | | B1 cao |
| | (b) | | $(2, 1\frac{1}{2})$ marked | 1 | B1 Allow 2mm tolerance from $(2, 1\frac{1}{2})$ |
| 9 | (a) | | 2.40 | 1 | B1 cao could be indicated on the diagram |
| | (b) | 1.60 + 0.40 | 2.00 | 2 | M1 for appropriate sum or product in £ or p or 200 seen eg 1.60 + 0.40, 160 + 40, 0.80 + 0.80 + 0.40, 80 + 80 + 40, $0.08\times25$, $0.80\times2.5$, 200<br>A1 cao |
| | (c) | $1\div0.8$ or $2.50\div2$ | 1.25 | 2 | M1 for $1.00\div0.8$ or $2.50\div2$ or 125 or appropriate combination eg $1+\frac{1}{2}\times0.50$<br>A1 cao |
| 10 | (a) | | hexagon | 1 | B1 Condone spelling error |
| | (b) | | Sum of angles at a point is 360° | 2 | B1 for 360 seen<br>B1 for "point", "complete turn" or "a circle" or similar unless accompanied by an incorrect angle<br>SC If neither B1 scored, award B1 for a clear indication that the size of an angle, other than *x*, is 90° or a right angle (may be on diagram) |
| | (c) | $30\times4+8\times2$ | 136 | 2 | M1 $30\times4+8\times2$ or attempt to sum 5 or 6 lengths<br>A1 cao |

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 11 | (a) | | 13, 67, 76, 103, 130 | 5 | B1 cao |
| | (b) | | $-7, -3, -1, 0, 5$ | | B1 cao |
| | (c) | | 0.07, 0.072,0.7, 0.702, 0.72 | | B1 cao |
| | (d) | | 0.6, $\frac{2}{3}$, 70%, $\frac{3}{4}$ | | B2 (B1 for any 3 in correct order) |
| 12 | (a) | | 16 30 | 1 | B1 Accept 4 30 pm Do not accept 4 30 |
| | (b)(i) | $33.56 \div 4$ oe | 8.39 | 3 | M1 for $33.56 \div 4$ oe eg $3356 \div 4$, division by 2 twice<br>A1 cao |
| | (ii) | | 9 | | B1 ft from "8.39" unless whole number of pounds |
| 13 | (a) | | 6 $cm^2$ | 3 | B2 for 6 cao for numerical answer<br>(B1 for $5.5 < \text{Area} \leq 7$)<br>then B1 (indep) for $cm^2$ with or without numerical answer |
| | (b) | See diagram | Correct shape | 2 | B2 (B1 for any 2 sides correct or a correct enlargement scale factor $\neq 1$ or 2) |

| Paper 5521/01 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 14 (a) | $(4+3)\times10$ | 70 | 2 | M1 for (4 + 3) × 10<br>A1 cao |
| (b) | $120\div10-3$ | 9 | 2 | M1 for $\frac{120}{10}$ or 12 seen eg $12\times10=120$<br>A1 cao |
| (c) | | $C=10(n+3)$ | 3 | B3 for $C=10(n+3)$ oe such as $C=(n+3)\times10$<br>(B2 for correct RHS or $C=n+3\times10$, $C=10n+3$ oe<br>B1 for $C$ = some other linear expression in $n$ or for $n+3\times10$, $10n+3$ etc)<br>Note: $C = n$ scores no marks |
| 15 | | 11 13<br>16 8<br>21 | 2 | B2 all correct<br>(B1 for 2 correct) |

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | (a) | | $2p + 4q$ | 2 | B2 for $2p + 4q$ (accept $2 \times p$ etc)<br>(B1 for $2p$ or $4q$) |
| | (b) | | $2y^2$ | 1 | B1 accept $2 \times y^2$ oe inc $2 \times y \times y$ |
| | (c) | | $3c + 4d$ | 2 | B2 for $3c + 4d$ (accept $3 \times c$ etc)<br>(B1 for $3c$ or $4d$) |
| | (d) | | $8pq$ | 1 | B1 accept in any order but must not include $\times$ sign |
| 17 | (a)(i) | | 60 | 2 | B1 cao |
| | (ii) | | eg top triangle is equilateral | | B1 for reason |
| | (b) | | 150 | 2 | M1 for $\frac{180 - "60"}{2} + 90$<br>A1 ft from (a)(i) if $x < 90$<br>SC B1 for "60" + 90 if $x < 90$ |
| 18 | | | 40 | 2 | M1 for $60 \times 2$ or 120 or $60 \div 3$ or 20 or $\frac{120}{180}$<br>A1 cao |
| 19 | |  | correct drawing | 2 | B2 Condone hidden detail shown with solid lines and missing lines on front face<br>(B1 for a correct sketch with other incorrect sketch(es)<br>or for prism with correct cross section >1 cube wide<br>or for attempt to draw prism with correct cross section<br>or prism with correct plan and side elevation) |

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | | $\frac{600}{3\times10}$ or $\frac{640}{3.2\times10}$ | $20\text{-}21\frac{1}{3}$ | 2 | M1 for rounding at least two of the numbers to 1 sf or for sight of 640, 3.2 or 640, 32 or 600, 32 or 30 seen<br>A1 for $20\text{-}21\frac{1}{3}$<br>Note: 20.3125 scores M0 A0 |
| 21 | (a) | | Points plotted | 1 | B1 $\pm$ 1 full (2 mm) square |
| | (b) | | positive | 1 | B1 cao |
| | (c) | | Line of best fit | 1 | B1 Must pass through (42.5, 1.45), (42.5, 1.55) AND (67.5, 1.75), (67.5, 1.85) |
| | (d) | | ~ 1.65 | 1 | B1 ft from single line segment with positive gradient $\pm$ 1 full (2 mm) square |
| 22 | (a) | eg $50\times\frac{2000}{500}$ | 200 | 2 | M1 for $\frac{2000}{500}$ or 4 seen<br>A1 cao |
| | (b) | eg $400\times\frac{750}{500}$ | 600 | 2 | M1 for $\frac{750}{500}$ or 1.5 seen or 400 + 200<br>A1 cao |

| Paper 5521/01 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 23 | (a) | $4\times3-2\times1$<br>$12-2$ | 10 | 3 | M1 for $3\times4$ (=12) or $1\times2$ or attempt to divide diagram up into rectangles<br>M1 "12"– "2" or sum of areas of rectangles<br>A1 cao |
| | (b)(i) | $\frac{10}{100}\times680$ or $680\div10$<br>680 + 68 | 748 | 5 | M1 $\frac{10}{100}\times680$ or 680÷10 or 68 seen<br>M1 (dep) 680 + "68" or M2 for $680\times1.10$<br>A1 cao |
| | (ii) | "748"÷50 or 14.96 | 15 | | M1 For "748"÷50 or 14.96<br>Accept "748" rounded up or down to next 50 followed by $\div50$<br>A1 ft from (b)(i) rounded up<br>SC B1 for 680 (seen) leading to 14 |

| Paper 5521/02 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | Plain llll lll 8<br>Chicken lll 3<br>Bovril llll 5<br>S & Vin llll 4 | | 3 | M1 for attempt to tally<br>A1 for 1 frequency correct or all tallies correct<br>A1 for all frequencies correct (accept for /20) |
| | (b) | | 4 | 1 | B1 ft |
| | (c) | | Plain or 8 | 1 | B1 ft |
| 2 | (a)(i) | | 11 | 2 | B1 cao |
| | (ii) | | 16 | | B1 cao |
| | (b) | See diagram | Correct lines | 2 | B2 cao for both lines correct<br>(B1 for one line correct) |
| | (c) | | 12 | 2 | B2 cao<br>(B1 for 11 or 13) |
| 3 | (a) | | 580 | 1 | B1 for 580 (± 2) could be written on line |
| | (b) | | 7.2 | 1 | B1 for 7.2 ± 0.02 could be written on line |
| | (c) | | Arrow at 48 | 1 | B1 allow ± half graduation |
| | (d) | | Arrow at 6.7 | 1 | B1 allow ± half graduation |
| 4 | (i) | | Cylinder | 2 | B1 ignore spelling |
| | (ii) | | Cuboid | | B1 ignore spelling |
| 5 | (a) | £10 – (£2.15 + £2.30) | 5.55 | 4 | M1 £2.15 + £2.30<br>A1 for 4.45<br>M1 £10 – "4.45"<br>A1 cao |
| | (b) | £60 ÷ £2.80 = 21.42857 | 21 | 2 | M1 for £60 ÷ 2.80 or sight of digits 214…<br>A1 for 21 |
| | (c) | $120 \times 25 \div 100$ | 30 | 2 | M1 ¼ of £120 (oe)<br>A1 cao<br>SC B2 for £90 |

| Paper 5521/02 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 6 | (a)(i) | | $143^0$ | 2 | B1 for 143 ($\pm 2^0$) |
| | (ii) | | Obtuse | | B1 for obtuse (ignore spelling) |
| | (b) | See diagram | Accurate drawing | 1 | B1 for accurate drawing ± 2mm |
| 7 | (a)(i) | | 5 | 2 | B1 cao |
| | (ii) | | 23 | | B1 cao |
| | (b) | × 2 – 1 | | 1 | B1 for explaining a suitable method |
| | (c) | See their diagram | | 1 | B1 for a correct diagram |
| | (d) | | 14, 17 | 2 | B2 cao for both (B1 for one only ft from their 14) |
| 8 | (a) | | 90 | 1 | B1 accept –90 |
| | (b) | | 540 | 1 | B1 accept –540 |
| | (c) | | Jupiter | 1 | B1 accept –150 |
| | (d) | | - 230 | 1 | B1 cao |

| Paper 5521/02 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 9 | (a) | 2658 – 2430 = 228<br><br>"228" × 32 | 72.96 | 4 | M1 2658 – 2430<br>A1 228<br>M1 "228" × 32 or "228" × 0.32 or digits 7296 seen<br>A1 cao<br>**Or**<br>M1 for 2430 × 32 (or digits 77760 seen)<br>or 2658 × 32 (or digits 85056 seen)<br>A1 if 1 correct<br>M1 for "85056" – "77760" or 7296 seen<br>A1 cao |
| | (b) | $\frac{2}{5} \times 145 = 58$<br><br>145 – "58" | 87 | 3 | M1 $\frac{2}{5} \times 145$ (or M1 $\frac{3}{5}$ seen)<br>A1 58 (or M1 $\frac{3}{5} \times 145$)<br>A1 for 87 ft |
| | (c)(i)<br>(ii) | | 80<br>125 | 2 | B1 for 80 ( ± 1)<br>B1 125 ( ± 3) |

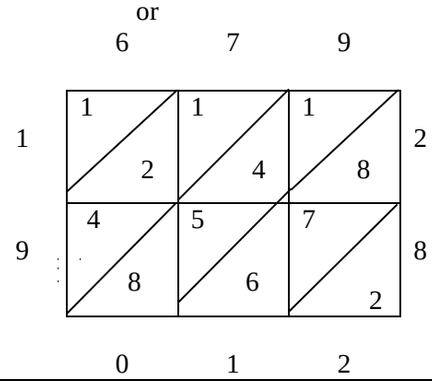
| Paper 5521/02 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 10 (a) | | 1.5 – 2.0 | 1 | B1 for height between 1.5m – 2.0m inclusive |
| (b) | Height of man × "2.5" | 3 – 6 | 3 | B3 for height between 3m – 6m inclusive<br>(B2 for multiplying (a) by a number between 2 and 3 inclusive)<br>(B1 for multiplying (a) by a number) |
| 11 | 61 – 19 = 42<br>42 ÷ 3 = 14 | 14 | 2 | M1 for – 19 or 42 seen<br>A1 cao |
| 12 (a) | | 5 | 1 | B1 |
| (b) | 4+5+5+5+4+3+2+1+4+5 = 38<br>mean = 38 ÷ 10 = 3.8 | 3.8 | 2 | M1 for attempt to add and ÷ 10 or 3.7 or 3.9 seen<br>A1 for 3.8<br>SC B1 for 33.5 seen |
| 13 (a) | | $3x$ | 1 | B1 cao Accept $3 \times x$, $x3$, $x \times 3$, $x + x + x$ |
| (b) | | $x$ - 9 | 1 | B1 for $x$ – 9 cao |
| 14 (a) | 14.44 – 8.660254038 | 5.77974(…) | 2 | M1 for 14.44 seen or 8.66(…) or 5.7 or 5.8 or better rounded or truncated |
| (b) | | 6 | 1 | A1 cao<br>B1 ft |
| 15 | 15 ÷ 24 | 62.5 | 2 | M1 for 15 ÷ 24 or 1500 ÷ 24 or sight of digits 625<br>A1 cao |
| 16 | 2.10 × 450 | 945 | 2 | M1 for digits 210 × 450 or sight of digits 945<br>A1 cao |
| 17 | See diagram | $2(y + y)$<br>$2y + 2y$ | 2 | B1 for $2(y + y)$<br>B1 for $2y + 2y$<br>(Deduct B1 for each additional tick (>2) to min 0) |
| 18 | 360° ÷ 18 (=20)<br>Sector angles: G= 60; S= 80; B=220;<br>Correct sectors labelled correctly<br>Use angle measurer | Angles drawn, labelled | 4 | B4 for fully correct and labelled pie chart<br>(B3 for all angles correct or for a labelled pie chart with 2 correct angles)<br>(B2 for labelled pie chart with 1 correct angle drawn)<br>(B1 for 360° ÷ 18 or 20 seen or implied) |

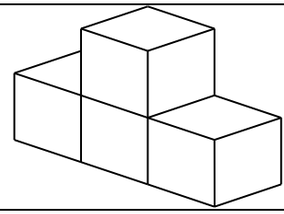
| Paper 5521/02 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 19 | (a) | | Correct plane | 2 | B2 for a correct plane defined by showing at least 2 lines.<br>(B1 for a line of symmetry on one face) |
| | (b) | | Correct net | 2 | B2 cao<br>(B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle joined appropriately to one of 3 rectangles) |
| | (c) | | Correct drawing | 2 | B1 for two extra sides of length 6cm (± 2mm)<br>B1 for construction arcs 6cm from each of the ends of the given line. |
| 20 | (a) | | 15 | 1 | B1 for 15 (± 1) |
| | (b) | | 15 | 1 | B1 for 15 (± 0.4) |
| | (c) | | | 2 | B1 horiz. line from (2, 20) to (3, 20)<br>B1 line from (3, 20) to (5,0) or horizontal translation of it<br>SC B1 for any journey ending at (5,0) |
| 21 | (a) | $x+4+x+x+4+x$ | $4x+8$ | 2 | M1 for attempting to add $x$, $x + 4$, $x$, $x + 4$ may be implied by $4x + a$ ($a > 0$)<br>A1 for $4x + 8$ or $4(x + 2)$ |
| | (b) | $4x + 8 = 54$<br>$4x = 46$<br>$x = 11.5$<br>Length = "11.5" + 4 | 15.5 | 3 | M1 for "$4x + 8$" = 54<br>A1 cao for 11.5 seen<br>B1 ft for "11.5" + 4 |
| 22 | | 0.4 + 0.15<br>1 – "0.55" | 0.45 | 2 | M1 for 1 – sum<br>A1 for 0.45 o.e.<br>SC B1 for 0.81 |
| 23 | (a) | | 3:1 | 1 | B1 cao |
| | (b) | $\pi \times 2.45$ | 7.7 | 2 | M1 for $\pi \times 2.45$ (accept $\pi$ as 3.1 or better)<br>A1 for 7.59 to 7.70 |

| Paper 5521/02 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 24 | | $7 \times 10000$ | 70 000 | 2 | M1 for 7 X 10 000 or 7 X 100 X 100<br>A1 cao |
| 25 | | 5.40 ÷ 3 × 7 | 12.60 | 3 | M1 for 5.40 ÷ 3 or sight of 1.8<br>M1 dep for "1.80" × 7<br>A1 for 12.6 or equivalent |
| 26 | | 7.60 x $\frac{17.5}{100}$ = 1.33<br><br>7.60 + 1.33 = 8.93<br>1650 x "8.93" | £14 734.50 | 4 | M1 for 7.60 x $\frac{17.5}{100}$ or 1.33 seen or 7.60 x 1.175 (oe)<br><br>(Award M1 for 10%, 5% and 2½% correctly calculated)<br>A1 for 8.93 or 893<br>M1 for 1650 x "8.93" or digits 147345 seen<br>A1 cao Accept 14734.5<br><br>**Alternative**<br><br>M1 for 1650 × 7.6(0) or 12540 seen<br>M1 for "12540" × $\frac{17.5}{100}$ or 2194.5 seen or "12540"× 1.175 (oe)<br>(Award M1 for 10%, 5% and 2½% correctly calculated)<br>M1 for "12540" + "2194.5" (dep on both previous method marks) or digits 147345 seen<br>A1 cao accept 14 734.5 |

| Paper 5523/03 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | Correct shape | 2 | B2<br>B1 for any 2 sides correct, or a correct enlargement scale factor ≠1 or 2. |
| 2 (a) | | 11 13<br>16 8<br>21 | 2 | B2 all correct<br>(B1 for 2 correct) sign |
| (b) | | $\frac{31}{80}$ | 1 | B1 oe |
| 3 (a) | | $2p+3q$ | 2 | B2 for $2p+3q$ (accept $2\times p$ etc)<br>(B1 for $2p$ or $3q$ or $2p3q$) |
| (b) | | $2y^2$ | 1 | B1 accept $2\times y^2$ or $2\times y\times y$ |
| (c) | | $3c+4d$ | 2 | B2 for $3c+4d$ (accept $3\times c$ etc)<br>(B1 for $3c$ or $4d$ or $3c4d$) |
| (d) | | $8pq$ | 1 | B1 accept in any order but must not include × |
| 4 (a)(i) | | 60 | 2 | B1 cao |
| (ii) | | eg top triangle is equilateral | | B1 for reason |
| (b) | | 150 | 2 | M1 $\frac{(180-"60")}{2}+90$<br>A1 ft from (a)(i) if $x < 90°$<br>SC:B1 for answer from "60" + 90 if $x < 90°$ |

| Paper 5523/03 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 5 | (a) | $4\times3-2\times1$<br>$12-2$ | 10 | 3 | M1 for $3\times4$ (=12) or $1\times2$ or attempt to divide diagram up into rectangles<br>M1 "12" – "2"<br>A1 cao |
| | (b)(i) | $\frac{10}{100}\times680$ or $680\div10$<br>680 + 68 | 748 | 5 | M1 $\frac{10}{100}\times680$ or $680\div10$ or 68 seen<br>M1 (dep) 680 +"68"<br>(or M2 for $680\times1.10$)<br>A1 cao |
| | (ii) | "748" ÷ 50 or 14.96 | 15 | | M1 for "748" $\div50$ or 14.96; accept "748" rounded up or down to next 50 followed by $\div50$<br>A1 ft from (b)(i) rounded up<br>SC B1 for 680 (seen) leading to 14 |
| 6 | (a) | $2\times5+5\times-3=10-15=$ | -5 | 2 | M1 substitute e.g $2\times5$ and $5\times-3$ or 10 and -15<br>A1 cao |
| | (b) | $5\times4^2$ - 7<br>$5\times16$ - 7 | 73 | 3 | M1 substitution e.g $5\times4^2$ -7; do not accept $54^2$-7<br>M1 $5\times16-7$ or $5\times4\times4$-7 or 80 – 7 (NB $4^2$ as $4\times4$)<br>A1 cao |

| Paper 5523/03 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 7 | | 679 × 28 = 5432 + 13580 = 19012 or 28 × 679 = 252 + 1960 + 16800 = 19012<br>or<br><br> | 190.12 | 3 | M1 for an attempt to multiply the units and tens, or correct partitioning<br>M1 complete correct method (condone one arithmetic error)<br>A1 for 190.12 cao<br>OR<br>M1 for putting the numbers in a grid<br>M1 for multiplying out and addition (condone one error)<br>A1 answer shown with point<br>OR<br>M1 for correct partitioning<br>M1 679×20 and 679×8 calculated oe (condone one error)<br>A1 cao |
| 8 | (a) | | Points plotted | 1 | B1 ±1 full (2mm) square |
| | (b) | | positive | 1 | B1 cao |
| | (c) | | Line of best fit | 1 | B1 must pass through (42.5, 1.45), (42.5, 1.55) AND (67.5, 1.75), (67.5, 1.85) |
| | (d) | | approx 1.65 | 1 | B1 ft from single line segment with positive gradient ± 1 full (2mm) square |

| Paper 5523/03 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | (a) | eg $50 \times \frac{2000}{500}$ | 200 | 2 | M1 $2000 \div 500$ or 4 seen<br>A1 cao |
| | (b) | eg $400 \times \frac{750}{500}$ | 600 | 2 | M1 $750 \div 500$ or 1.5 seen or 400 + 200<br>A1 cao |
| 10 | | | $C = 10(n+3)$ | 3 | B3 for $C = 10(n+3)$ oe such as $C = (n+3) \times 10$<br>(B2 for correct RHS or $C = n + 3 \times 10$, $C = 10n + 3$ etc<br>B1 for C = some other linear expression in $n$ or $n + 3 \times 10$, $10n + 3$ etc)<br>NB: C=$n$ scores no marks |
| 11 | (a) | | $p(p+6)$ | 2 | B2 for $p(p+6)$ or $p \times (p+6)$<br>(B1 for $p(ap+b)$ where $a,b$ are numbers or $p+6$ seen on it's own, or part of an expression) |
| | (b) | $x^2 - 4x + 7x - 28$ | $x^2 + 3x - 28$ | 2 | M1 for 4 terms correct ignoring signs (e.g $x^2, 4x, 7x, 28$) or 3 terms with correct signs (e.g $x^2, -4x, 7x, -28$)<br>A1 cao |
| 12 | |  | correct drawing | 2 | B2. Condone hidden detail shown with solid lines, or missing lines on front face.<br>(B1 for :<br>one sketch correct with other sketches incorrect<br>cross-section correct with depth > 1 cube,<br>correct plan and side elevation) |

| Paper 5523/03 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 13 | | $\frac{600}{3\times10}$ or $\frac{640}{3.2\times10}$ | 20 to 21 $\frac{1}{3}$ | 2 | M1 For rounding at least two of the numbers to 1 sf, or for sight of 640, 3.2 or 640, 32 or 600, 32 or 30 seen<br>A1 for 20 to 21 $\frac{1}{3}$<br>NB: 20.3125 scores M0 A0 |
| 14 | (a) | | correct reflection | 2 | B2 (B1 reflection in line other than $x$=3) |
| | (b) | | reflection in $y = x$ | 2 | B2 cao Accept the word "reflected"<br>(B1 any statement including the word "reflection") |
| 15 | (a)(i) | | $5^6$ | 1 | B1 accept 15125, $5^{4+2}$ |
| | (ii) | | $5^3$ | 1 | B1 accept 125, $5^{9-6}$ |
| | (b) | $x + y = 10$ and $x - y = 4$ | $x = 7$<br>$y = 3$ | 3 | M1 for either $x + y = 10$ or $x - y = 4$<br>A2 for both values correct [(A1 for one value correct)<br>If M0, award B3 for both values correct or B2 for one value correct, otherwise B0]<br>SC B2 for $x = 3$ and $y = 7$ |

| Paper 5523/03 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 16 (a) | $5-3x=2x+2$<br>$5-2=2x+3x$ | $\frac{3}{5}$ | 3 | B1 for $2x+2$ seen OR $2.5-1.5x=x+1$<br>M1 for correct rearrangement of 4 terms<br>A1 for $\frac{3}{5}$ oe |
| (b) | | $-3,-2,-1,0,1,2$ | 2 | B2 (B1 for 5 correct and not more than one incorrect integers) |
| 17 | | question + response boxes oe | 2 | 1st aspect: One question with time period (eg each night); ignore other questions.<br>2nd aspect: Response list (at least two), not overlapping.*<br>3rd aspect: Some mention of units (eg hours) in either question or responses<br>Award B2 for all three aspects, or B1 for just two aspects.<br>* 0-1, 2-3, 4-5 is OK, but 0-1, 1-2, 2-3 is not OK. |

| Paper 5523/03 | | | | |
|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 18 (a) | $\frac{2}{3}\times\frac{3}{4}=\frac{6}{12}$ | $\frac{1}{2}$ | 2 | M1 for $\frac{6}{12}$ or $\frac{3}{6}$ or $\frac{2\times3}{3\times4}$<br>A1 accept 0.5 |
| (b) | $1+2+\frac{8}{12}+\frac{9}{12}$ | $4\frac{5}{12}$ | 3 | M1 for attempt to convert to fractions with common denominator e.g two fractions, denominator of 12<br>A1 correct conversion : $\frac{8}{12}$ and $\frac{9}{12}$,<br>or $\frac{20}{12}$ and $\frac{33}{12}$ seen (oe)<br>A1 cao for $4\frac{5}{12}$<br>OR<br>attempts to convert to decimals: must use at least 2dp<br>M1 0.66+0.75 (or 1.66+2.75) or 0.67+0.75 etc<br>A1 4.41, 4.417, 4.416<br>A1 4.416 (*recurring*) |
| 19 | $2\times\frac{1}{2}\times6\times8$ or 48<br>$8\times9+6\times9+10\times9$<br>or 72 +54 + 90 | 264<br>$cm^2$ | 4 | M1 attempt to find the area of one face;<br>$\frac{1}{2}\times6\times8$ or $(8\times9)$ or $(6\times9)$ or $(10\times9)$ or 72 or 54 or 90 or 24<br>M1 all five faces with an intention to add<br>A1 cao numerical answer of 264<br>B1 (indep) $cm^2$ with or without numerical answer |

| Paper 5523/03 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | |  | $\frac{\pi ab^3}{3d}$ $3(c+d)^3$ $3\pi bc^2$ | 3 | B3 (B1 for each one correct)<br>Nb –B1 for each of the 4th,5th,6th tick |
| 21 | (a) | $x+0.3+0.2+x=1$ | 0.25 | 2 | M1 for $x+0.3+0.2+x=1$ oe, or $0.5\div 2$<br>A1 oe |
| | (b) | $0.3\times 200$ | 60 | 2 | M1 $0.3\times 200$<br>A1 cao Accept 60 out of 200 (in words)<br>SC B1 for $\frac{60}{200}$ |
| 22 | (a) | | $(-12)-4\quad -2\quad (0)8$ | 3 | B3 for all correct [(B1 for each one correct) |
| | (b) | | points plotted accurately<br>points joined with smooth curve | 2 | B1 $\pm 1$ full (2mm) square ft table if at least B1 awarded (all 5 points plotted)<br>B1 ft for any smooth curve if previous B1 gained<br>NB: curve must pass within 1 full square of the points |
| 23 | | | $\frac{1}{4}$ on LH branch<br>$\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches | 2 | B1<br>B1 |
| 24 | | | $m$=3<br>$n$=5 | 2 | B1 for 3<br>B1 for 5<br>(B2 for $2^3\times 5$ or $2\times 2\times 2\times 5$)<br>SC: award B1 only if $m$=5, $n$=3 or for $8\times 5$ seen |

| Paper 5523/03 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 25 | | $\frac{5--1}{-1-2} = -2$ | $y = -2x + 5$ | 4 | M1 for clear attempt to find gradient eg fraction with -1,5 in numerator, 2,-1 in denominator<br>A1 for $-2$<br>B2 ft for $y =$"$-2$"$x + 5$ oe (eg $y = \frac{-6}{3}x + 5$)<br>(B1 for $y = mx + 5$ or , $-2x+5$ or $y =$"$-2$"$x + c$) |
| 26 | (a)(i) | | 150 | 2 | B1 accept 150 or 210 |
| | (ii) | | | | B1 for angle at the centre is twice the angle at the circumference |
| | (b) | $360 - 90 - 90 -$"150" | 30 | 3 | B1 identifies angle between radius and tangent as $90°$ (may be in working or on diagram)<br>M1 $360° - 90 - 90 -$"150"<br>A1 ft from (a)(i) excluding a negative answer<br>OR<br>B1 for 90<br>M1 for $2 \times (180 - 90 -$"$\frac{150}{2}$"$)$<br>A1 ft from (a)(i) excluding a negative answer<br>OR<br>B3 for $180 -$(a) |

| Paper 5523/04 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | 14.44 – 8.660254038 | 5.77974(….) | 2 | M1 for 14.44 seen or 8.66(……) seen or 5.7 or 5.8 or better, rounded or truncated<br>A1 cao |
| | (b) | | 6 | 1 | B1 ft |
| 2 | | 15 ÷ 24 | 62.5 | 2 | M1 for 15 ÷ 24 or 1500 ÷ 24 or sight of digits 625<br>A1 cao |
| 3 | (a) | 2.10 × 450 | 945 | 2 | M1 for digits 210 × 450 or sight of digits 945<br>A1 cao |
| | (b) | 63÷2.10 | 30 | 2 | M1 for 63 ÷ digits 210<br>A1 cao |
| 4 | | See diagram | 2($y$ + $y$)<br>2$y$ + 2$y$ | 2 | B1 for 2($y$ + $y$)<br>B1 for 2$y$ + 2$y$<br>(Deduct B1 for each additional tick (>2) to min 0) |
| 5 | | 360° ÷ 18 (=20)<br>Sector angles: G= 60; S= 80; B=220;<br>Correct sectors labelled correctly<br>Use angle measurer | Angles drawn, labelled | 4 | B4 for fully correct and labelled pie chart<br>(B3 for all angles correct or for a labelled pie chart with two angles correct)<br>(B2 for labelled pie chart with one correct angle drawn)<br>(B1 for 360÷18 or 20 seen or implied) |
| 6 | (a) | | Correct plane | 2 | B2 for a correct plane defined by showing at least 2 lines.<br>(B1 for a line of symmetry on one face) |
| | (b) | | Correct net | 2 | B2 cao<br>(B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle joined appropriately to one of the three rectangles) |
| | (c) | | Correct drawing | 2 | B1 for two extra sides of length 6 cm (± 2mm)<br>B1 for construction arcs 6cm from each of the ends of the given line |
| 7 | | 61 – 19 = 42<br>42 ÷ 3 = 14 | 14 | 2 | M1 for –19 or 42 seen or 3$x$ + 19<br>A1 cao |

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|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 8 | (a)<br>(b)<br>(c) | | 15<br>15 | 1<br>1<br>2 | B1 cao for $15(\pm 1)$<br>B1 cao for $15(\pm 0.4)$<br>B1 horiz. line from (2,20) to (3,20)<br>B1 line from (3,20) to (5,0) or horiz. translation of it<br>SC: B1 for any journey ending at (5,0) |
| 9 | (a) | $x+4+x+x+4+x$ | $4x+8$ | 2 | M1 for attempting to add $x+4, x, x+4, x$ may be implied by $4x+a$, $a>0$<br>A1 for $4x+8$ or $4(x+2)$ |
| | (b) | $4x + 8 = 54$<br>$4x = 46$<br>$x = 11.5$<br>Length = "11.5" + 4 | 15.5 | 3 | M1 for "$4x + 8$" = 54<br>A1 cao for 11.5 seen<br>B1 ft for "11.5"+ 4 |
| 10 | | 0.4 + 0.15<br>1 – 0.55 | 0.45 | 2 | M1 for 1 – sum<br>A1 for 0.45 oe<br>SC: B1 for 0.81 |
| 11 | (a)<br>(b) | <br>$\pi \times 2.45$ | 3:1<br>7.7 | 1<br>2 | B1 cao<br>M1 for $\pi \times 2.45$ (accept $\pi$ as 3.1 or better)<br>A1 for 7.59 to 7.70 |
| 12 | | $7 \times 10000$ | 70000 | 2 | M1 for $7 \times 10000$ or $7 \times 100 \times 100$<br>A1 cao |
| 13 | | $5.40 \div 3 \times 7$ | 12.60 | 3 | M1 for $5.40 \div 3$ or sight of 1.8<br>M1 (dep) for "1.80" × 7<br>A1 for 12.6 or equivalent |

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|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 14 | $7.60 \times \frac{17.5}{100} = 1.33$<br><br>7.60 + 1.33 = 8.93<br>1650 × "8.93" | £14734.50 | 4 | M1 for $7.60 \times \frac{17.5}{100}$ or 1.33 seen or 7.60 ×1.175 (oe)<br><br>(Award M1 for 10%, 5% and 2½% correctly calculated)<br>A1 for 8.93 or 893<br>M1 for 1650 × "8.93" or digits 147345 seen<br>A1 cao Accept 14734.5<br>OR<br>M1 for $1650 \times 7.6$ or 12540 seen<br>M1 for "12540" $\times \frac{17.5}{100}$ or 2194.5 seen or<br>"12540"×1.175 (oe)<br>(Award M1 for 10%, 5%, and 2½% correctly calculated)<br>M1 for "12540" + "2194.5" (dep on both previous M marks) or digits 147345 seen<br>A1 cao accept 14734.5 |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | | $285 \times 1000/(60 \times 60) = 79.1\dot{6}$ | | 3 | M2 for $285 \times 1000 \div 60 \div 60$<br>or $80 \times 60 \times 60 \div 1000$<br>or for a correct method to obtain two comparable values e.g $80 \times 60 \times 60$ and $285 \times 1000$<br><br>(M1 for $285 \div 60 \div 60$ or 0.079(….) seen<br>or $80 \times 60 \times 60$ or 288000 seen<br>or for $285 \times 1000$ or 285000 seen<br>or $80 \div 1000$ or 0.08 seen)<br><br>A1 for 288 or 79.(….) or for two correctly calculated comparable values e.g 288000 and 285000 |
| 16 | (a) | $4x + 12 = 6$<br>$4x = -6$ | -1.5 | 3 | B1 for $4x + 12$ or $x + 3 = \frac{6}{4}$<br>M1 for a correct re-arrangement of their 3 terms to isolate $4x$ or $x$<br>A1 for $-1.5$ oe |
| | (b) | $v - u = 5t$ | $\frac{v-u}{5}$ | 2 | M1 for isolating $\pm 5t$ or $\pm t$ or for dividing through by 5<br>A1 oe |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 17 | | 3→15<br>4→48<br>3.1→17.3(91)<br>3.2→19.9(68)<br>3.3→22.7(37)<br>3.4→25.7(04)<br>3.5→28.8(75)<br>3.4→25.7(04)<br>3.3→22.7(37)<br>3.35→24.1(95375) | 3.3 | 4 | B2 for trial between 3.3 and 3.4 inclusive<br>(B1 for trial between 3 and 4 inclusive)<br>B1 for different trial between 3.3 and 3.4 exclusive<br>B1 (dep on at least one previous B1) for 3.3<br>NB trials should be evaluated to at least 1 dp truncated or rounded |
| 18 | (a) | 36 ÷ (7+3+2)<br>"3" × 7 | 21 | 3 | M1 for 36 ÷ (7+3+2)<br>M1 (dep) for "3" × 7 or 3 or 2<br>A1 cao |
| | (b) | $51.5 \times \frac{8.5}{100} = 4.3775$<br>51.5 – 4.3775 = 47.1225 | 47 or 47.1 or 47.12 | 4 | M1 for $51.5 \times \frac{8.5}{100}$ or 4.37(75) seen<br>M1 (dep) for 51.5 – "4.37(75)"<br>A1 for 47 or better<br>B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p<br>OR<br>M1 for $51.5 \times \frac{100-8.5}{100}$<br>M1 for $51.5 \times$"0.915" or 0.515 × "91.5"<br>A1 for 47 or better<br>B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 19 | (a) | | Angle in a semicircle | 1 | B1 oe |
| | (b) | $12^2 + 16^2 = 400$<br>$\sqrt{400} = 20$ | 20 | 3 | M1 for $12^2 + 16^2$<br>M1 for $\sqrt{144+256}$<br>A1 cao |
| | (c) | $\pi \times 10^2$ | 314 | 3 | M1 for $\pi \times \left(\frac{"20"}{2}\right)^2$<br>M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any $r$<br>A1 for 314 – 315 inclusive |

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| No | | Working | Answer | Mark | Notes |
| 20 | (a) | $(1 \times 10)+(3 \times 15)+(5 \times 30)+(7 \times 35)+$ $(9 \times 25)+(11 \times 5) = 730$ "730" $\div$ 120 = 6.08333 | 6.08 | 4 | M1 for use of *fx* with *x* consistent within intervals (including end points)<br>M1 (dep) for use of midpoints<br>M1 (dep on 1st M1) for use of $\frac{\sum fx}{\sum f}$<br>A1 6.08 to 6.085 |
| | (b) | | (10),25,55,90,115, 120 | 1 | B1 for all correct |
| | (c) | | graph | 2 | B1 ft for 5 or 6 points plotted correctly $\pm$ 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error)<br>B1(dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points.<br>(SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined) |

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|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| (d) | | 72–74 | 2 | M1 (ft dep on graph being cf) for reading from graph at 7<br>A1 ft ±1 full (2 mm) square<br>Or B2 for $72-74$ |
| 21 (a)<br>(b)<br><br>(c)<br>(d) | | $a^7$<br>$15x^3y^4$<br><br>$x-1$<br>$(x+3)(x-3)$ | 1<br>2<br><br>1<br>1 | B1 accept $a^{4+3}$<br>B2 cao<br>(B1 for two of 15, $x^3$, $y^4$ in a product)<br>B1 cao<br>B1 cao |
| 22 | 80% = 220<br>$220 \div 80 \times 100$ | 275 | 3 | M1 for recognising that 80% is equivalent to 220<br>M1 for $220 \div 80 \times 100$ oe<br>A1 cao |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 23 | | | $x = 3$<br>$y = 0.5$ | 3 | M1 for coefficients of $x$ or $y$ the same followed by correct operation, condone one arithmetical error<br>M1 (dep) for substituting found value in one equation<br>A1 cao<br>SC: B1 for one correct answer only if M's not awarded |
| 24 | | | $1.4 \times 10^{10}$ | 2 | B2 for $1.4 \times 10^{10}$ or $1.44 \times 10^{10}$<br>(B1 for $14.4 \times 10^{9}$ or 14400,000,000 or 14000,000,000 or $14 \times 10^{9}$) |
| 25 | (a) | $\tan x = \frac{1.9}{3.2}$<br>$x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$ | 30.7 | 3 | M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$<br>M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$<br>A1 for 30.6 – 30.7 |
| | (b) | 90 + "30.7" | 121 | 1 | B1 (indep) ft for 90 + "30.7" rounded to 3 or 4 s.f |

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| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 26 | SF$=\frac{12}{9}$<br>$\frac{12}{9}\times 6=8$ | 2 | 2 | M1 for $\frac{12}{9}$ or $\frac{9}{12}$ or 1.33… seen or 0.75 seen or 8 seen<br>or $\frac{6}{9}$ or $\frac{9}{6}$ or 0.66… or 1.5 or $\frac{1}{3}$ or 3 oe seen<br>A1 cao |

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|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | $x^2-4x+7x-28$ | $x^2+3x-28$ | 2 | M1 for 4 terms correct ignoring signs (e.g $x^2,4x,7x,28$) or 3 terms with correct signs (e.g $x^2,-4x,7x,-28$)<br>A1 cao |
| | (b) | | $y^4+2y^2$ | 2 | B2 cao<br>B1 for $y^4$ or $2y^2$ |
| | (c) | | $p(p+6)$ | 2 | B2 for $p(p+6)$ or $p\times(p+6)$<br>(B1 for $p(ap+b)$ where $a,b$ are numbers or $p+6$ seen on it's own, or part of an expression) |
| | (d) | | $3x(2x-3y)$ | 2 | B2 (B1 for $3(2x^2-3xy)$ or $x(6x-9y)$ or $3x(...)$) |
| 2 | | | question + response boxes oe | 2 | 1st aspect: One question with time period (eg each night); ignore other questions.<br>2nd aspect: Response list (at least two), not overlapping.*<br>3rd aspect: Some mention of units (eg hours) in either question or responses<br>Award B2 for all three aspects, or B1 for just two aspects.<br>* 0-1, 2-3, 4-5 is OK, but 0-1, 1-2, 2-3 is not OK. |
| 3 | (b) | | reflection in $y=x$ | 2 | B2 cao accept the word "reflected"<br>(B1 any statement including the word "reflection") |
| 4 | (a) | $5-3x=2x+2$<br>$5-2=2x+3x$ | $\frac{3}{5}$ | 3 | B1 for $2x+2$ seen OR $2.5-1.5x=x+1$<br>M1 for correct rearrangement of 4 terms<br>A1 for $\frac{3}{5}$ oe |
| | (b) | | $-3,-2,-1,0,1,2$ | 2 | B2 (B1 for 5 correct and not more than one incorrect integers) |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | (a) | $\frac{2}{3}\times\frac{3}{4}=\frac{6}{12}$ | $\frac{1}{2}$ | 2 | M1 for $\frac{6}{12}$ or $\frac{3}{6}$ or $\frac{2\times3}{3\times4}$<br>A1 accept 0.5 |
| | (b) | $1+2+\frac{8}{12}+\frac{9}{12}$ | $4\frac{5}{12}$ | 2 | M1 for attempt to convert to fractions with common denominator e.g two fractions, denominator of 12<br>A1 correct conversion : $\frac{8}{12}$ and $\frac{9}{12}$,<br>or $\frac{20}{12}$ and $\frac{33}{12}$ seen (oe)<br>A1 cao for $4\frac{5}{12}$<br>OR<br>attempts to convert to decimals: must use at least 2dp<br>M1 0.66+0.75 (or 1.66+2.75) or 0.67+0.75 etc<br>A1 4.41, 4.417, 4.416 or 0.41, 0.417, 0.416 or 0.42, 4.42<br>A1 4.416 (*recurring*) |
| 6 | (a)(i) | | $5^6$ | 1 | B1 accept 15625, $5^{4+2}$ |
| | (ii) | | $5^3$ | 1 | B1 accept 125, $5^{9-6}$ |
| | (b) | $x+y=10$ and $x-y=4$ | $x = 7$<br>$y = 3$ | 3 | M1 for either $x + y = 10$ or $x-y=4$<br>A2 for both values correct [(A1 for one value correct)<br>If M0, award B3 for both values correct or B2 for one value correct, otherwise B0]<br>SC B2 for $x = 3$ or $y = 7$ |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 7 | | $2\times\frac{1}{2}\times6\times8$ or 48<br>$8\times9+6\times9+10\times9$<br>or 72 +54 + 90 | 264<br>$cm^2$ | 4 | M1 attempt to find the area of one face;<br>$\frac{1}{2}\times6\times8$ or $(8\times9)$ or $(6\times9)$ or $(10\times9)$ or 72 or 54 or 90 or 24 or 48<br>M1 all five faces with an intention to add<br>A1 cao numerical answer of 264<br>B1 (indep) $cm^2$ with or without numerical answer |
| 8 | |  | $\frac{\pi ab^3}{3d}$ $3(c+d)^3$ $3\pi bc^2$ | 3 | B3 (B1 for each one correct)<br>Nb –B1 for each of the 4th,5th,6th tick |
| 9 | (a) | $x+0.3+0.2+x=1$ | 0.25 | 2 | M1 for $x+0.3+0.2+x=1$ oe, or 0.5 ÷ 2<br>A1 oe |
| | (b) | $0.3\times200$ | 60 | 2 | M1 $0.3\times200$<br>A1 cao Accept 60 out of 200 (in words)<br>SC B1 for $\frac{60}{200}$ |
| 10 | (a) | | $(-12)-4\quad-2\quad(0)8$ | 3 | B3 for all correct [(B1 for each one correct) |
| | (b) | | 5 points plotted accurately<br>points joined with smooth curve | 2 | B1 $\pm1$ full (2mm) square ft table if at least B1 awarded (all 5 points plotted)<br>B1 ft for any smooth curve if previous B1 gained<br>NB: curve must pass within 1 full square of the points |
| 11 | | | $m$=3<br>$n$=5 | 2 | B1 for 3<br>B1 for 5<br>(B2 for $2^3\times5$ or $2\times2\times2\times5$)<br>SC: award B1 only if $m$=3, $n$=3, for $8\times5$ seen |

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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 12 | | $\frac{5--1}{-1-2} = -2$ | $y = -2x + 5$ | 4 | M1 for clear attempt to find gradient eg fraction with -1,5 in numerator, 2,-1 in denominator<br>A1 for $-2$ cao<br>B2 ft for $y =$"$-2$"$x + 5$ oe (eg $y = \frac{-6}{3}x + 5$)<br>(B1 for $y = mx + 5$ or , $-2x+5$ or $y =$"$-2$"$x + c$) |
| 13 | (a) | | $\frac{1}{4}$ on LH branch<br>$\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches | 2 | B1 cao<br>B1 |
| | (b) | $\frac{3}{4} \times \frac{2}{3} + \frac{1}{4} \times \frac{1}{3} = \frac{6}{12} + \frac{1}{12}$ | $\frac{7}{12}$ | 3 | M1 for $\frac{3}{4} \times \frac{2}{3}$ or $\frac{1}{4} \times \frac{1}{3}$ from their tree diagram<br>M1 for sum of two products<br>A1 for $\frac{7}{12}$ oe |
| | (c) | $n = 21 \times 4$ or $\frac{1}{6} : \frac{1}{4}$ oe<br>$\frac{1}{6} \times 84$ or $21 \times \frac{2}{3}$ | 14 | 3 | M1 for either $\frac{1}{3} \times \frac{3}{4} \left(= \frac{1}{4}\right)$ or $\frac{2}{3} \times \frac{1}{4} \left(= \frac{1}{6}\right)$ from their tree diagram<br>M1 for $21 \times 4$ (=84) or $\frac{21}{3} \times 2$<br>A1 for 14 cao<br>SC: B2 for 63 seen in fraction or ratio |

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|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 14 | (a)(i) | | 150 | 2 | B1 accept 150 or 210 |
| | (ii) | | | | B1 for angle at the centre is twice the angle at the circumference |
| | (b) | | 30 | 3 | B1 identifies angle between radius and tangent as $90°$ (may be in working or on diagram)<br>M1 $360° - 90 - 90 - "150"$<br>A1 ft from (a)(i) excluding a negative answer<br>Or<br>B1 for 90<br>M1 for $2 \times (180 - 90 - "\frac{150}{2}")$<br>A1 ft from (a)(i) excluding a negative answer<br>Or<br>B3 for $180 - (a)$<br>SC: 180 – "210" can get B1 for $90°$ and/or B1 for "cyclic quadrilateral" |
| | | $360 - 90 - 90 - "150"$ or $180 - "150"$ | | | |
| 15 | (a) | | 0.2727… | 1 | B1 for 2.27 recurring or 0.2727…. oe or 0.273 |
| | (b) | eg $x = 0.3939…$ so $100x = 39.3939…$<br>$99x = 39$<br>so $x = \frac{39}{99} = \frac{13}{33}$ | | 3 | M1 for $100x = 39.39…$<br>M1 dep for subtraction of both sides<br>A1 for $\frac{13}{33}$ from correct proof<br>**Alternative method**<br>M1 for $13.000 \div 33$<br>M1 for remainders 31 and 13<br>A1 for 0.39 recurring<br>SC:B1 for $\frac{39}{99}$ |

| Paper 5525/05 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | (a) | $d = kt^2$<br>$80 = k \times 4^2$ | $d = 5t^2$ | 3 | M1 for $d = kt^2$ or $d \propto t^2$<br>M1 sub $d$=80 and $t$=4 into their equation<br>A1 for $d = 5t^2$ oe (cao) |
| | (b) | | 245 | 1 | B1 ft from (a) using "k" |
| | (c) | $45 = 5t^2$ | 3 | 2 | M1 ft from (a) for substituting $d$=45 into their equation<br>A1 for 3 cao (condone inclusion of $-3$) |
| 17 | (a)(i)<br>(ii) | | (0, 9)<br>(8, 25) | 3 | B1 cao<br>B1 for $x = 8$ cao<br>B1 for $y = 25$ cao<br>SC: B1 for (25, 8) |
| | (b) | LHS = $\left(\frac{100-(x^2-16x+64)}{4}\right)$<br>= $\left(\frac{36+16x-x^2}{4}\right)$<br>RHS = $\left(\frac{36-2x+18x-x^2}{4}\right)$ = LHS | | 3 | M1 for expansion of either set of brackets with at least 3 of 4 terms correct<br>M1 for common denominator of 4 or multiplying through by 4 or reducing each numerator to a single term<br>A1 for fully correct solution<br>**Alternative method**<br>M1 for $(5-\frac{(x-8)}{2})(5+\frac{(x-8)}{2})$<br>M1 for $(\frac{2\times5-(x-8)}{2})(\frac{2\times5+(x-8)}{2})$<br>A1 for $\frac{(18-x)(x+2)}{4}$ |

| Paper 5525/05 | | | | | |
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| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | (a) | $\frac{810\pi}{90\pi}$ or 9<br>$\sqrt{9}$ or 3 | 12 | 3 | M1 for $\frac{810\pi}{90\pi}$ or 9 or $\frac{1}{9}$ or 1:9 oe<br>M1 for $\sqrt{\frac{810\pi}{90\pi}}$ or $\sqrt{9}$ or 3 or $\frac{1}{3}$ or $\sqrt{9}:\sqrt{1}$ oe<br>A1 cao |
| | (b) | $3^3$ or 27 or 2700 | $2700\pi$ | 2 | SC:B1 for answer of 36<br>M1 for "3"$^3$ or 27 or $\left(\sqrt{9}\right)^3 : (\sqrt{81})^3$ oe or $9^3$ or 2700–<br>A1 cao |
| 19 | (a)(i) | | 1 | 1 | B1 cao |
| | (ii) | | 8 | 1 | B1 cao |
| | (iii) | $64^{-\frac{2}{3}} = \frac{1}{64^{\frac{2}{3}}}$ or $64^{-\frac{2}{3}} = (4^2)^{-1}$ | $\frac{1}{16}$ | 2 | M1 for knowing negative power is a reciprocal or power of $\frac{1}{3}$ root is a cube root<br>A1 cao for $\frac{1}{16}$ |
| | (b) | $\sqrt{27} = \sqrt{9\times3}$ or $\sqrt{27} = 3\sqrt{3}$ or $\sqrt{27} = 3^{3/2}$ | $\frac{5}{2}$ oe | 2 | M1 for $\sqrt{27} = \sqrt{9\times3}$ or $\sqrt{27} = 3^{3/2}$<br>A1 for $\frac{5}{2}$ oe (cao)<br>**Alternative method**<br>M1 for $9\times27 = 3^{2n}$<br>A1 for $\frac{5}{2}$ oe (cao) |

| Paper 5525/05 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | (a)(i)<br>(ii)<br>(b)(i)<br>(ii) | | (90, 1)<br>(180, 0)<br>(45, 0)<br>(90, -3) | 2<br><br>2<br> | B1 cao could be indicated on diagram<br>B1 cao could be indicated on diagram<br>B1 cao could be indicated on diagram<br>B1 cao could be indicated on diagram |
| 21 | | $\frac{1}{3}\pi x^2 h = \frac{4}{3}\pi(2x)^3$<br>$x^2 h = 4\times 8x^3$ | $32x$ | 3 | M1 for substitution in correct formulae<br>M1 (dep.) for correct unsimplified expression eg<br>$h = \frac{\frac{4}{3}\pi(2x)^3}{\frac{1}{3}\pi x^2}$ oe or $h = 8x$ oe<br>A1 for $32x$ cao |
| 22 | (a) | $\left(\overline{OM} =\right)\ \boldsymbol{a} + 2\boldsymbol{b}$ $\left(\overline{ON} =\right) 3\boldsymbol{a}$ or $\frac{6}{2}\boldsymbol{a}$<br>$\left(\overline{MN} =\right)\ -\boldsymbol{a} - 2\boldsymbol{b} + 3\boldsymbol{a}$ | $2\boldsymbol{a} - 2\boldsymbol{b}$ | 2 | B2<br>(B1 for either $\overline{OM}$ or $\overline{ON}$ or $-\boldsymbol{a} - 2\boldsymbol{b} + 3\boldsymbol{a}$<br>SC: B1 for $2\boldsymbol{b} - 2\boldsymbol{a}$ |
| | (b) | $\left(\overline{OX} =\right)\ 2\boldsymbol{a} + \boldsymbol{b}$ $\left(\overline{OY} =\right) \boldsymbol{b} + 4\boldsymbol{a}$<br>(½ $\overline{QR}$ =) $2\mathbf{a} - \boldsymbol{b}$ or (½ $\overline{RQ}$ =) $\boldsymbol{b} - 2\boldsymbol{a}$ | $\overline{XY} = 2\boldsymbol{a}$<br>(hence parallel) | 2 | B1 for either $\overline{OX}$ or $\overline{OY}$ or (½ $\overline{QR}$ )<br>B1 for $\overline{XY} = 2\boldsymbol{a}$ or $\overline{YX} = -2\boldsymbol{a}$ |

| Paper 5525/06 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 1 | (a) | $v - u = 5t$ | $\frac{v-u}{5}$ | 2 | M1 for isolating $\pm 5t$ or $\pm t$ or for dividing through by 5<br>A1 oe |
| | (b) | $x - 3 = 5x - 25$<br>$22 = 4x$ | $5\frac{1}{2}$ | 3 | M1 for $x - 3 = 5(x-5)$ or $\frac{x}{5} - \frac{3}{5} = x - 5$<br>M1 for isolating terms in $x$ correctly from $ax + b = cx + d$<br>A1 cao accept $5\frac{1}{2}$, $\frac{11}{2}$, 5.5 |
| 2 | (a) | $36 \div (7+3+2)$<br>"3" $\times 7$ | 21 | 3 | M1 for $36 \div (7+3+2)$<br>M1 (dep) for "3" $\times 7$ or 3 or 2<br>A1 cao |
| | (b) | $51.5 \times \frac{8.5}{100} = 4.3775$<br>$51.5 - 4.3775 = 47.1225$ | 47 or 47.1 or 47.12 | 4 | M1 for $51.5 \times \frac{8.5}{100}$ or 4.37(75) seen<br>M1 (dep) for 51.5 – "4.37(75)"<br>A1 for 47 or better<br>B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p<br>OR<br>M1 for $51.5 \times \frac{100 - 8.5}{100}$<br>M1 for $51.5 \times$"0.915" or 0.515 ×"91.5"<br>A1 for 47 or better<br>B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p |

| Paper 5525/06 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 3 | | 3→15<br>4→48<br>3.1→17.3(91)<br>3.2→19.9(68)<br>3.3→22.7(37)<br>3.4→25.7(04)<br>3.5→28.8(75)<br>3.4→25.7(04)<br>3.3→22.7(37)<br>3.35→24.1(95375) | 3.3 | 4 | B2 for trial between 3.3 and 3.4 inclusive<br>(B1 for trial between 3 and 4 inclusive)<br>B1 for different trial between 3.3 and 3.4 exclusive<br>B1 (dep on at least one previous B1) for 3.3<br>NB trials should be evaluated to at least 1 dp truncated or rounded |
| 4 | (a) | | Angle in a semicircle | 1 | B1 oe |
| | (b) | $12^2 + 16^2 = 400$<br>$\sqrt{400} = 20$ | 20 | 3 | M1 for $12^2 + 16^2$<br>M1 for $\sqrt{144+256}$<br>A1 cao |
| | (c) | $\pi \times 10^2$ | 314 | 3 | M1 for $\pi \times \left(\frac{"20"}{2}\right)^2$<br>M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any $r$<br>A1 for 314 – 315 inclusive |

| Paper 5525/06 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 5 | (a) | $(1 \times 10)+(3 \times 15)+(5 \times 30)+(7 \times 35)+$ $(9 \times 25)+(11 \times 5) = 730$ "730" ÷ 120 = 6.08333 | 6.08 | 4 | M1 for use of *fx* with *x* consistent within intervals (including end points)<br>M1 (dep) for use of midpoints<br>M1 (dep on 1st M1) for use of $\frac{\sum fx}{\sum f}$<br>A1 6.08 to 6.085 |
| | (b) | | (10),25,55,90, 115,120 | 1 | B1 for all correct |
| | (c) | | graph | 2 | B1 ft for 5 or 6 points plotted correctly ± 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error)<br>B1(dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points.<br>(SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined) |
| | (d) | | 72 – 74 | 2 | M1 (ft dep on graph being cf) for reading from graph at 7<br>A1 ft ±1 full (2 mm) square<br>Or B2 for $72 - 74$ |

| Paper 5525/06 | | | | | |
|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 6 | (a) | | $a^7$ | 1 | B1 accept $a^{4+3}$ |
| | (b) | | $15x^3y^4$ | 2 | B2 cao<br>(B1 for two of 15, $x^3$, $y^4$ in a product) |
| | (c) | | $x-1$ | 1 | B1 cao |
| | (d) | | $(a + 3b)(a - 3b)$ | 2 | B2 for $(a + 3b)(a - 3b)$<br>(B1 for $(a \pm 3b)(a \pm 3b)$ |
| 7 | | 80% = 220<br>$220 \div 80 \times 100$ | 275 | 3 | M1 for recognising that 80% is equivalent to 220<br>M1 for $220 \div 80 \times 100$ oe<br>A1 cao |
| 8 | | | $x = 3$<br>$y = 0.5$ | 3 | M1 for coefficients of $x$ or $y$ the same followed by correct operation, condone one arithmetical error<br>M1 (dep) for substituting found value in one equation<br>A1 cao<br>SC: B1 for one correct answer only if Ms not awarded |
| 9 | | | $1.4 \times 10^{10}$ | 2 | B2 for $1.4 \times 10^{10}$ or $1.44 \times 10^{10}$<br>(B1 for $14.4 \times 10^9$ or 14400,000,000 or 14000,000,000 or $14 \times 10^9$) |

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|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 10 | (a) | $\tan x = \frac{1.9}{3.2}$<br>$x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$ | 30.7 | 3 | M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$<br>M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$<br>A1 for 30.6 – 30.7 |
| | (b) | 90 + "30.7" | 121 | 1 | B1 (indep) ft for 90 + "30.7" rounded to 3 or 4 s.f |
| 11 | (a) | $SF = \frac{12}{9}$<br>$\frac{12}{9} \times 6 = 8$ | 2 | 2 | M1 for $\frac{12}{9}$ or $\frac{9}{12}$ or 1.33… seen or 0.75 seen or 8 seen or $\frac{6}{9}$ or $\frac{9}{6}$ or 0.66… or 1.5 or $\frac{1}{3}$ or 3 oe seen<br>A1 cao |
| | (b) | $SF = \frac{9}{12}, \frac{9}{12} \times 7 = 5.25$ | 5.25 | 2 | M1 for $\frac{BE}{7} = \frac{9}{12}$ oe<br>A1 cao |

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|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 12 | (a) | $84 = 6.7\pi + 2 \times 6.7 + 2a$<br>$2a + 13.4 = 62.95\ldots$<br>or $2a + 34.44 = 84$ | 24.8 | 3 | M1 for substituting correctly, $\pi$ may be left<br>M1 for correct rearrangement as far as $\pm 2a$<br>A1 for $24.7 - 24.8$ |
| | (b) | $P = \pi r + 2r + 2a$<br>$P - 2a = \pi r + 2r$<br>$P - 2a = (\pi + 2)r$ | $\frac{P-2a}{\pi+2}$ | 3 | M1 subtracting $2a$ from each side<br>M1 for factorising to get $(\pi+2)r$<br>A1 for $\frac{P-2a}{\pi+2}$ oe<br>S.C $\frac{p-2a}{5.14}$ oe is M1 M1 A0 |
| 13 | | Area $\Delta ABC = \frac{1}{2} \times 14 \times 8 \times \sin 106$ (= 53.8) | 53.8 | 3 | M1 for $\frac{1}{2} \times 14 \times 8 \times \sin 106$<br>M1 (dep) for $56 \times 0.961(26..)$ or $107.6\ldots$<br>A1 $53.8 - 53.9$<br>SC 107.6 is B2 |
| 14 | (a) | | 4.5 | 1 | B1 cao |
| | (b) | $500 \times 1.045^{20} = 1205.857\ldots\ldots$ | 1205.86 | 2 | M1 for $500 \times 1.045^{20}$<br>A1 for $1205.85 - 1206$<br>(SC:B1 for $705.85 - 706$ no working) |

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|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 15 (a) | $6x^2 + 11x - 10 + 6x - 4 = 25$<br>$6x^2 + 17x - 39 = 0$ | | 3 | M1 for an expression for the area involving either<br>$(3x-2)(2x+5)+2(3x-2)$<br>or $3x(3x-2)+(3x-2)(7-x)$<br>or $3x(2x+5)-2(7-x)$<br>or $(3x-2)^2 + 2(3x-2) + (3x-2)(7-x)$<br>where in each case at least one of 2 or 3 product terms must be correct<br>M1 (indep) for one correct expansion involving $x^2$<br>A1 for simplification to final answer |

| Paper 5525/06 | | | | | |
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 15 | (b)(i) | $x = \frac{-17 \pm \sqrt{17^2 - 4\times 6\times(-39)}}{2\times 6}$<br>$= \frac{-17 \pm \sqrt{289+936}}{12}$<br>$x = +\frac{18}{12}$ or $-4.33$ | 1.5, $-\frac{13}{3}$ | 4 | M1 for $x = \frac{-17 \pm \sqrt{17^2 - 4\times 6\times(-39)}}{2\times 6}$ up to signs in b & c<br>M1 for $x = \frac{-17 \pm \sqrt{1225}}{12}$<br>A1 $x = 1.5$ or $-4.33$, or better<br>OR<br>M2 for $(3x+13)(2x-3)$<br>(M1 for $(3x \pm a)(2x \pm b)$ with $ab$ = ±39<br>A1 $x$ = 1.5 or – 4.33, or better |
| | | $x^2 + \frac{17}{6}x - \frac{39}{6} = 0$<br>$\left(x+\frac{17}{12}\right)^2 - \left(\frac{17}{12}\right)^2 - \frac{39}{6} = 0$<br>$\left(x+\frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$ | | | OR<br>M1 for $\left(x+\frac{17}{12}\right)^2$ *seen*<br>M1 $\left(x+\frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$<br>A1 $x$ = 1.5 or – 4.33, or better<br>SC:M1 for answer "1.5" with no working or T & I |
| | (ii) | | 8 | | B1 cao length = 8 |

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|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | (a) | P(win) = $\frac{2}{5}\times\frac{3}{5}+\frac{2}{5}\times\frac{1}{5}(=\frac{8}{25})$ | $\frac{8}{25}$ | 3 | M1 for $\frac{2}{5}\times\frac{3}{5}$ or $\frac{2}{5}\times\frac{1}{5}$ or for clearly identifying in P(R) $\times$P(R) + P(B) $\times$ P(B)<br>M1 for P(win) = " $\frac{2}{5}$ " $\times$ " $\frac{3}{5}$ " + " $\frac{2}{5}$ " $\times$ " $\frac{1}{5}$ "<br>A1 for $\frac{8}{25}$, oe |
| | (b) | $\frac{8}{25}$ $\times$ 100 (=32)<br>100 $\times$ 20 – "32" $\times$ 50 | £4 | 2 | M1 for ( " $\frac{8}{25}$ " $\times$100)$\times$50 or $\times$ 0.5<br>A1 cao |

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|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 17 | | Lower bound of 1200 is 1150<br>Upper bound of 60 is 65<br>$1150 \div 65$ | 17 | 4 | B1 for 1150 or 1250 seen<br>B1 for 65 or 55 seen<br>M1 (Lower bound of load) ÷ (Upper bound of weight)<br>Where 1150 ≤ LB load < 1200 and<br>60 < UB Weight ≤ 65<br>A1 for 17 requires fully correct working<br>OR<br>B1 for 1150 or 1250 seen<br>B1 for 65 or 55 seen<br>M1 (upper bound of load) ÷(lower bound of weight)<br>Where 1200 ‹ UB load ≤ 1250 and 55 ≤ LB weight < 60<br>A1 for 22 requires fully correct working<br>OR<br>M2 $1200 \div 55$<br>A1 21.8<br>A1 21 requires fully correct working<br>OR<br>M2 $1200 \div 65$<br>A1 18.4(6)<br>A1 18 requires fully correct working |
| 18 | (a) | $3^4 x^4 y^8$ | $81x^4y^8$ | 2 | B2 for $81x^4y^8$<br>(B1 for 2 of 81, $x^4$, $y^8$) |
| | (b) | $\frac{x(x-3)}{(x-5)(x-3)}$ | $\frac{x}{x-5}$ | 3 | B1 for $x(x-3)$<br>B1 for $(x-5)(x-3)$<br>B1 cao |

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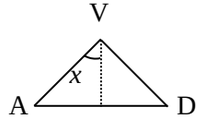
|---|---|---|---|---|---|
| No | | Working | Answer | Mark | Notes |
| 19 | (a) | $6^2 - 2^2 = 32$ | 5.66 | 2 | M1 for $6^2 - 2^2$ (= 32)<br>A1 5.65 – 5.66 |
| | (b) | V<br><br><br>$DVA = 2 \times \sin^{-1}(\frac{2}{6})$<br>OR<br>$\cos DVA = \frac{6^2 + 6^2 - 16}{2 \times 6 \times 6}$<br>$= \frac{56}{72}$<br>$DVA = \cos^{-1}\left(\frac{56}{72}\right) = 38.94$ | 38.9 | 3 | M1 $\sin x = \frac{2}{6}$ oe<br>M1 for $DVA = 2 \times \sin^{-1}(\frac{2}{6})$<br>A1 38.9 – 38.95<br><br>OR<br>M1 for $(\cos DVA =) \frac{6^2 + 6^2 - 4^2}{2 \times 6 \times 6}$<br>M1 for $DVA = \cos^{-1}\left(\frac{56}{72}\right)$<br>A1 38.9 – 38.95 |

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|---|---|---|---|---|
| **No** | **Working** | **Answer** | **Mark** | **Notes** |
| 19 (c) | $AC^2 = 2^2 + 2^2 - 2 \times 2 \times 2 \times \cos 120^o$<br>$AC = \sqrt{12}$<br>**OR**<br>$AN = 2 \times \sin 60 = \sqrt{3}$<br>**OR**<br>$VN = \sqrt{"32"+1} = \sqrt{33}$<br>$\cos AVC = \frac{6^2+6^2-12}{2\times 6\times 6}$<br>$\cos AVC = \frac{60}{72}$<br>**OR**<br>$AVC = 2 \times \sin^{-1}\frac{\sqrt{3}}{6}$, using $AN$<br>**OR**<br>$AVC = 2\times\cos^{-1}\frac{\sqrt{33}}{6}$, using $VN$ | 33.6 | 4 | M1 for any valid method for $AC$ or $AN$ or $VN$ where $N$ is the midpoint of $AC$<br>A1 for $AC^2 = 12$ or $AC = \sqrt{12}$ (= 3.46…) or $AN = \sqrt{3}$ (=1.73…)or $VN = \sqrt{33}$ (=5.74…)<br>M1 (indep) for correct method to find angle $AVC$<br>A1 33.55 – 33.6 |

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|---|---|---|---|---|---|
| **No** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | (a) | Graph translated 1 unit to the right passing through the points (-1,0), (1,2) and (2,0) | | 2 | M1 for translation of $\begin{pmatrix}1\\0\end{pmatrix}$ or $\begin{pmatrix}-1\\0\end{pmatrix}$<br>A1 for right through the 3 points, $\pm\frac{1}{4}$ sq |
| | (b) | Graph stretched 2 units parallel to y-axis; passing through the points (-2,0), (0,4) and (1,0) | | 2 | M1 for graph stretched parallel to the y-axis by scale factor 2<br>A1 through all 3 points; $\pm\frac{1}{4}$ sq not on grid at $x = 2$ |

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# Mark Scheme (Results)

# November 2010

GCSE

## GCSE Mathematics (Modular) 5MB2H
## Unit 2 - Higher

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GCSE MATHEMATICS 2MB01

**NOTES ON MARKING PRINCIPLES**

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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**7 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

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**11 Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**12 Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

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|---|---|---|---|---|---|
| Question | | Working | Answer | Mark | Notes |
| 1 | | $140\div(3+4)(=20)$<br>"20"×4 | 80 | 2 | M1 for $140\div(3+4)$ or 20 or $\frac{4}{7}\times140$<br>A1 cao |
| 2 | (a) | | $8bc$ | 1 | B1 cao |
| | (b) | | $6w-15t$ | 2 | M1 for $3\times2w-3\times5t$ or 6w or -15t<br>A1 cao |
| | (c) | $x^2+-2x+7x-14$ | $x^2+5x-14$ | 2 | M1 for all 4 terms correct with or without signs **or** 3 out of no more than four terms correct with signs **or** $x(x-2)+7(x-2)$ *or* $x(x+7)-2(x+7)$<br>A1 cao |
| 3 | | $80\div100\times15$ | 12 | 2 | M1 for $80\div100\times15$ **or** 8 and 4 seen **or** correct method to find 10% and 5% of 80 eg $80\div100\times10$ and $80\div100\times5$ oe<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 4 | $BFD = 42°$<br>*HFB* = 110°<br><br>$110 - 42$ | 68 | 3 | M1 for $EDC = 42$ or $DHF = 180 - 110$<br>M1 for $180 - 42 - 70$<br>A1 cao<br>**or**<br>M1 for $BFD = 42°$ or $HFB = 110°$<br>M1 for $110 - 42$<br>A1 cao<br>**or**<br>M1 for $AFH = 180 - 110 = 70$<br>M1 for $180 - 70 - 42 = 68$<br>A1 cao |
| 5 | | 24 | 2 | M1 for list of at least 3 multiples of 8 **and** 2 multiples of 12<br>**or**<br>correct method to write **either** 8 **or** 12 as product of prime factors<br>A1 cao |
| 6 | $180 - 140 (= 40)$<br>$360 \div "40"$ | 9 | 3 | M1 for $180 - 140 (= 40)$<br>M1 (dep) for $360 \div "40"$<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 7 (a) | | 68 | 2 | M1 for $\frac{9}{5}\times 20+32$<br>A1 cao |
| (b) | Table of values<br>10 20 30 40 50<br>50 68 86 104 122<br>**or**<br>Use $y=mx+c$<br>With $m=\frac{9}{5}$, $c=32$ | Single line from (0, 32) to (50, 122) | 3 | B3 for correct single straight line from (0, 32) to (50, 122)<br>[B2 for at least 3 points correctly plotted (ft from (a)) and joined with line segments **or** 3 correct points plotted two of which must be the extremes with no joining<br>**or** a single line of gradient $\frac{9}{5}$ passing through (0,32)<br>B1 for 2 correctly plotted points ft from (a)<br>**or** a single line of gradient $\frac{9}{5}$<br>**or** a single line with positive gradient passing through (0,32)<br>**or** 2 correct pairs of values, may include (20,68) from (a) if correct] |
| (c) | | 37.8 | 1 | B1 for answer in range 36 - 39<br>**or** ft from line drawn (± 2mm)<br>*NB : Whole question needs to be clipped together* |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 8 | $12\times 7=84$<br>$84-\frac{1}{2}(3\times 6)$<br><br>$75\div 32$ | 3 | 4 | M1 for $12\times 7\,(=84)$<br>M1 for $"84"-\frac{1}{2}(3\times 6)\ \ (=75)$<br><br>M1 for "area" $\div 32$ or (32, 64,) 96 seen with "area" calculated.<br>A1 cao (dep on all M marks)<br><br>**or**<br>M1 for $12\times 4\ \ (=48)$<br>M1 for $"48"+\frac{1}{2}(12+6)\times 3$<br>M1 for "area" $\div 32$ or (32, 64,) 96 seen with "area" calculated.<br>A1 cao (dep on all M marks)<br><br>M1 for $6\times 3+\frac{1}{2}(3\times 6)\ (=27)$<br>M1 for $"27"+12\times 4$<br>M1 for "area" $\div 32$ or (32, 64,) 96 seen with "area" calculated.<br>A1 cao (dep on all M marks) |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | $3600\times 4=14400$<br>$\frac{2}{5}=40\%$<br>$\frac{1}{4}=25$<br>$30+40+25=95\%$<br>Saved 5%<br><br>10% of $14400=1440$<br>5% 0f $14400=1440\div 2$ | £720 | 5 | M1 $3600\times 4\ (=14400)$<br>B1 for $\frac{2}{5}=40\%$ **or** $\frac{1}{4}=25$<br>M1 for $30+40+25$ or 95 or 5<br>M1 for complete method to find 5% of 14400<br>A1 cao<br>**or**<br>M1 for $3600\times 4\ (=14400)$<br>B1 for $30\%=\frac{3}{10}$ oe<br>M1 $\frac{3}{10}+\frac{2}{5}+\frac{1}{4}$ or $\frac{19}{20}$ or $\frac{1}{20}$<br>M1 for complete method to find $\frac{1}{20}$ of 14400<br>A1 cao<br>**or**<br>M1 $3600\times 4\ (=14400)$<br>M1 for $0.3\times 14400$ oe $(=4320)$<br>M1 for $\frac{2}{5}\times 14400$ oe $(=5760)$<br>M1 $14400-3600-4320-5760$<br>A1 cao<br>SC if no other marks awarded<br>M1 for $0.3\times 3600\ (=1080)$<br>M1 for $\frac{2}{5}\times 3600\ (=14400)$ |

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| 5MB2H_01 | | | | |
|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 10 (a) | | $4wy(5w+6y^2)$ | 2 | M1 for a correct factor taken outside the brackets<br>Or 4*wy*(a 2 term expression in w and y, with just one error)<br>A1 cao |
| (b) | | $(m + 8)(m - 5)$ | 2 | M1 for $(m \pm 8)(m \pm 5)$<br>A1 cao |
| 11 | 45 | 200 minutes | 6 | M1 for $120\times 20\times 30 (= 72000)$<br>M1 for $"72000"\div 120$<br>A1 for $600\,\text{cm}^3$ min oe<br>M1 for $\frac{1}{2}\times(120+80)\times 40\times 30\,(=120000)$<br>M1 for $"120000"\div"600"$<br>A1 for 200 minutes or 3 hours 20 mins oe<br>SC B1 for 4 hours |
| 12 (a) | | 1 | 1 | B1 cao |
| (b) | | $8x^{18}y^{-3}$ | 2 | M1 for $2^3x^{3\times 6}y^{3\times -1}$ **or** $8x^{18}y^k$ (k ≠ 0)<br>**Or** $8x^k y^{-3}$ (k ≠ 0) **or** $kx^{18}y^{-3}$ (k ≠ 0, k ≠ 1)<br>**or** $2x^6y^{-1} \times 2x^6y^{-1} \times 2x^6y^{-1}$<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 13 | $0.5\times10^6$ | $5\times10^5$ | 2 | M1 for $0.5\times10^6$ or $500000$ or $2.5\div0.5\times10^6$ or $0.5\times10^{9-3}$ Or $2500000000\div5000$ A1 cao |
| 14* | $(2x-2)(2x+1)$ $+\frac{1}{2}(2x-2)((3x+5)-(2x+1))$ $4x^2 - 2x - 2$ $+ x^2 + 4x - x - 4$ $= 5x^2 + x - 6$ Or $(2x-2)(3x+5)$ $-\frac{1}{2}(2x-2)((3x+5)-(2x+1))$ $= 6x^2 - 6x + 10x - 10$ $- x^2 - 4x + x + 4$ $= 5x^2 + x - 6$ | Show | 4 | M1 for correct expression for a single rectangle area $(2x-2)(2x+1)$ or $(2x-2)(3x+5)$ M1 for correct expression for triangle area $\frac{1}{2}(2x-2)((3x+5)-(2x+1))$ M1 for all 4 terms correct with or without signs or 3 out of no more than four terms correct with signs in expansion of any two linear expressions. C1 for $5x^2+x-6$ and all steps clearly shown in a logical progression **QWC: All steps need to be clearly laid out showing a logical progression** |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | $\frac{2x}{x-1}-\frac{7x-3}{x^2-1}$<br><br>$=\frac{2x(x+1)}{x^2-1}-\frac{7x-3}{x^2-1}$<br><br>$=\frac{2x^2+2x-7x+3}{x^2-1}$<br>$=\frac{2x^2-5x+3}{x^2-1}$<br><br>$=\frac{(2x-3)(x-1)}{(x+1)(x-1)}$<br>$=\frac{2x-3}{x+1}$ | $\frac{2x-3}{x+1}$ | 4 | B1 for $x^2-1=(x+1)(x-1)$<br>M1 for correct process to obtain any common denominator<br>M1 for correct expansion and simplification of numerator<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | Alternative method<br>$\frac{2x}{x-1} - \frac{7x-3}{x^2-1}$<br>$= \frac{2x(x^2-1)}{(x-1)(x^2-1)} - \frac{(7x-3)(x-1)}{(x-1)(x^2-1)}$<br>$= \frac{2x(x^2-1)-(7x+3)(x-1)}{(x-1)(x^2-1)}$<br>$= \frac{2x^3-2x-7x^2+7+3x-3}{(x-1)(x^2-1)}$<br>$= \frac{2x^3-7x^2+8x-3}{(x-1)(x^2-1)}$<br>$= \frac{(2x-3)(x-1)^2}{(x+1)(x-1)^2}$<br>$= \frac{2x-3}{x+1}$ | $\frac{2x-3}{x+1}$ | 4 | Alternative Method<br><br>M1 for correct process to obtain any common denominator<br><br>B1 for $2x^3-2x-7x^2+7+3x-3$<br><br>M1 (dep on first M1) for correct expansion and simplification of numerator<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 16* | $AOT = 90 - x$<br>(Angle between tangent and radius is $90^o$)<br>$AOC = 90 + x$<br>(Tangents from an external point are equal)<br><br>$ACB = 2(180 - (90 + x)) \div 2 = 90 - x$<br><br>Or<br><br>Obtuse angle $BOA = 180 - 2x$<br>(Angle between tangent and radius is $90^o$)<br>Reflex angle $BOA = 180 + 2x$<br>(Tangents from an external point are equal)<br>$ACB = (360 - (180 + 2x)) \div 2 - 90 - x$ | | 5 | B1 for $AOT = 90 - x$<br>or $OAT$ = 90° or $OBT$= 90° (may be shown on diagram)<br>B1 for $AOC = 90 + x$<br>B1 for completing the proof<br><br>C2 for 2 reasons:<br>Angle between tangent and radius is 90° **and**<br>Tangents from an external point are equal.<br>**QWC: proof should be clearly laid out with technical language correct**<br>[C1 for 1 of: Angle between tangent and radius is 90° **or**<br>Tangents from an external point are equal,<br>**QWC: proof should be clearly laid out with technical language correct**]<br><br>**OR**<br>B1 for obtuse angle $BOA = 180 - 2x$<br>or $OAT$ = 90° or $OBT$= 90° (may be shown on diagram)<br>B1 for reflex angle $BOA = 180 + 2x$<br>B1 for completing the proof<br><br>C2 for 2 reasons:<br>Angle between tangent and radius is 90° **and**<br>Tangents from an external point are equal.<br>**QWC: proof should be clearly laid out with technical language correct**<br>[C1 for 1 of: Angle between tangent and radius is 90° **or**<br>Tangents from an external point are equal,<br>**QWC: proof should be clearly laid out with technical language correct**] |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 16* | Alternative method<br><br>$AOB = 360 - 2x - 90 - 90 = 180 - 2x$<br>(Angle between tangent and radius is $90^o$)<br><br>$ACB = (180 - 2x)/2$<br>(Angle at the circumference is half angle at the centre) | | | Alternative method<br><br>B1 for $AOB = 360 - 2x - 90 - 90$<br>B1 for $ACB = (180 - 2x)/2$<br>B1 for completing the proof<br><br>C2 for 2 reasons:<br>Angle between tangent and radius is 90° **and**<br>Angle at the circumference is half angle at the centre<br>**QWC: proof should be clearly laid out with technical language correct**<br>[C1 for 1 of: Angle between tangent and radius is 90° **or**<br>Angle at the circumference is half angle at the centre<br><br>**QWC: proof should be clearly laid out with technical language correct**]<br><br>B3 maybe awarded for a fully correct alternative method. |

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# Mark Scheme (Results)

## June 2011

## Modular Mathematics (GCSE)
## Unit 2: 5MB2H_01 (Higher)

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## NOTES ON MARKING PRINCIPLES

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**7 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**11 Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**12 Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | $5 \times 6 \div 2$ | $15\text{cm}^2$ | 3 | M1 $5 \times 6 \div 2$ oe seen<br>A1 15<br>B1 $\text{cm}^2$ |
| 2 | (a) | | $3y + 7x + 3$ | 1 | B1 cao |
| | (b) | | $2x(x - 2)$ | 2 | B2 for $2x(x - 2)$. Accept $2x(x + -2)$.<br>(B1 for $x(2x - 4)$ or $2(x^2 - 2x)$<br>or $2x$(linear expression in $x$)<br>or $(x - 2)$(linear expression in $x$) |
| | (c) | $11-3x - 6$ | $5-3x$ | 2 | M1 for expansion of $-3(x + 2)$<br>A1 cao |
| | (d) | $3x^2+7x-18x-42$ | $3x^2- 11x - 42$ | 2 | M1 for 4 terms correct with or without signs or 3 out of exactly 4 terms correct (the terms may be in an expression or table)<br>**OR**<br>$x(3x+7)-6(3x+7)$ or $3x(x - 6) + 7(x - 6)$<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 3 (a) | 48=2 × 24<br>= 2 × 2 × 12<br>= 2 × 2 × 2 × 6<br>=2 × 2 × 2× 2 × 3<br>**OR**<br>Use of factor trees | 2 × 2 × 2 × 2 × 3 | 2 | M1 for a systematic method that isolates 2 correct prime numbers<br>correct divisions by a prime number<br>**OR**<br>an equivalent factor tree<br>A1 for 2 × 2 × 2 × 2 × 3 or $2^4 \times 3$ |
| (b) | Exeter coach after 20, 40, 60, 80, 100…<br>Plymouth coach after 16, 32, 48, 64, 80, 96, …<br>**OR**<br>Timetable schedule for the coaches<br>Exeter coach at 8.00, 8.20, 8.40, 9.00, 9.20…<br>Plymouth coach at 8.00, 8.16, 8.32, 8.48, 9.04, 9.20…<br>**OR**<br>LCM of 16 and 20 is 80 | 9:20(am) | 3 | M1 for attempt to list multiples of 16 and 20 (at least first 3 of each, condone 1 addition error)<br>M1(dep) for identifying their LCM<br>A1 9:20 am (accept 9:20)<br>**OR**<br>M1 for attempt to draw up a timetable showing when the coaches will run (at least 3 extra times for each, condone 1 addition error)<br>M1(dep) for identifying the first time common to both timetables<br>A1 9:20 oe (do not accept 9:20pm)<br>**OR**<br>M1 attempt to find the LCM<br>M1 for 2 × 2 × 2 × 2 × 5 oe seen<br>A1 9:20 oe (do not accept 9:20pm) |
| 4 | 10% = 6<br>6 × 4 = 24 | 24 | 2 | M1 40 ÷ 100 × 60 oe or any complete method,<br>eg 10% = 6, 6 × 4<br>A1 cao<br><br>SC B1 for 36 or 84 |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 5 (a) | Table of values<br>$x$ = -1 0 1 2 3<br>y = 2 2 6 10 14<br>OR<br>Using $y = mx + c$, gradient = 4,<br>$y$ intercept = 2 | Line from<br>( 1, 2) to (3,14) | 3 | **(Table of values)**<br>M1 for at least 2 correct attempts to find points by substituting values of $x$.<br>M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct)<br>A1 for correct line between 1 and 3<br><br>**(No table of values)**<br>M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 4x + 2$ drawn (ignore any additional incorrect segments)<br>(M1 for at least 3 correct points with no more than 2 incorrect points)<br>A1 for correct line between -1 and 3<br><br>**(Use of $y = mx + c$)**<br>M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 4x + 2$ drawn (ignore any additional incorrect segments)<br>(M1 for line drawn with gradient 4 OR line drawn with a $y$ intercept of 2)<br>A1 for correct line between 1 and 3 |
| (b)(i) | | $y = 4x + c$, $c \neq 2$ | 1 | B1 Correct equation given. |
| (ii) | | – 0.25 | 1 | B1 Correct gradient given.<br>Note – 0.25 could be written as $-\frac{1}{4}$ oe |

| 5MB2H_01 | | | | |
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| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 6 | $6 \times 2 + 3 \times 2 = 12 + 6 = 18$<br>or<br>$2 \times 5 + 4 \times 2 = 18$<br><br>$18 \div 2.5 = 7.2$<br>or<br>$2.5 \times 7 = 17.5$<br>or<br>$2.5 \times 8 = 20$<br><br>OR<br><br>$6 \times 5 - 4 \times 3 = 18$<br><br>$18 \div 2.5 = 7.2$<br>or<br>$2.5 \times 7 = 17.5$<br>or<br>$2.5 \times 8 = 20$ | 8 packs | 4 | M2 for a complete method for finding the total area (can be implied by 18)<br>(M1 for attempt to calculate at least one area, 6×2(=12) or 3×2 or 2×5(=10) or 4×2(=8) or 2×2 or 6×5 (=30) or 3×4(=12))<br>M1 for their area $\div 2.5$ or repeated addition of 2.5 to within 2.5 of their area<br>C1 for clear communication that 8 full packs are required supported by their calculations, provided at least one of the first two method marks awarded<br><br>SC B3 for 8 identified as the answer to the problem. |
| 7 | $\frac{3+7}{2}, \frac{8+5}{2}$ | $(5, 6\frac{1}{2})$ | 2 | M1 for either $x$ or $y$ coordinate correct or $\frac{3+7}{2}, \frac{8+5}{2}$, both seen but not correctly evaluated<br>Al for $(5, 6\frac{1}{2})$ oe |
| 8 (a)<br>(b)<br>(c) | | $p^8$<br>$h^5$<br>$x^6$ | 3 | B1 for $p^8$<br>B1 for $h^5$<br>B1 for $x^6$ |

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| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | 24 × 2 = 48<br>56 ÷ 8 × 5 = 35<br>or<br>24 × 2 = 48<br>48 ÷ 5 × 8 = 76.8 | Monday | 4 | M1 for a correct method to obtain two comparable time periods or speeds.<br>eg 24 × 2 (= 48 miles), 56 ÷ 2 (= 28 km)<br>M1 for a correct method to convert between miles and km or mph and km/h<br>eg –, – – –<br>A1 for two correct values (using same units) for comparison<br>C1 for day identified from a clear attempt to use comparable time periods and speeds/distances<br>Note: day alone scores zero |
| 10 (a) | | $4n + 2$ | 2 | B2 for oe<br>(B1 for $4n+k$ where $k \neq 2$) |
| (b) | $2 \times 3^2 - 4$<br>18 - 4 | 14 | 2 | M1 for $2 \times 3^2 - 4$<br>A1 cao |
| 11 | 360 ÷ 10<br>36 ÷ 2 | 18° | 4 | M1 for correct method to find the size of an exterior angle<br>eg 360 ÷ 10<br>A1 for 36<br>M1 for '36' ÷ 2 or (180 – (180 – 36)) ÷ 2<br>A1 cao<br>OR<br>M1 for correct method to find the size of an interior angle<br>eg(180 × 8) ÷ 10<br>A1 144<br>M1 (180 '144') ÷ 2<br>A1 cao |

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| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 12 | $n^2 - 2n + 1 + n^2 + n^2 + 2n + 1 \equiv 3n^2 + 2$ | Proof | 2 | M1 for correct expansion of either $(n - 1)^2$ or $(n + 1)^2$ or $n^2 - 2n + 1$ or $n^2 + 2n + 1$ seen<br>A1 for $3n^2 + 2$ from correct working |
| 13 | $42 \div 2 = 21$<br>$180 - 90 - 21 = 69$<br>$69 \times 2 = 138$ | 138° | 3 | M1 for 90 seen.<br>A1 for 138 (accept 222)<br>C1 for<br>The tangent to a circle is perpendicular (90°) to the radius (diameter)<br>and<br>Angles in a triangle add up to 180°<br><br>**OR**<br><br>The tangent to a circle is perpendicular (90°) to the radius (diameter)<br>and<br>Angles in a quadrilateral (4 sided shape) add up to 360° |
| 14 (a) | $5\sqrt{9\times3}$ | $15\sqrt{3}$ | 2 | M1 for sight of $\sqrt{9\times3}$ or $\sqrt{9}\ \sqrt{3}$ or $3\sqrt{3}$<br>A1 for $15\sqrt{3}$ (accept $n = 15$) |
| (b) | | $7\sqrt{3}$ | 2 | M1 for $\frac{21\sqrt{3}}{\sqrt{3}\sqrt{3}}$<br>A1 for $7\sqrt{3}$ (accept $\frac{21\sqrt{3}}{3}$) |

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| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | (a) | | 3 | 1 | B1 cao |
| | (b) | | $\frac{1}{5}$ | 2 | M1 $\frac{1}{25^{\frac{1}{2}}}$ or $\sqrt{25} = 5$<br>A1 $\frac{1}{5}$ or $5^{-1}$ or 0.2 |
| 16 | (a) | $\frac{2(y-6)}{(y-6)(y-2)}$ | $\frac{2}{y-2}$ | 3 | M1 $2(y-6)$<br>M1 $(y-6)(y-2)$<br>A1 cao |
| | (b) | $\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$ | $\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$ | 2 | M1 for $3(x+5)$ or $3x+15$ or $3x+5$ or $-(x-4)$ or $-x+4$ or $-x-4$ or $(x-4)(x+5)$<br>A1 for $\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$ oe |

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# Mark Scheme (Results)

## March 2012

## GCSE Mathematics (2MB01) Higher
## 5MB2H (Non-Calculator) Paper 01

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**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

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**12 Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | 30 ÷ 12 = 2.5<br><br>220 × 2.5<br>40 × 2.5<br>150 × 2.5<br>2 × 2.5 | 550<br>100<br>375<br>5 | 3 | M2 for any one of 220 + 220 + 110 or 40 + 40 + 20 or 150 + 150 + 75 or 2 + 2 + 1 or 550 or 100 or 375 or 5<br>A1 for all 4 correct values<br><br>OR<br><br>M1 for 30 ÷ 12 oe or sight of 2.5<br>M1(dep) for 220 × '2.5' or 40 × '2.5' or 150 × '2.5' or 2 × '2.5' oe or 550 or 100 or 375 or 5<br>A1 for all 4 correct values<br><br>OR<br><br>M1 for 220 ÷ 12 or 40 ÷ 12 or 150 ÷ 12 or 2 ÷ 12 or $18\frac{1}{3}$ or $3\frac{1}{3}$ or 12.5 or $\frac{1}{6}$ seen<br>M1(dep) for '$18\frac{1}{3}$' × 30 or '$3\frac{1}{3}$' × 30 or '12.5' × 30 or '$\frac{1}{6}$' × 30 or 550 or 100 or 375 or 5<br>A1 for all 4 correct values<br><br>**Continued on next page** |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| | | | | | OR<br><br>M1 for M1 for 220 ÷ 2 or 40 ÷ 2 or 150 ÷ 2 or 2 ÷ 2 or 110 or 20 or 75 or 1 seen<br>M1(dep) for '110' × 5 or '20' × 5 or '75' × 5 or '1' × 5 or 550 or 100 or 375 or 5 seen<br>A1 for all 4 correct values<br><br>(SC: B2 for 275, 50, 187.5 and 2.5<br>or B1 for 275 or 50 or 187.5 or 2.5, if M0 scored) |
| 2 | (a) | | Terms must end in 2 or 7 | 1 | B1 for any correct reason; eg terms must end in 2 or 7 |
| | (b) | | $5n - 3$ | 2 | B2 for $5n - 3$ (oe, including unsimplified)<br>(B1 for $5n + k$, $k \neq -3$ or $k$ is absent, or $n = 5n - 3$) |
| 3 | | $\left(\frac{1+4}{2}, \frac{2+0}{2}\right)$ | (2.5, 1) | 2 | M1 for $\frac{1+4}{2}$ and $\frac{2+0}{2}$ or for either the $x$ coordinate correct or the $y$ coordinate correct<br>A1 for (2.5, 1) oe<br><br>SC: B1for an answer of (1, 2.5) if M0 scored |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 4* | | 500 × 1000 × 400<br>= 200 000 000<br>20 × 50 × 40 = 40 000<br>200 000 000 ÷ 40 000 = 5000<br><br>OR<br><br>(500 ÷ 20) × (1000 ÷ 50) × (400 ÷ 40)<br>= 25 × 20 × 10 = 5000 | Proof | 4 | B1 for a correct unit conversion, could be seen on the diagram or in working<br>M1 for 500 × 1000 × 400 or 200 000 000<br>or 20 × 50 × 40 or 40 000<br>or 5 × 10 × 4 or 200<br>or 0.2 × 0.5 × 0.4 or 0.04<br>M1(dep) for '200 000 000' ÷ '40 000'<br>C1 for fully correct working leading to final answer of 5000<br><br>OR<br><br>B1 for a correct unit conversion, could be seen on the diagram or in working<br>M1 for (500 ÷ 20) or (1000 ÷ 50) or (400 ÷ 40) or at least two of 25, 20, 10 seen<br>M1(dep) for '25' × '20' × '10'<br>C1 for fully correct working leading to final answer of 5000 |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | (a) | | $8e - 5f$ | 2 | B2 for $8e - 5f$ oe<br>(B1 for $8e$ or $-5f$) |
| | (b) | | $2(2t + 5)$ | 1 | B1 cao |
| | (c) | $3 + 2p - 2$ | $1 + 2p$ | 2 | M1 for $2 \times p$ and $2 \times -1$ oe within at most 3 terms seen<br>A1 cao |
| | (d) | $x(a + b) + y(a + b)$ | $(a + b)(x + y)$ | 2 | M1 for $x(a + b)$ or $y(a + b)$ or $a(x + y)$ or $b(x + y)$ seen<br>A1 for $(a + b)(x + y)$ oe 2-bracketed expression |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 6 | | 30000 × 20 ÷ 100 = 6000<br>30000 – 6000 = 24000<br>24000 ÷ 12<br><br>OR<br>30000 ÷ 12 = 2500<br>2500 × 20 ÷ 100 = 500<br>2500 – 500<br><br>OR<br>100 – 20 = 80<br>30000 × 80 ÷ 100 = 24000<br>24000 ÷ 12<br><br>OR<br>30000 ÷ 12 = 2500<br>2500 × 80 ÷ 100 | 2000 | 3 | M1 for 30000 × 20 ÷ 100 oe (= 6000)<br>M1 for (30000 – '6000') ÷ 12<br>A1 cao<br><br>OR<br><br>M1 for 30000 ÷ 12 (= 2500)<br>M1 for '2500' – '2500' × 20 ÷ 100 oe<br>A1 cao<br><br>OR<br><br>M1 for 100 – 20 (= 80)<br>M1 for 30000 × 80 ÷ 100 oe and dividing by 12<br>A1 cao<br><br>OR<br><br>M1 for 30000 ÷ 12 (= 2500)<br>M1 for '2500' × 80 ÷ 100 oe<br>A1 cao |

<table>
<tr><th colspan="5">5MB2H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>7</td><td></td><td>10 × 8/5 = 16<br>60 – 16<br><br>OR<br>60 × 5/8 = 37.5<br>37.5 – 10</td><td>44 km or<br>27.5 miles</td><td>3</td><td>B1 for 5 miles = 8 km or equivalent statement or use of conversion factor 8/5 or 5/8<br>M1 for 10 × ‘8/5’ (= 16) or 60 × ‘5/8’ (= 37.5)<br>A1 for 44 km or 27.5 miles, accept76 km or 47.5 miles (units must be quoted)</td></tr>
<tr><td>8</td><td></td><td><table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>–10</td><td>–6</td><td>–2</td><td>2</td><td>6</td><td>10</td></tr></table><br>OR<br><br>Using $y = mx + c$<br><br>gradient = 4<br>$y$ intercept = –2</td><td>Straight line from (–2, –10) to (3, 10)</td><td>3</td><td>(Table of values)<br>M1 for at least 2 correct attempts to find points by substituting values of $x$<br>M1 (dep) ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted)<br>A1 for correct line between $x = -2$ and $x = 3$<br><br>(No table of values)<br>M2 for at least 2 correct points and no incorrect points plotted OR line segment of $y = 4x - 2$ drawn (ignore any additional incorrect segments)<br>(M1 for at least 3 correct points with no more than 2 incorrect points)<br>A1 for correct line between $x = -2$ and $x = 3$<br><br>(Use of $y = mx + c$)<br>M2 line segment of $y = 4x - 2$ drawn (ignore any additional incorrect segments)<br>(M1 for line drawn with gradient of 4 OR line drawn with $y$ intercept of –2 and a positive gradient)<br>A1 for correct line between $x = -2$ and $x = 3$</td></tr>
</table>

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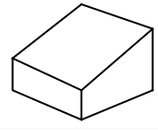
| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | (a) | | 6 by 4 rectangle drawn | 2 | B2 for a 6 by 4 rectangle drawn<br>(B1 for a rectangle drawn with one correct dimension) |
| | (b) | | 3-D sketch  | 2 | M1 for an attempt at a 3-D sketch with a trapezoidal face<br>A1 for a correct 3-D sketch |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10* | | Angle *ABE* = 40 (vertically opposite angles are equal)<br>Angle *BAE* = angle *BEA* = (180 – 40)/2 = 70 (base angles of an isos triangle are equal)<br>*x* = 70 (alternate angles on parallel lines are equal)<br><br>OR<br><br>Angle *ABE* = 40 (vertically opposite angles are equal)<br>Angle *BAE* = angle *BEA* = (180 – 40)/2 = 70 (base angles of an isosceles triangle are equal)<br>Angle *BEF* = 40 (corresponding angles are equal)<br>*x* = 180 – 70 – 40 = 70 (angles as a straight line add up to 180°) | 70 | 5 | B1 for angle *ABE* = 40, could be marked on the diagram<br>M1 for (180 – '40')/2 (= 70)<br>A1 for 70° identified as the angle $x^o$<br><br>C2 for fully correct reasons:<br>'vertically opposite angles are equal' or 'vertically opposite angles are equal'<br>'base angles of an isosceles triangle are equal'<br>'alternate angles on parallel lines are equal'<br>(C1 for just one correct reason quoted)<br><br>OR<br><br>B1 for angle *ABE* = 40 or angle *BEF* = 40, could be marked on the diagram<br>M1 for (180 – '40')/2 (= 70)<br>A1 for 70° identified as the angle $x^o$<br>C2 for fully correct reasons:<br>'vertically opposite angles are equal' or 'vertically opposite angles are equal'<br>'base angles of an isosceles triangle are equal'<br>'corresponding angles on parallel lines are equal'<br>'angles on a straight line add up to 180'<br>(C1 for just one correct reason quoted) |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 11 | (a) | | 1 | 1 | B1 cao |
| | (b) | | 3 | 1 | B1 cao |
| | (c) | | $\frac{1}{8}$ | 1 | B1 for $\frac{1}{8}$ oe |
| 12 | | Angle *PTO* = angle *PSO* = 90<br>Angle *TPS* = 24 × 2 = 48<br>360 – 90 – 90 – 48<br><br>OR<br><br>Angle *PTO* = 90<br>Angle *TOP* = 180 – 90 – 24 = 66<br>66 × 2 | 132 | 3 | M1 for angle *PTO* = 90 or angle *PSO* = 90, could be marked on the diagram<br>M1 for 360 – 90 – 90 – (24 × 2)<br>A1 cao<br><br>OR<br><br>M1 for angle *PTO* = 90 or angle *PSO* = 90, could be marked on the diagram<br>M1 for 2 × (180 – 90 – 24)<br>A1 cao |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 13* | | Rectangle – unshaded triangle<br><br>$(x + 6)(3x – 5) – ½×2x(3x – 5)$<br>$=3x^2 + 18x – 5x – 30 – (3x^2 – 5x)$<br>$=3x^2 + 18x – 5x – 30 – 3x^2 + 5x$ QED<br><br>OR<br><br>$(x + 6)(3x – 5) – ½×2x(3x – 5)$<br>$= (x + 6)(3x – 5) – x(3x – 5)$<br>$= (3x – 5)( x + 6 – x)$<br>$= 6( 3x – 5) = 18x – 30$ QED<br><br>OR<br><br>Shaded trapezium + shaded triangle<br><br>$½(x + 6 – 2x + x + 6)(3x – 5)$<br>$=6( 3x – 5) = 18x – 30$ QED | Proof | 4 | M1 for using two lengths to find an area<br>M1(dep) for '$(x + 6)(3x – 5)$' – '$½ × 2x(3x – 5)$'<br>M1 for $3x^2 + 18x – 5x – 30$ or $½×(6x^2 – 10x)$ or $3x^2 – 5x$<br>C1 for a correct completion of the proof resulting in $18x – 30$ from fully correct working<br><br>OR<br><br>M1 for using two lengths to find an area<br>M1(dep) for '$(x + 6)(3x – 5)$' – '$½ × 2x(3x – 5)$'<br>M1 for factorising process with $(3x – 5)$ as the common factor<br>C1 for a correct completion of the proof resulting in $18x – 30$ from fully correct working<br><br>OR<br><br>M1 for $x + 6 – 2x$ $(= 6 – x)$<br>M2 for $½( x + 6 – 2x + x + 6)(3x – 5)$<br>C1 for a correct completion of the proof resulting in $18x – 30$ from fully correct working |

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| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 14 | | .<br>0.25 = 0.2555…<br>0.25555…×10 = 2.5555…<br>0.25555…×100 = 25.5555…<br>25.5555…– 2.5555… = 23<br><br>**Alternative Method**<br><br>$x$ = 0.25555 …<br>10$x$ = 2.5555 …<br>100$x$ = 25.5555…<br>90$x$ = 23 | $\frac{23}{90}$ | 3 | M1 for 0.25555... or 0.2 + 0.05555…<br>M1 for two correct recurring decimals that, when subtracted, would result a terminating decimal, and attempting the subtraction or $\frac{2.3}{9}$ or $\frac{253}{990}$<br>A1 cao<br><br>**Alternative Method**<br><br>M1 for $x$ = 0.25555…<br>M1 for two correct recurring decimals that, when subtracted, would result a terminating decimal, e.g. 10$x$ = 2.5555..., 100$x$ = 25.5555… and attempting the subtraction or 9$x$ = 2.3 or 90$x$ = 23 or 900$x$ = 230 or $\frac{2.3}{9}$ or $\frac{253}{990}$<br>A1 cao<br><br>SC: B1 for fraction with denominator 90 if M0 |
| 15 | | Grad = $\frac{1}{3}$<br>$3 = 6 \times \frac{1}{3} + c$<br>$c = 1$ | $y = \frac{1}{3}x + 1$ | 3 | M1 for $-3 \times m = -1$ oe or $\frac{1}{3}$ seen<br><br>M1 for $3 = 6 \times$ '$\frac{1}{3}$' $+ c$ or $y - 3 =$ '$\frac{1}{3}$'$(x - 6)$<br><br>A1 for $y = \frac{1}{3}x + 1$ oe |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | (a) | $\frac{15}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$ | $3\sqrt{5}$ | 2 | M1 for $\frac{15}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$<br>A1 for $\frac{15\sqrt{5}}{5}$ or better |
| | (b) | $(1 + \sqrt{3})(1 + \sqrt{3})$<br>$= 1 + \sqrt{3} + \sqrt{3} + 3$<br>$= 4 + 2\sqrt{3}$ | 4, 2 | 2 | M1 for $1\times1 + 1\times\sqrt{3} + 1\times\sqrt{3} + \sqrt{3}\times\sqrt{3}$ oe<br>A1 cao |
| 17 | | $\frac{3(a-b)+2b}{b(a-b)}$<br>$\frac{3a-3b+2b}{b(a-b)}$ | $\frac{3a-b}{b(a-b)}$ | 3 | M1 for a common denominator of $b(a-b)$ oe<br>M1 for $\frac{3(a-b)+2b}{'b(a-b)'}$ or $\frac{3(a-b)}{'b(a-b)'} + \frac{2b}{'b(a-b)'}$<br>A1 for $\frac{3a-b}{b(a-b)}$ or $\frac{3a-b}{ba-b^2}$ |

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## Foundation (Non-Calculator) Paper 1F

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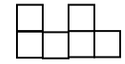
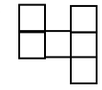
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

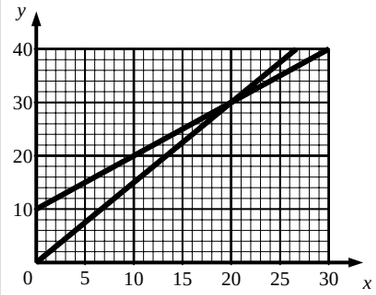
| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | | 380 | 1 | B1 cao |
| | (b) | | 6.2 | 1 | B1 cao |
| | (c) | | Arrow at 34 | 1 | B1 cao |
| 2 | (a) | | 8 | 1 | B1 for 8 ± 0.2 |
| | (b) | | 35 | 1 | B1 for 35 ± 2° |
| | (c) | | Circle drawn | 1 | B1 for all parts within ± 2mm, (use overlay) |
| 3 | (a) | | 4, 7, 4, 3, 2 | 2 | M1 for at least 3 correct tallies **or** at least 3 correct frequencies<br>A1 for all frequencies correct |
| | (b) | | 7 | 1 | B1 for 7 **or** ft from frequencies in (a) or tallies if no frequencies |
| | (c) | | Diagram drawn | 3 | M1 for bar chart or other suitable chart with at least 3 correct heights for their scale (can f.t.)<br>A1 for all 5 bars correctly labelled and vertical axis correctly scaled<br>A1 for fully correct **or** ft frequencies in (a)<br>**OR**<br>M1 for pictogram with at least 3 correct rows (can f.t.)<br>A1 for correct labels on all 5 rows and correctly key<br>A1 for fully correct **or** ft frequencies in (a)<br>**OR**<br>M1 for pie chart with at least 3 correct sectors ± 2° (can f.t.)<br>A1 for all 5 sectors correctly labelled<br>A1 for fully correct **or** ft frequencies in (a) |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 4 | | £1.18 + 94p = £2.12<br><br>£5 – £2.12 – 30p<br>= £2.58<br><br>£2.58 ÷ 2 = | 1.29 | 3 | M2 for (5 – 1.18 – 0.94 – 0.30) ÷ 2 oe **or** digits 129<br><br>(M1 for 1.18 + 0.94 **or** 2.12 seen<br>**or** 1.18 + 0.94 + 0.30 oe **or** 2.42 seen<br>**or** 5 – 1.18 – 0.94 oe **or** 2.88 seen<br>**or** (5 – 1.18 – 0.94) ÷ 2 **or** 1.44 seen<br>**or** 5 – 1.18 – 0.94 – 0.30 oe **or** 2.58 seen )<br>A1 cao<br>**NOTE**: Accept working in £ or pence |
| 5 | (a)(i) | | (2, 3) | 2 | B1 cao |
| | (ii) | | (–3, 1) | | B1 cao |
| | (b) | | Point plotted at (3, –4) | 1 | B1 cao |
| 6 | (a) | | – 5 | 1 | B1 cao |
| | (b) | | 6 | 1 | B1 for 6 or – 6 |
| | (c) | | 3 | 1 | B1 cao |
| 7 | | | (P, B), (P, S), (P, L)<br>(M, B), (M, S), (M, L)<br>(H, B), (H, S), (H, L) | 2 | M1 for any 3 combinations with no incorrect combinations<br>A1 for all 9 combinations with no duplicates or extras |
| 8 | (a) | | Walk | 1 | B1 cao |
| | (b) | 24 ÷ 4 = | 6 | 2 | M1 for 24 ÷ 4 oe or ¼ oe seen<br>A1 cao |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | (a) | | Isosceles triangle | 1 | B1 for isosceles triangle |
| | (b) | | Rectangle with area 12 cm$^2$ | 2 | M1 for rectangle drawn<br>A1 cao |
| 10 | (a) | | A marked at 0 | 1 | B1 for A marked at 0 (within overlay) |
| | (b) | | B marked at 1/4 | 1 | B1 for B marked at 1/4 (within overlay) |
| 11 | (a) | | 9 | 1 | B1 cao |
| | (b) | | 33 | 2 | M1 for 5 × 5 **or** 25 seen in the working<br>**or** 2 × 2 × 2 **or** 8 seen in the working<br>A1 cao |
| 12 | (a) | | 20 | 2 | M1 3 × 3 × 3 oe seen or drawn or 27 seen or use of 3 layers<br>A1 cao |
| | (b) | |  | 2 | B2 for correct view<br>(B1 for  or  ) |
| 13 | (a)(i) | | 07 29 | 2 | B1 for 07 29 |
| | (ii) | | 36 | | B1 for 36 or ft difference between (i) and 06 53 |
| | (b) | | 07 51 | 1 | B1 cao |
| | (c) | | 09 55 | 1 | B1 for 09 55 or 9 55 or five to ten |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 14 | | 2 + 8 + 2 + 8 = 20<br>20 ÷ 4 = | 5 | 4 | M2 for 2 + 8 + 2 + 8 oe **or** 20 seen **or** (2 + 8) ÷ 2 oe<br>(M1 for the sum of 3 sides of the rectangle)<br>M1 (dep) for the sum of 3 or 4 sides of the rectangle ÷ 4<br>**or** an attempt to evaluate (2 + 8) ÷ 2 oe to get the length of one side<br>A1 cao<br>**SC**: B1 for an answer of 4 coming from $\sqrt{2\times 8}$ oe |
| 15 | (a) | | 4 | 1 | B1 cao |
| | (b) | 9.5 – 4.75 =<br>**OR**<br>9.5 ÷ 2 = | 4.75 | 2 | M1 for 9.5 – 4.75 **or** 9.5 ÷ 2 **or** 4.75 – 9.5<br>A1 cao |
| | (c) | | 6 | 1 | B1 cao |
| | (d) | 12 × 4 = | 48 | 2 | M1 for × 4 seen **or** identifying + 0.5 for every 2 inches **or** 12 + 12 + 12 + 12 oe **or** build up method eg 12, 24, 36, 48 allow one error<br>A1 cao |
| 16 | (a) | | trapezium | 1 | B1 for trapezium or isosceles trapezium |
| | (b) | | | 2 | B2 for correct tessellation (at least 5 more shapes)<br>(B1 for at least 4 shapes (including initial shape) correctly tessellating) |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 17* | | S: 35 ÷ 100 × 40 = 14<br>W: 40 ÷ 8 × 3 = 15<br><br>**OR**<br>D: 16 ÷ 40 (× 100)<br>= 0.4 (40%)<br>W: 3 ÷ 8 (× 100)<br>= 0.375 (37.5%)<br><br>**OR**<br>D: $\frac{16}{40} = \frac{80}{200}$<br>S: $\frac{35}{100} = \frac{70}{200}$<br>W: $\frac{3}{8} = \frac{75}{200}$ | Debbie and correct calculations | 4 | **Compares Marks out of 40 or fractions with denominator of 40**<br>M1 for 35 ÷ 100 × 40 oe **or** 14 seen (or 14/40 seen)<br>M1 for 40 ÷ 8 × 3 **or** 15 seen (or 15/40 seen)<br>A1 for 14 and 15 **or** $\frac{14}{40}$ and $\frac{15}{40}$<br>C1 (dep on M1) for correct conclusion for their working QWC with 3 comparable marks:<br>Decision and justification should be clear with working clearly presented and attributable.<br><br>**OR Decimals (or Percentages)**<br>M1 for 16 ÷ 40 (× 100) oe **or** 0.4 (or 40) seen<br>M1 for 3 ÷ 8 (× 100) oe **or** 0.375 (or 37.5) seen<br>A1 for 0.4 and 0.375 (**or** 40 and 37.5)<br>C1 (dep on M1) for correct conclusion for their working QWC: with 3 comparable decimals (or percentages:<br>Decision and justification should be clear with working clearly presented and attributable.<br><br>**OR Compares Fractions with denominator other than 40**<br>M1 for attempt to convert all to fractions with a common denominator other than 40<br>M1 for at least 1 correct<br>A1 for $\frac{80}{200}$ and $\frac{70}{200}$ and $\frac{75}{200}$ oe<br>C1 (dep on M1) for correct conclusion for their working QWC with 3 comparable fractions:<br>Decision and justification should be clear with working clearly presented and attributable. |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 18* | (a) | | 10 | 1 | B1 cao |
| | (b) | <br>**Miles** 0 10 20 30 40 50<br>**Ed** 0 15 30 45 60 75<br>**Bill** 10 20 30 40 50 60 | Ed is cheaper up to 20 miles,<br><br>Bill is cheaper for more than 20 miles | 3 | M1 for correct line for Ed intersecting at (20,30) ±1 sq tolerance **or** $10 + x = 1.5x$ oe<br>C2 (dep on M1) for a correct full statement ft from graph<br>eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles<br>(C1 (dep on M1) for a correct conclusion ft from graph<br>eg. cheaper at 10 miles with Ed ;<br>eg. cheaper at 50 miles with Bill<br>eg. same cost at 20 miles;<br>eg for £5 go further with Bill<br>**or** A general statement covering short **and** long distances eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances)<br><br>**OR** (continued on next page) |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 18 (contd) | | | | | **OR**<br><br>M1 for correct method to work out Ed's delivery cost for at least 2 values of $n$ miles where $0 < n \leq 50$<br>**or** for correct method to work out Ed and Bill's delivery cost for $n$ miles where $0 < n \leq 50$<br><br>C2 (dep on M1) for 20 miles linked with £30 for Ed and Bill with correct full statement<br>eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles<br>(C1 (dep on M1) for a correct conclusion<br>eg. cheaper at 10 miles with Ed;<br>eg. cheaper at 50 miles with Bill<br>eg. same cost at 20 miles;<br>eg for £5 go further with Bill<br>**or** A general statement covering short **and** long distances<br>eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances)<br><br>SC: B1 for correct full statement seen with no working<br>eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles<br><br>QWC Decision and justification should be clear with working clearly presented and attributable |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 19 | | 1,96 × 2.25 = 4.41<br><br>**OR**<br>4.23 ÷ 9 = 0.47<br>1.96 ÷ 4 = 0.49<br>**OR**<br>4.23 × 4 = 16.92<br>1.96 × 9 = 17.64<br>**OR**<br>4.23 ÷ 9 = 0.47<br>0.47 × 4 = 1.88<br>**OR**<br>1.96 ÷ 4 = 0.49<br>0.49 × 9 = 4.41<br>**OR**<br>9 ÷ 4.23 = 2.12<br>4 ÷ 1.96 = 2.04 | Pack of 9 | 3 | M2 for a fully correct method to enable a conclusion<br>eg 1.96 × 2¼<br>**OR**<br>M1 for 4.23 ÷ 9 or 423 ÷ 9 **or** 0.47 seen **or** 47 seen<br>M1 for 1.96 ÷ 4 or 196 ÷ 4 or 0.49 seen or 49 seen<br>**OR**<br>M1 for 4.23 × 4 **or** 423 × 4 **or** 16.92 seen **or** 1692 seen<br>M1 for 1.96 × 9 **or** 196 × 9 **or** 17.64 seen **or** 1764 seen<br>**OR**<br>M1 for 4.23 ÷ 9 **or** 423 ÷ 9 **or** 0.47 seen **or** 47 seen<br>M1 for 0.47 × 4 **or** 47 × 4 **or** 1.88 seen **or** 188 seen<br>**OR**<br>M1 for 1.96 ÷ 4 **or** 196 ÷ 4 **or** 0.49 seen **or** 49 seen<br>M1 for 0.49 × 9 **or** 49 × 9 **or** 4.41 seen **or** 441 seen<br>**OR**<br>M1 for 9 ÷ 4.23 **or** 2.12(...) seen **or** 2.13 seen<br>M1 for 4 ÷ 1.96 **or** 2.04(...) seen<br>A1 for Pack of 9 and fully correct calculations<br>**NOTE:** B0 for an answer of 9 not supported by working. |
| 20 | (a) | | 6 | 1 | B1 cao |
| | (b) | | 44 | 1 | B1 cao |
| | (c) | | 31 | 2 | M1 for 60 – 29<br>**or** 29 – 60<br>**or** any correct method that is attempting to find the difference between 29 and 60<br>(allow 1 arithmetic error)<br>A1 cao |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 21* | | Angle *DBC* = (180 – 50) ÷ 2<br>Base angles of isosceles triangle are equal<br>Angle *ABD* = 180 – 65<br>Angles on a straight line add up to 180<br>*x* = 180 – 20 – 115<br>Angles in a triangle add up to 180<br><br>**OR**<br>Angle *DBC* = (180 – 50) ÷ 2<br>Base angles of isosceles triangle are equal<br>*x* = 65 – 20<br>Exterior angle of triangle is equal to sum of interior opposite angles<br><br>**OR**<br>Angle *DCB* = (180 – 50) ÷ 2<br>Base angles of isosceles triangle are equal<br>*x* = 180 – 50 – 20 – 65<br>Angles in a triangle add up to 180 | 45 with reasons | 4 | M1 for (180 – 50) ÷ 2 oe **or** 65 seen<br><br>M1 for 180 – 20 – (180 – "65") **or** "65" – 20<br>or 180 – 50 – 20 –'65' oe<br><br>C2 for *x* identified as 45 with full reasons<br><br>QWC: Reasons clearly laid out with correct geometrical language used<br><br>(C1 (dep on M1) for one reason<br>QWC: Reasons clearly laid out with correct geometrical language used )<br><br>NOTE: *x* = 45 with no working or without any correct angles marked on the diagram cannot score. |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 22 | (a) | 360 ÷ 60 = 6<br>300 ÷ 60 = 5<br>6 × 5 = | Yes and 30 | 3 | M1 for dividing side of patio by side of paving slab<br>eg 360 ÷ 60 **or** 300 ÷ 60 **or** 3.6 ÷ 0.6 **or** 3 ÷ 0.6 **or** 6 and 5 seen **or** 6 divisions seen on length of diagram **or** 5 divisions seen on width of diagram<br>M1 for correct method to find number of paving slabs<br>eg (360 ÷ 60) × (300 ÷ 60) oe **or** 6 × 5<br>**or** 30 squares seen on diagram<br>(units may not be consistent)<br>A1 for Yes **and** 30 ( or 2 extra) with correct calculations<br><br>**OR**<br>M1 for correct method to find area of patio **or** paving slab eg 360 × 300 **or** 108000 seen **or** 60 × 60 **or** 3600 seen **or** 3.6 × 3 **or** 10.8 seen **or** 0.6 × 0.6 **or** 0.36 seen<br>M1 for dividing area of patio by area of a paving slab<br>eg. (3.6 × 3) ÷ (0.6 × 0.6) oe<br>(units may not be consistent)<br>A1 for Yes **and** 30 ( or 2 extra) with correct calculations<br><br>**OR**<br>M1 for method to find area of patio and area of 32 slabs eg. 60 × 60 × 32 **or** 360 × 300<br>M1 for method to find both areas<br>eg. 60 × 60 × 32 **and** 360 × 300<br>(units may not be consistent)<br>A1 for Yes **and** 115200 **and** 108000<br>**OR** Yes **and** 11.52 **and** 10.8<br>**NB :** Throughout the question, candidates could be working in metres or centimetres |

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| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 22 | (b) | 1726<br>25890<br>27616<br><br>**8 6 3**<br>**2** 2 4 1 8 9 **3**<br>**7** 1 6 1 2 6 **2**<br>6 1 6<br><br>800 60 3<br>30 24000 1800 90<br>2 1600 120 6<br>24000 + 1800 + 90<br>+ 1600 + 120 + 6<br>= 27616 | 276.16 | 3 | M1 for complete correct method with relative place value correct.<br>Condone 1 multiplication error, addition not necessary.<br><br>**OR**<br>M1 for a complete grid.<br>Condone 1 multiplication error, addition not necessary.<br><br>**OR**<br>M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary.<br><br>A1 for digits 27616<br><br>A1 ft (dep on M1) for correct placement of decimal point after addition (of appropriate values)<br><br>(SC: B1 for attempting to add 32 lots of 8.63 ) |
| 23 | (a) | | 30 | 2 | M1 for 25 ÷ 10 **or** 2.5 seen **or** 10 ÷ 25 **or** 0.4 seen **or** 12+12+6 oe **or** a complete method eg. 25×12÷10 oe<br>A1 cao |
| | (b) | 1000 ÷ 200 × 12 | 60 | 2 | M1 for 500 ÷ 50 **or** 1000 ÷ 200 **or** 500 ÷ 10 **or** correct scale factor clearly linked with one ingredient eg 10 with sugar or 5 with butter or flour or 50 with milk **or** an answer of 120 or 600<br>A1 cao |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 24 | | Acton after 24, 48, 72, 96, ..<br>Barton after 20, 40, 60, 80, ..<br>LCM of 20 and 24 is 120<br>9:00 am + 120 minutes<br><br>**OR**<br>Acton after 24, 48, 1h 12 min...<br>Barton after 20, 40, 1 h<br>LCM is 2 hours<br>9:00 am + 2 hours<br><br>**OR**<br>Times from 9:00 am when each service leaves the bus station<br>Acton at 9:24, 9:48, 10:12..<br>Barton at 9:20, 9:40, 10:00..<br><br>**OR**<br>20 = 2 × 2 × 5<br>24 = 2 × 2 × 2 × 3<br>2 × 2 × 2 × 3 × 5 = 120 | 11:00 am | 3 | M1 for listing multiples of 20 and 24 with at least 3 numbers in each list ; multiples could be given in minutes or in hours and minutes<br>(condone one addition error in total in first 3 numbers in lists)<br>A1 identify 120 (mins) **or** 2 (hours) as LCM<br>A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock<br><br>**OR**<br>M1 for listing times after 9am when each bus leaves the bus station, with at least 3 times in each list<br>(condone one addition error in total in first 3 times after 9am in lists)<br>A1 for correct times in each list up to and including 11:00<br>A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock<br><br>**OR**<br>M1 for correct method to write 20 and 24 in terms of their prime factors 2, 2, 5 and 2, 2, 2, 3<br>(condone one error)<br>A1 identify 120 as LCM<br>A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 25 | (a) | | $6y - 15$ | 1 | B1 cao |
| | (b) | | $4x(2x + y)$ | 2 | B2 cao<br>(B1 for $x(8x + 4y)$<br>**or** $2x(4x + 2y)$<br>**or** $4(2x^2 + xy)$<br>**or** $4x(ax + by)$ where $a$, $b$ are positive integers<br>**or** $ax(2x + y)$ where $a$ is a positive integer<br>**or** $4x(2x \quad y)$ ) |
| | (c) | $10t = gh$<br>$h = \frac{10t}{g}$ | $\frac{10t}{g}$ | 2 | M1 for clear intention to multiply both sides of the equation by 10 (eg. ×10 seen on both sides of equation)<br>**or** clear intention to divide both sides of the equation by $g$ (eg. ÷ g seen on both sides of equation)<br>**or** $10t = gh$<br>**or** $\frac{t}{g} = \frac{h}{10}$<br>**or** fully correct reverse flow diagram<br>eg. ← ×10 ← ÷$g$ ←<br>A1 for $\frac{10t}{g}$ oe |

| 1MA0_1F | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 26 | (a) | $2 \times 5 \times 2 = 20$<br>$300 \div 20 =$ | 15 | 3 | M2 for $300 \div (2 \times 5 \times 2)$ oe<br>(M1 for $2 \times 5 \times 2$ **or** 20 seen **or** $300 \div (2 \times 5)$ **or** 30 seen<br>A1 cao |
| | (b) | $c = \frac{30 \times 40}{150}$ = | 8 | 2 | M1 for $\frac{30 \times 40}{150}$ **or** 1200 seen<br>A1 cao |
| 27 | | $3x - 15 = 2x + 24$<br>$x = 39$<br><br>**OR**<br>$2x + 3x - 15 + 2x + 2x + 24 = 360$<br>$9x + 9 = 360$<br>$9x = 351$<br>$x = 39$<br><br>**OR**<br>$2x + 2x + 24 = 180$<br>$4x + 24 = 180$<br>$4x = 156$<br>$x = 39$<br><br>**OR**<br>$2x + 3x - 15 = 180$<br>$5x - 15 = 180$<br>$5x = 195$<br>$x = 39$ | 39 | 3 | M1 for forming an appropriate equation<br>eg $3x - 15 = 2x + 24$<br>**or** $2x + 3x - 15 + 2x + 2x + 24 = 360$ oe<br>**or** $2x + 2x + 24 = 180$ oe<br>**or** $2x + 3x - 15 = 180$ oe<br>**or** $2x + 3x - 15 = 2x + 2x + 24$<br>M1 (dep) for correct operation(s) to isolate $x$ and non-$x$ terms in an equation to get $ax = b$<br>A1 cao<br><br>**OR**<br>M2 for $\frac{351}{9}$ **or** $\frac{195}{5}$ **or** $\frac{156}{4}$ oe<br>A1 cao |

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# Mark Scheme (Results)

## June 2012

## GCSE Mathematics (2MB01) Higher
## 5MB2H (Non-Calculator) Paper 01

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**NOTES ON MARKING PRINCIPLES**

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**7 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**11 Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**12 Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *1 | | Angle *BED* = 68°<br>180 – (68 + 68)<br><br>OR<br>Angle *BEF* = 180 – 68 = 112<br>Angle *BED* = 180= 112 = 68<br>180 – (68 + 68) | *x* = 44° | 4 | M1 for Angle *BED* = 68° seen in the diagram or correctly used in the working space<br>M1 for 180 – 2 × "68"<br>A1 for *x* = 44° (accept angle *BDE* = 44°)<br>[Note: 44° only seen in the body of the script without the "*x* =" gets M1M1A0]<br><br>C1 (dep on at least M1) for alternate angles are equal (or equivalent) and one other reason; either angles in a triangle add to 180° or base angles of an isosceles triangle are equal<br>OR for allied angles (or equivalent, eg co-interior) add up to 180° and angles on a straight line add up to 180° and one other reason; either angles in a triangle add to 180° or base angles of an isosceles triangle are equal |
| 2 | | | 4*n* + 2 | 2 | B2 for 4*n* + 2 oe (eg 4×*n* + 2 or *n*4 + 2, …)<br>or *n*th = 4*n* + 2<br>(B1 for a linear expression in 4*n* e.g. 4*n* + a ($a \neq 2$) or *n* = 4*n* + 2)<br>(B0 for *n* = 4*n* and *n* + 4) |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 3 | | 35 ÷ (5 + 2) = 5<br>5 × 5<br><br>OR<br>5 2<br>10 4<br>15 6<br>20 8<br>25 10 | 25 | 2 | M1 for 35 ÷ (5 + 2) or 35 ÷ 7 or 35 × $\frac{5}{7}$<br>A1 for 25 cao<br>OR<br>M1 for listing 5, 10, 15, ….. and 2, 4, 6, ….. to at least 15 and 6<br>A1 for 25 cao<br>[SC: B1 for an answer of 25:10 if M0 scored] |
| 4 | | $\frac{16}{40} + \frac{15}{40} = \frac{31}{40}$<br><br>OR<br><br>\| \| 2 \| 5 \|<br>\| 3 \| \| 15 \|<br>\| 8 \| 16 \| 40 \|<br><br>OR<br>0.4 + 0.375 | $\frac{31}{40}$ or 0.775 | 2 | M1 for attempt to write both fractions with a common denominator (a multiple of 40) with at least one of them correct<br>A1 for $\frac{31}{40}$ oe<br><br>OR<br>M1 for 40 in the correct cell and 15 or 16 in the correct cell<br>A1 for $\frac{31}{40}$ oe<br><br>OR<br>M1 for changing both fractions to decimals with both 0.4 and 0.375 seen<br>A1 for 0.775 |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | | $\frac{15}{100} \times 400 = 60$<br>$400 - 60 =$<br><br>OR<br>$\frac{85}{100} \times 400$ | 340 | 3 | M1 for $\frac{15}{100} \times 400$ (= 60) oe or 40 + 20 or 400 × 0.15<br>M1 (dep) for 400 – "60"<br>A1 for 340 cao<br>OR<br>M1 for 100–15 (=85)<br>M1 (dep) for $\frac{'85'}{100} \times 400$ or '0.85' × 400<br>A1 for 340<br>[SC: B1 for an answer of 460 if M0 scored] |
| 6 | (a) | | $5(2a + 1)$ | 1 | B1 for $5(2a + 1)$ or $5\times(2a + 1)$ or $(2a + 1)5$ or $5(1 + 2a)$, etc |
| | (b) | $5x + 35 + 3x - 6$ | $8x + 29$ | 2 | M1 for $5x + 35$ or $3x - 6$ or $8x$ or 29<br>A1 for $8x + 29$ |
| | (c) | | $3ab(a + 2b)$ | 2 | B2 for $3ab(a + 2b)$<br>(B1 for correct partial factorisation $a(3ab + 6b^2)$ or $b(3a^2 + 6ab)$ or $3a(ab + 2b^2)$ or $3b(a^2 + 2ab)$ or $ab(3a + 6b)$<br>OR $3ab(ma + 2b)$ or $3ab(a + nb)$ where $m \neq 1$, $n \neq 2$)<br>[B0 for partial factorisation using only an integer e.g. $3(a^2b + 2ab^2)$] |

**5MB2H_01**

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 7 | | 515 × 35<br>2575<br>15450<br>18025<br><br>10 × 515 = 5150<br>10 × 515 = 5150<br>10 × 515 = 5150<br>5 × 515 = 2575<br>18025<br><br>15000 + 2500 + 300 + 50 + 150 + 25 =18025 | £180.25 | 4 | M1 for 515 × 0.35 or 515 × 35 This may be implied from an incomplete method of multiplication<br><br>M1 for a complete method with relative place value correct. Condone one multiplication error, addition not necessary<br><br>Or for a complete grid, condone one multiplication error, addition not necessary<br><br>Or for sight of a complete partitioning method. Condone one multiplication error final addition not necessary<br><br>M1 (dep on the previous M1) for addition of appropriate elements of the calculation<br><br>A1 for £180.25(p) or 18025p (with '£' sign deleted) |

| | 5 | 1 | 5 | × |
|---|---|---|---|---|
| | 1 / 5 | 0 / 3 | 1 / 5 | 3 |
| 1 | 2 / 5 | 0 / 5 | 2 / 5 | 5 |
| 8 | 0 | 2 | 5 | |

| | 500 | 10 | 5 |
|---|---|---|---|
| 30 | 15000 | 300 | 150 |
| 5 | 2500 | 50 | 25 |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| | | OR<br>3307 × 35 = 115 745<br>2792 × 35 = 97720<br>115745 – 97720 | | | OR<br>M1 for 3307 × 0.35 − 2792 × 0.35<br>or 3307 × 35 − 2792 × 35<br><br>M1 for a correct method of multiplication of at least one product, using digits 3307 and 35 or 2792 and 35<br>Condone one multiplication error, addition not necessary<br><br>M1 (dep on the previous M1) for addition of appropriate elements of the calculation<br>A1 for £180.25 or 18025p (with '£' sign deleted) |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 8 | | **Triangular ends**<br>$\frac{1}{2} \times 5 \times 12 = 30$<br>$\frac{1}{2} \times 5 \times 12 = 30$<br>**Base**<br>$20 \times 5 = 100$<br>**Vertical face**<br>$20 \times 12 = 240$<br>**Slant face**<br>$20 \times 13 = 260$<br>**Total area**<br>$= 30 + 30 + 100 + 240 + 260$<br>OR<br>$(5 + 12 + 13) \times 20 + 2 \times \frac{1}{2} \times 5 \times 12$ | 660 | 3 | M1 for $\frac{1}{2} \times 5 \times 12$ (= 30) or $20 \times 5$ (= 100) or $20 \times 12$ (= 240) or $20 \times 13$ (= 260)<br>M1 (dep) for adding at least 3 areas found from correct methods (of no more than 5 faces)<br>A1 cao<br><br>OR<br>M1 for $(5 + 12 + 13) \times 20$ or $\frac{1}{2} \times 5 \times 12$ (= 30)<br>M1 (dep) for adding "$(5 + 12 + 13) \times 20$" to at least "$1 \times \frac{1}{2} \times 5 \times 12$"<br>A1 cao<br><br>Note: Sight of $\frac{1}{2} \times 5 \times 12 \times 20$ or 600 (ie a volume calculation) scores no marks |

**5MB2H_01**

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 9 | | Table of values<br>$x$ \| –2 \| –1 \| 0 \| 1 \| 2<br>$y$ \| –7 \| –5 \| –3 \| –1 \| 1<br><br>OR<br>Using $y = mx + c$<br>Gradient 2 intercept –3 | Single line drawn from (–2, –7) to (2, 1) | 3 | **(Table of values)**<br>M1 for at least 2 correct attempts to find points by substituting values of $x$.<br>M1 (dep) ft for correctly plotting at least 2 of their points (any points plotted from their table must be plotted correctly)<br>A1 for the correct line from (-2, -7) to (2, 1)<br>OR<br>**(No table of values)**<br>M2 for at least 2 correct points (and no incorrect points) correctly plotted<br>or for a line segment of the graph of $y = 2x – 3$ drawn (ignore any additional incorrect line segments)<br>[M1 for at least 3 correct points plotted with no more than 2 incorrect points]<br>A1 for the correct line from (-2, -7) to (2, 1)<br>OR<br>**(Use of $y = mx + c$)**<br>M2 for a single straight line of gradient 2, passing through (0, -3)<br>[M1 for a single straight line of gradient 2 or for a single straight line passing through (0, -3)]<br>A1 for the correct line from (-2, -7) to (2, 1) |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | | $\frac{1}{2}$ (6 + 4) × 3<br><br>OR<br>6 × 3 – $\frac{1}{2}$ × 2 × 3<br><br>OR<br>4 × 3 + $\frac{1}{2}$ × 2 × 3 | 15 cm² | 4 | M2 for $\frac{1}{2}$ (6 + 4) × 3 oe<br>A1 for 15 cao<br>B1 for cm²<br>OR<br>M1 for 6 × 3 (=18) or $\frac{1}{2}$ × 2 × 3 (=3)<br>M1 (dep on "6 × 3" and "$\frac{1}{2}$ × 2 × 3") for "18" – "3" from correct methods<br>A1 for 15 cao<br>B1 for cm²<br>OR<br>M1 for 4×3 (=12) or $\frac{1}{2}$ × 2 × 3 (=3)<br>M1 (dep on "4×3" and "$\frac{1}{2}$ × 2 × 3") for "12" + "3" from correct methods<br>A1 for 15 cao<br>B1 for cm² |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 11 | | 10 000 × 0.8<br>8000 × 0.9 = 7200<br><br>OR<br>10 000 – $\frac{20}{100}$ × 10 000 = 8000<br>8000 – $\frac{10}{100}$ × 8 000<br><br>OR<br>10 000 × 0.8 × 0.9 | 7200 | 3 | M1 for 10 000 × 0.8 (= 8000)<br>M1 (dep) for "8000" × 0.9 (= 7200)<br>A1 for £7200 cao<br>OR<br>M1 for 10 000 – $\frac{20}{100}$ × 10 000 oe<br>M1 (dep) for "8000" – $\frac{10}{100}$ × "8 000" oe<br>A1 7200 cao<br>OR<br>M1 for 0.8 × 0.9 (=0.72)<br>M1 (dep)for 10 000 × "0.72"<br>A1 for 7200 cao<br>[SC: B1 for an answer of 7000 if M0 scored] |
| 12 | (a) | | $x^2 - 3x - 40$ | 2 | M1 for 3 terms correct (out of no more than 4 terms) from $x^2$, $5x$, $-8x$ and $-40$ or 4 terms $x^2$, $5x$, $8x$ and 40 (ignoring signs)<br>A1 for $x^2 - 3x - 40$<br>[Note: $x^2 - 3x + 40$ and $x^2 + 3x - 40$ with no working get M0A0] |
| | (b) | | $(x + 4)(x - 4)$ | 1 | B1 for $(x + 4)(x - 4)$ oe |
| 13 | (a) | | (0, 2, 4) | 1 | B1 cao |
| | (b) | $\left(\frac{0+6}{2}, \frac{2+2}{2}, \frac{4+4}{2}\right)$ | (3, 2, 4) | 2 | M1 for an answer of ($a$, 2, 4) or (3, $b$, 4) or (3, 2, $c$) or for[ ("0" + 6) ÷2, ("2" + 2) ÷2, ("4" + 4) ÷2] This may be implied by their answer with no working seen<br>A1 for (3, 2, 4) cao |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 14 | (a) | $x = 0.25555\ldots$<br>$10x = 2.555\ldots$<br>$100x = 25.5555\ldots$<br>$90x = 25 - 2 = 23$<br>OR<br>$x = 0.25555\ldots$<br>$10x = 2.555\ldots$<br>$100x = 25.5555\ldots$<br>$9x = 2.3$<br>OR<br>$0.2 + (x = 0.0555\ldots.)$<br>$10x = 0.555\ldots$<br>$100x = 5.5555\ldots$<br>$0.2 + 5/90$ | $\frac{23}{90}$ | 3 | M1 for $0.255(5\ldots.)$ or $0.2 + 0.055(5\ldots)$ This can be implied in subsequent working<br>M1 for 2 correct recurring decimals which when subtracted will leave an integer or a terminating decimal number<br>A1 for $\frac{23}{90}$<br>[Note: $\frac{2.3}{9}$ gets A0]<br>[SC: B1 for an answer of $\frac{25}{99}$ oe $(= 0.\dot{2}\dot{5})$, with or without working if M0 scored] |
| | (b) | $\frac{12}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{12\sqrt{6}}{6}$ | $2\sqrt{6}$ | 2 | M1 for multiplying numerator and denominator by $\sqrt{6}$<br>A1 for $2\sqrt{6}$ (accept $\frac{2\sqrt{6}}{1}$) |

| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *15 | | 180 –(90 + 20) = 70<br><br>2 × 70 = 140 | Angle *TOR* =140º | 4 | M1 for angle *PTO* (*PRO*) = 90º or seeing it marked on the diagram with a right angle or as 90°<br>M1 (dep) for 180 –(90 + 20) (=70° ) or for 360 – (90 + 90 + 40) (=140)<br>A1 for (angle) *TOR* = 140º or for 140º seen in the correct place in the diagram<br>[140º alone without the '*TOR* =' gets A0]<br>C1 (dep on at least M1) for angle between a tangent and a radius = 90° plus at least one other correct reason from:<br>Sum of angles in a triangle is 180º<br>Sum of angles in a quadrilateral is 360º<br>Triangles *PTO* and *PRO* are congruent<br>Tangents from a point are equal in length<br>OR<br><br>M1 for angle *PTO* (*PRO*) = 90º or seeing it marked on the diagram with a right angle or as 90°<br>M1 for (180 – 40)÷2 (=70) and [180 – 2×(90 –"70")] (=140)<br>A1 for (angle) *TOR* = 140º or for 140º seen in the correct place in the diagram<br>[140º alone without the '*TOR* =' gets A0]<br>C1 (dep on at least M1) for angle between a tangent and a radius = 90° plus at least one other correct reason from:<br>Sum of angles in a triangle is 180º<br>Base angles of an isosceles triangle are equal<br>Triangles *PTO* and *PRO* are congruent<br>Tangents from a point are equal in length |
| | | (180 – 40)÷2 =70<br>180 – 2×(90 –70) = 140 | | | |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | | $80 \times \frac{5}{8} = 50$<br>$50 \times 2.75$<br><br>OR<br><br>$80 \times 2.75 = 220$<br>$220 \times \frac{5}{8}$ | 136 to 138 inc. | 3 | M1 for $80 \times \frac{5}{8}$ or $80 \div 1.6$ oe (= 50)<br>M1 (indep) for "50" × 2.75 [accept "50"× 165 (=8250)] or "50" + "50" + "50"÷2 (=25) + "25" ÷2 (=12.5)<br>Note: "50" is what is considered to be their speed in miles per hour calculated using an explicitly stated conversion factor<br>A1 for an answer in the range 136 to 138 inc.<br>OR<br>M1 for 80 × 2.75 (=220) [accept 80 × 165 (=13200)] or 80 + 80 + 80÷2 (=40) + "40"÷2 (=20)<br>M1 (indep) for "220" × $\frac{5}{8}$<br>Note: "220" is what is considered to be their distance in kilometres calculated using an explicitly stated conversion factor<br>A1 for an answer in the range 136 to 138 inc. |
| 17 | | $y = -\frac{1}{2}x + 2.5$<br>*mm'* = –1 shows gradient is 2<br>$y = 2x + c$ goes through (3, 7)<br>$7 = 2 \times 3 + c$ | $y = 2x + 1$ | 4 | M1 for establishing gradient of original line is $-\frac{1}{2}$ or sight of $y = -\frac{1}{2}x + c$<br>M1 (indep) for<br>(gradient of perpendicular) × "$-\frac{1}{2}$" = –1<br>This can be implied by a gradient of 2 or ft on "$-\frac{1}{2}$"<br>M1 (dep on the previous M1) for substituting (3, 7) into $y$ = "2"$x$ + c<br>A1 for $y = 2x + 1$ (or equivalent algebraic equation) |

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| 5MB2H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | | $\frac{2x^2-9x-5}{4x^3+2x^2}$<br><br>$\frac{(2x+1)(x-5)}{2x^2(2x+1)}$ | $\frac{x-5}{2x^2}$ | 3 | M1 for factorising the numerator correctly<br>M1 for fully factorising the denominator correctly<br>A1 for $\frac{x-5}{2x^2}$ oe eg. $\frac{-5+x}{2x^2}$ |

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# Mark Scheme (Results)

## March 2013

## GCSE Mathematics (2MB01) Higher
## 5MB3H (Calculator) Paper 01

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**NOTES ON MARKING PRINCIPLES**

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
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| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

PMT

| 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *1 | | | small and correct answers | 3 | M1 for 4.2 ÷ 1.75 (=2.4(0)) **or** 8.68 ÷ 3.5 (=2.48)<br>M1 for 4.2 ÷ 1.75 (=2.4(0)) **and** 8.68 ÷ 3.5 (=2.48)<br>C1 (dep on at least M1) for small and (£)2.4(0) and (£)2.48<br><br>**OR**<br>M1 for 1.75 ÷ 4.2 (=0.41(6)) **or** 3.5 ÷ 8.68 (=0.40(3))<br>M1 for 1.75 ÷ 4.2 (=0.41(6)) **and** 3.5 ÷ 8.68 (=0.40(3))<br>C1 (dep on at least M1) for small and 0.41(6)(kg) and 0.40(3)(kg)<br><br>**OR**<br>M1 for 4.2 ÷ 1.75 (=2.4(0)) **or** 8.68 ÷ 3.5 (=2.48)<br>M1 for (4.2 ÷ 1.75) × 3.5 (=8.4(0)) or (8.68 ÷ 3.5) × 1.75 (=4.34)<br>C1 (dep on at least M1) for small and (£)8.4(0) or for small and (£)4.34<br><br>**OR**<br>M1 for 1.75 ÷ 4.2 (=0.41(6)) or 3.5 ÷ 8.68 (=0.40(3))<br>M1 for (1.75 ÷ 4.2) × 8.68 (=3.61(6)) or (3.5 ÷ 8.68) × 4.2 (=1.69(3))<br>C1 (dep on at least M1) for small and 3.61(6)(kg) or 1.69(3)(kg)<br><br>**OR**<br>M2 for 8.68 ÷ 2 (=4.34) or 4.20 × 2 (=8.40)<br>C1 (dep on at least M1) for small and (£)4.34 or (£8.40)<br><br>**OR**<br>Any other method considered equivalent. Figures may be truncated or rounded as long as their method is clear. |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 2 | | $7 \times 8^2 + 320 = 448 + 320$<br>768p = 7.68 | £7.68 | 3 | M1 for $7 \times 8^2$ or 448 seen<br>A1 for 768<br>B1 for correct monetary answer written correctly eg £7.68 or 768p |
| 3 | | | correct shaded region | 2 | B1 for arc of circle, centre oak tree, radius 4cm(±2mm)<br>B1 for shaded region where the tree can be planted, bounded by sides of garden and arc of circle centre oak tree |
| 4 | (a) | | −3, −2, −1,0,1 | 2 | B2 for all 5 values and no others<br>(B1 for 4 correct values and no others<br>or -4,-3,-2,-1,0,1 or -3,-2,-1,0,1,2 |
| | (b) | | $-2 \leq x < 4$ | 2 | B2 for $-2 \leq x < 4$<br>(B1 for $-2 \leq x$ or $x < 4$ or $-2 < x \leq 4$)<br>[Note: accept the use of any letter other than $x$ throughout and ignore any attempt to list integer values] |
| 5 | | | 25.1-25.2 | 2 | M1 for $2 \times 3.142 \times 4$ or $8\pi$ oe<br>A1 for 25.1 – 25. 2 |
| 6 | (a) | | 5, −4, −3 | 2 | B2 for 5, −4 and −3<br>(B1 for 5 or −4 or −3) |
| | (b) | | correct curve | 2 | B2 for fully correct curve<br>(B1 ft for at least 5 points plotted correctly) |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 7 | | | enlargement, scale factor 2, centre (6, −5) | 3 | B1 for enlargement<br>B1 for (scale) factor 2 or ×2 or sf 2<br>B1 for (6, −5)<br>NB: award 0 marks for an explanation that includes reference to more than one transformation. |
| *8 | | Cost of wages, rent and other expenses last year<br>92 000+10 800+7000=109 800<br><br>Cost of wages, rent and other expenses this year<br>$1.075\times92\,000 + \frac{7}{9} \times 10$ 800 + 7000÷2 = 98 900+8400+3500 = 110 800<br><br>Costs are more this year, so she cannot increase the amount she spends on goods | no, with working and reason | 4 | M1 for an attempt to calculate using 7.5% and 92000 (eg 7.5% of 92000 or increase of 7.5%) eg 92000 + 6900 or 98900<br><br>M1 for an attempt to find a fractional amount of 10800 (eg $\frac{7}{9}$ × 10800 or 8400 or $\frac{2}{9}$ × 10800 or 2400)<br><br>M1 for complete method of increasing 92000 by 7.5%, finding $\frac{7}{9}$ of 10800, and halving 7000, with at least all of these three added together.<br><br>C1 for statement eg "no" with both 110800 & 109800 seen, OR "no" with "1000 more" OR "no" and compares 181800 with 182800, oe. |
| 9 | (a) | $\sqrt{30} = 5.4772255\ldots$<br>$2.5^2 = 6.25$<br>5.4772255...÷ 6.25 = | 0.876 | 2 | M1 for $\sqrt{30} \div 6.25$ or $5.4(7\ldots) \div 2.5^2$<br>A1 for any answer in the range 0.876 to 0.877 |
| | (b) | 4.5 × 1000 × 1000 | 4 500 000 | 2 | M1 for complete method equivalent to 4.5 × 1000 × 1000<br>A1 for 4 500 000 oe |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | | 3 → 21<br>4 → 56<br>3.1 → 23.5(9)<br>3.2 → 26.3(6)<br>3.3 → 29.3(3)<br>3.4 → 32.5(0)<br>3.5 → 35.8(7)<br>3.6 → 39.4(5)<br>3.7 → 43.2(5)<br>3.8 → 47.2(7)<br>3.9 → 51.(5)<br>3.35 → 30.8(9) | 3.3 | 4 | B2 for a trial between 3.3 and 3.4 inclusive<br>(B1 for a trial between 3 and 4 inclusive)<br>B1 for a different trial between 3.3 and 3.4 exclusive<br>B1 (dep on at least one previous B1) for 3.3<br><br>NB trials should be evaluated to at least 1dp truncated or rounded |
| 11 | | | 45 | 3 | M1 for 60000 × 0.75 or ÷1000 or digits 45 or the numbers 60 or 0.00075)<br>M1 for the complete method 60 000 × 0.75 ÷ 1000 oe<br>A1 cao |
| 12 | (a) | | −7 | 2 | M1 for an attempt to get *x*s on one side or number terms on one side<br>A1 cao |
| | (b) | | 8.5 | 2 | M1 for an attempt to divide each side by 4 or an attempt to expand the bracket eg $4 \times x - 4 \times 5$<br>A1 for 8.5 oe |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *13 | | 2500×0.04×2 =£200<br>2500×$(1.039)^2$ = £2698.80<br>£2698.80 – £2500 = £198.80<br>Scheme A gives £1.20 more | statement | 4 | M1 for a correct method to find 4% of 2500 or 3.9% of 2500<br>A1 for a correctly calculated amount 2700 or 2698.8(0) or 200 or 198.8(0); or percentage rate calculated over the 2 years for comparison: 3.93% or 3.976% oe<br>M1 for a correct compound interest method using 3.9% and 2500 over 2 years<br>C1 for statement of scheme A, with two correct comparable figures. |
| 14 | | $3x - 2y = 7$<br>$7x + 2y = 13$<br>$10x = 20$ $x = 2$<br>$3\times2 - 2y = 7$ $-2y = 1$<br>$y = -0.5$ | 2, −0.5 | 3 | M1 for a correct process to eliminate either $x$ or $y$ (allow one arithmetic error)<br>M1 (dep) for correct substitution of their found variable or an otherwise correct method to eliminate the other variable<br>A1 for 2 and −0.5 oe |
| 15 | (a) | | $3.7 \times 10^{-3}$ | 1 | B1 cao |
| | (b) | | 49 000 | 1 | B1 cao |
| | (c) | 500 ÷ 250 000 [= 0.002]<br>OR<br>$(5 \times 10^2) \div (2.5 \times 10^5)$ [= $(5\div2.5)\times10^{2-5}$ ]<br>OR<br>$\frac{500}{250} \times \frac{1}{10^3}$ [ = $2 \times 10^{-3}$]<br>OR<br>$\frac{500\div100}{250000\div100} = \frac{5}{2500}$<br>[= 0.002] | $2 \times 10^{-3}$ | 2 | M1 for an attempt to divide using two numbers that are in consistent form eg following an attempt to convert to ordinary numbers, or standard form numbers.<br>A1 for $2 \times 10^{-3}$ |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | | | 12.7 | 3 | M1 for 3.142 × 5 × 5 oe or 3.142 × 5 × 5 × '*h*' (=78.5 – 78.55)<br>M1 for 1000 ÷ (3.142 × 5 × 5)<br>A1 for 12.7 – 12.8<br>NB: multiples of π acceptable for M marks |
| 17 | | $4x - 3 = 2x + 2y$<br>$2x - 3 = 2y$<br>$2x = 2y + 3$<br>$x = y + 1.5$ | $x = y + 1.5$ | 3 | M1 for attempt to expand brackets eg $2\times x+2\times y$ or divide through by 2 (each term).<br>M1 for attempt to get $x$ on one side of equation.<br>A1 for $(x =) y + 1.5$ , $\frac{2y + 3}{2}$, oe |
| 18 | | | (11, 21) | 3 | M1 for 5 – 2 or 9 – 3 OR 3 or 6 as long as these are not related to the 3 from *A* or multiple 3 or 9,18<br><br>M1 for 2 + 3 × "3" and 3 + 3 × "6"<br>OR for 5 + 2 × "3" and 9 + 2 × "6"<br>OR for 2 + 3 × "3" (=11) and ($y$=) 2 × '11' – 1<br><br>A1 cao<br><br>SC: B1 if no method shown and answer shows $x$ coordinate as 11 or $y$ coordinate as 21. |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 19 | | | 4.6 | 5 | M1 for $AC = \sqrt{(3^2+4^2)}$ (=5) or $DA = \sqrt{(5^2+2^2)}$<br>M1 for tan $BAC$ = 0.75 oe or ($BAC$=) 36.8(6) or 36.9<br>M1 for tan $DAC$ = 0.4 oe or ($DAC$=) 21.8(0)<br>M1 for $\sqrt{'5'^2+2^2}$ × sin("36.8(6)"+"21.8(0)") or 5.385 × sin 58.7<br>A1 for 4.59 – 4.61<br><br>OR<br><br>M1 for $AC = \sqrt{3^2+4^2}(=5)$ or $DP = \sqrt{(29 - AP^2)}$<br>M1 for cos $BAC$ = 0.8 oe or ($BAC$=) 36.8(6) oe<br>M1 for angle $CDP$ = angle $BAC$<br>M1 for (DP=) 3 + 2×cos $CDP$ or (AP=) 4 – 2×sin $CDP$<br>A1 for 4.59 – 4.61 |
| 20 | | | 0.5, −3 | 3 | M1 for $(2x \pm 1)(x \pm 3)$<br>M1 for $(2x - 1)(x + 3)$<br>A1 cao<br><br>OR<br>M1 for $\frac{-5 \pm \sqrt{5^2 - 4 \times 2 \times -3}}{2 \times 2}$ allow sub. of $c = \pm 3$<br>M1 for $\frac{-5 \pm \sqrt{49}}{4}$<br>A1 cao<br><br>NB: any other method put in review. |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 21 | | $1180.5 \div \frac{4}{3}\pi(6.15)^3$ | 1.21 | 4 | M1 for 1180 ± 0.5 or 6.2 ± 0.05<br>M1 for 'max. mass' ÷ 'min. volume' where "min volume" is defined as any expression involving 6.15<br>M1 for $1180.5 \div \frac{4}{3}\pi(6.15)^3$<br>A1 for 1.21 – 1.22 |
| 22 | | | proof | 3 | B1 for *AD* = *AB* and *AE* = *AG*<br>B1 for angle *EAB* = angle *DAG* (= 90 + angle *DAE*)<br>B1 (dep on previous B marks) for 2 sides and included angle (SAS) oe |
| 23 | (a) | | $3\boldsymbol{a} + \boldsymbol{b}$ | 1 | B1 oe |
| | (b) | | $3\mathbf{c}$ | 4 | M1 for writing *QB* as a combination of vectors<br>eg $\frac{1}{2}$ ('3**a** + **b**') + **b** or 3**a** + 2**b** – $\frac{1}{2}$ ('3**a** + **b**') or 2**a** + 2**b** − **c** oe<br>M1 for equating **a** + **b** = 2**c** or writing *PQ* in terms of vectors **a** and **b**<br>eg −**a** + $\frac{1}{2}$ ('3**a** + **b**') or 2**a** + **b** – $\frac{1}{2}$ ('3**a** + **b**')<br>A1 for (*PQ*=) $\frac{1}{2}$**a** + $\frac{1}{2}$**b or** (*QB*=) $\frac{3}{2}$**a** + $\frac{3}{2}$**b** or (*QB*=) 2**c**−**a** + **a** + **c**<br>A1 cao<br>NB: accept equivalent expressions throughout |

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# Mark Scheme (Results)

## Summer 2013

## GCSE Mathematics (2MB01) Higher
## 5MB3H (Calculator) Paper 01

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## NOTES ON MARKING PRINCIPLES

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**7 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**11 Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**12 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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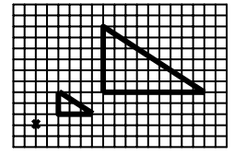
| Guidance on the use of codes within this mark scheme |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | | 13 | 2 | M1 for 7.8(0) ÷ 6 × 10 or 7.8(0) ÷ 6 or 7.8(0) × 10 or $\frac{10}{6}$ oe or $\frac{6}{10}$ oe<br>A1 cao |
| 2 | | |  | 3 | B3 for fully correct triangle<br>(B2 for 2 vertices correct or enlargement scale factor 3 in wrong position or enlargement, centre *A*, with different scale factor)<br>(B1 for 1 vertex correct or enlargement, not from *A*, different scale factor) |
| 3 | | | 1.3852.. | 2 | M1 for 6.4 or 4.62 or $\frac{320}{231}$<br>A1 for 1.3852(81385) |
| *4 | | | 4 rolls | 4 | M1 for $\pi \times 2.4$<br>M1 for $(\pi \times 2.4) \div 2$ or 7.5 to 7.541<br>M1 for or 3.75 or 3.76... or 3.77... or (2, 4,) 6 , 8<br>C1 for a clear statement that 4 (rolls) are needed |

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| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | (a) | $3 \times -2 + 5$ | $-1$ | 2 | M1 for substitution of $-2$ into $3e + 5$ e.g. $3 \times -2 + 5$<br>A1 cao |
| | (b) | $4y - 2y = 14 - 3$<br>$2y = 11$<br>$y = \frac{11}{2}$ | $\frac{11}{2}$ | 2 | M1 for clear attempt to subtract $2y$ or 3 from both sides<br>A1 for $\frac{11}{2}$ oe |
| | (c) | $3x - 15 = 21$<br>$3x = 36$<br>$x = 12$ | 12 | 2 | M1 for $3 \times x - 3 \times 5$ or intention to divide both sides of equation by 3 as a first step<br>A1 cao |
| | (d) | | $-2, -1, 0, 1, 2, 3$ | 2 | B2 for all 6 correct values; ignore repeats, any order<br>(B1 for 5 correct and no incorrect values<br>e.g. $-2, -1, 1, 2, 3$ or 6 correct and one incorrect value<br>e.g. $-2, -1, 0, 1, 2, 3, 4$) |
| 6 | | | Correct position of $T$ | 3 | M1 for line drawn or point marked within guidelines from $B$<br>M1 for line drawn or point marked within guidelines from $C$<br>A1 for $T$ within region on overlay |

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| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 7 | | | 550 | 5 | M1 for a correct method to find 20% of an amount e.g. 3500 × 0.2 oe (= 700)<br>M1 for a correct method to increase an amount by 20% e.g. 3500 × 1.2 oe (= 4200)<br>M1 for subtracting 900<br>M1 for division by 6<br>A1 for 550<br><br>**NB** Operations may occur in any order as long as they could lead to the correct answer. Award marks until a breakdown in method occurs. |
| 8 | | $x + 2x + 15 = 63$<br>$3x = 48$ | 16 | 3 | M1 for $x + 2x + 15 = 63$<br>M1 for attempt to subtract 15 from each side of their equation<br>A1 cao<br><br>OR<br>M1 for 63 – 15 (= 48)<br>M1 for '48' ÷ 3<br>A1 cao<br><br>OR<br>M2 for 16 and 32 seen<br>(M1 for a strategy using at least two pairs with the ratio 1 : 2)<br>A1 cao |

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| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | | 342 ÷ 88 = 3.886…<br>570 ÷ 195 = 2.923…<br>1500 ÷ 399 = 3.759…<br><br>OR<br><br>88 ÷ 342 = 0.257…<br>195 ÷ 570 = 0.342…<br>399 ÷ 1500 = 0.266 | Small bottle with correct calculations | 4 | M1 for one of 342 ÷ 88 (= 3.886…),<br>570 ÷ 195 (= 2.923…), 1500 ÷ 399 (= 3.759…)<br>OR one of 88 ÷ 342 (= 0.257…),<br>195 ÷ 570 (= 0.342…), 399 ÷ 1500 (= 0.266)<br>OR any other calculation that could lead to a comparative figure<br><br>M1 for calculations that could lead to comparative figures for 2 bottles<br><br>M1 for calculations that could lead to comparative figures for 3 bottles, e.g. all three from the above lists<br><br>C1 for correct comparative figures for all 3 bottles leading to a correctly stated comparison: small or 342g best value |

| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | (a) | $24.5^2 + 10.6^2$ (= 712.61)<br>$\sqrt{712.61}$ | 26.7 | 3 | M1 for ($GJ^2$ =) $24.5^2 + 10.6^2$ or 600.25 + 112.36 or 712.61<br>M1 for $\sqrt{24.5^2 + 10.6^2}$ or $\sqrt{712.61}$<br>A1 for answer in the range 26.69 – 26.7 |
| | (b) | $\cos x = \frac{7}{18}$<br>$x = \cos^{-1}\left(\frac{7}{18}\right)$ | 67.1 | 3 | M1 for $\cos(x) = \frac{7}{18}$ oe<br>M1 for ($x$ =) $\cos^{-1}\left(\frac{7}{18}\right)$ or $\cos^{-1}(0.388...)$ or $\cos^{-1}(0.38)$<br>A1 for answer in the range 67.1 – 67.17<br><br>SC: B2 for an answer of 1.1(713...) or 1.2 or 74.5(717...) or 74.6 |

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| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 11 | | 4 40<br>4.1 44.(321)<br>4.2 48.(888)<br>4.3 53.(707)<br>4.4 58.(784)<br>4.5 64.(125)<br>4.6 69.(736)<br>4.7 75.(623)<br>4.8 81.(792)<br>4.9 88.(249)<br>5 95<br><br>4.81 82.4(2464)<br>4.82 83.0(6017)<br>4.83 83.6(9859)<br>4.84 84.3(399)<br>4.85 84.9(8412) | 4.8 | 4 | B2 for a trial between 4 and 5 exclusive<br>(B1 for a trial at 4 or 5 )<br>B1 for a different trial of $4.8 < x \leq 4.85$<br>B1 (dep on at least one previous B1) for 4.8<br><br>Trials should be evaluated to at least 2 sf truncated or rounded for values of $x$ correct to 1 decimal place.<br>Trials should be evaluated to at least 1 dp truncated or rounded for values of $x$ correct to 2 dp.<br>(For trial at 4.82, accept 83, for trial at 4.85 accept 85)<br><br>**NB** no working scores no marks even if the answer is correct |
| 12 | (a) | | –13, –1, 2 | 2 | B2 for all values correct<br>(B1 for any one value correct) |
| | (b) | | Graph drawn | 2 | M1 ft for at least 4 points plotted correctly from their table<br>A1 cao for correct curve drawn from (–2, –13) to (2, 11) |

PMT

| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 13 | | $3x + 10y = 7$<br>$3x - 12y = 18$<br><br>$22y = -11$<br>$y = -0.5$<br>$3x + 10 \times -0.5 = 7$<br>$x = 4$ | $x = 4$,<br>$y = -0.5$ | 3 | M1 for a full method to eliminate $x$ or $y$, allow one error in calculation<br>M1 (dep) for substitution of one variable into one of the equations, or by appropriate method after starting again<br>A1 for 4 and –0.5 |
| 14 | | **B** at (3, –1), (5, –1), (5, –4)<br>**C** at (–1, –1), (–3, –1), (–3, –4) | Rotation of $180^o$ about (1,0) | 3 | M1 for showing **C** correctly on the grid without showing **B** or for showing **B** and **C** correctly on the grid<br>A1 for rotation of $180^o$<br>A1 for (centre) (1,0)<br><br>OR<br><br>M1 for showing **C** correctly on the grid without showing **B** or for showing **B** and **C** correctly on the grid<br>A1 for enlargement scale factor –1<br>A1 for (centre) (1,0)<br><br>**NB** Award no marks for any correct answer from an incorrect diagram and no A marks if more than one transformation is given |

PMT

| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | | Northway Bank:<br>6000 × 0.038 = 228<br>6000 + 228 = 6228<br>6228 × 0.038 = 236.664<br>6228 + 236.664<br>= 6464.664<br><br>Portland Bank:<br>6000 × 0.05 = 300<br>6000 + 300 = 6300<br>6300 × 0.032 = 201.6<br>6300 + 201.6<br>= 6501.6 | Portland Bank with values | 4 | M1 for a correct method to calculate 3.8% or 5% of 6000<br>M1 for a correct method to calculate using a compound interest method, eg $1.038^2$ oe or 1.05 followed by 1.032 oe<br>A1 for 1.077444 or 1.0836 or for 6464.66(4) or 464.66(4) or for 6501.6(0) or 501.6(0)<br>C1 for a correct decision in a statement with two correct comparable values e.g. for 7.7(444)% and 8.36 %, or for 6464.66(4) and 6501.6(0), or for 464.66(4) and 501.6(0)<br><br>**NB** all final money values can be rounded or truncated to nearest integer or left unrounded |
| 16 | | | $2.52\times10^{15}$ | 2 | M1 for $4.032\times10^9$ or 4 032 000 000 or sight of figures 252<br>A1 for $2.52\times10^{15}$ |
| 17 | | | 40960 | 3 | M1 for $T \propto \frac{1}{d^2}$ or $T = \frac{k}{d^2}$ or $k = Td^2$<br>M1 for $k = 160 \times 8^2$ (= 10240)<br>A1 for 40960 |

| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | | | 0.27 and –1.47 | 3 | M1 for $\frac{-6\pm\sqrt{6^2-4\times5\times-2}}{2\times5}$, allow substitution of 2 or –2 for $c$<br>M1 for $\frac{-6\pm\sqrt{76}}{10}$<br>A1 for 0.27(17797…) and –1.47(17797…) |
| 19 | | | 12.7 | 6 | M1 for $0.5 \times 12.3 \times AB \times \sin 73 = 50$<br>M1 for ($AB$ =) $50 \div (0.5 \times 12.3 \times \sin 73)$<br>A1 for 8.5 – 8.502<br>M1 for ($AC^2$ =) $12.3^2 + \text{‘8.50’}^2 - 2\times12.3\times\text{‘8.50’}\times\cos 73$<br>M1 (dep) for correct order of evaluation or 162.42…<br>A1 for answer in the range 12.7 – 12.8<br><br>OR<br><br>(with perpendicular from $A$ meeting $BC$ at a point $X$)<br>M1 for $0.5 \times 12.3 \times AX = 50$<br>M1 for ($AB$ =) $\frac{50\div(0.5\times12.3)}{\sin 73}$<br>A1 for 8.5 – 8.502<br>M1 for ($BX$ =) ‘8.5’ × cos73 (= 2.485…)<br>M1 for ($AC$ =) $\sqrt{\text{'8.13'}^2+(12.3-\text{'2.485'})^2}$<br>A1 for answer in the range 12.7 – 12.8 |

PMT

| PAPER: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | (a) | | 4**b** – 2**a** | 1 | B1 for 4**b** – 2**a** oe |
| | (b) | $\overrightarrow{ON} = \overrightarrow{OA} + \overrightarrow{AN}$,<br>$2\mathbf{a} + \frac{3}{4}(4\mathbf{b} - 2\mathbf{a})$<br>2**a** + 3**b** – 1.5**a** | 3**b** + 0.5**a** | 3 | M1 for a correct vector for $\overrightarrow{ON}$,<br>e.g. $(\overrightarrow{ON} =)\ \overrightarrow{OA} + \overrightarrow{AN}$,<br>may be written in terms of **a** and **b**<br>e.g. $(\overrightarrow{ON} =)\ 2\mathbf{a} + \frac{3}{4}(4\mathbf{b} - 2\mathbf{a})$<br>M1 for $(\overrightarrow{AN} =)\ \frac{3}{4}(4\mathbf{b} - 2\mathbf{a})$ oe or $(\overrightarrow{NB} =)\ \frac{1}{4}(4\mathbf{b} - 2\mathbf{a})$ oe or $(\overrightarrow{NA} =)\ \frac{3}{4}(2\mathbf{a} - 4\mathbf{b})$ oe or $(\overrightarrow{BN} =)\ \frac{1}{4}(2\mathbf{a} - 4\mathbf{b})$ oe<br>A1 for 3**b** + 0.5**a** |
| 21 | (a) | | 35.55 | 1 | B1 cao |
| | (b) | $\sqrt{\frac{2 \times 35.55}{9.85}}$ | 2.68668.. | 3 | B1 for 9.85<br>M1 for $\sqrt{\frac{2\times'35.55'}{'9.85'}}$ where '35.55' is ft from (a) and $9.8 <$ '9.85' $\leq 9.85$<br>A1 (dep on M1) for 2.68668… (can be rounded or truncated to at least 3 sf ) supported by correct working |

*PMT*

**Modifications to the mark scheme for Modified Large Print (MLP) papers.**

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| **PAPER: 5MB3H_01** | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| 2 | | Given triangle named Shape P. Enlargement given on diagram (Shape Q).<br>Candidates asked to: 'Describe fully the single transformation that maps Shape P onto Shape Q.' | B1 for "enlargement"; B1 for "scale factor 3"; B1 for reference to point A as the centre of enlargement. |
| 6 | | Diagram size not altered, but North lines extended to 9 cm. | Standard mark scheme |
| 9 | | No pictures, just the information given. | Standard mark scheme |
| 10 | | Braille only: Information given about the diagrams | Standard mark scheme |
| 12 | | 2 cm grid. Leeway needed. | Standard mark scheme |
| 14 | | 2 cm grid. 1 row removed at top and bottom. | Standard mark scheme |
| 20 | | Vectors a and b in a larger font than other letters. | Standard mark scheme |

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# Mark Scheme (Results)

## Summer 2014

## Pearson Edexcel GCSE
## In Mathematics A (1MA0)
## Higher (Non-Calculator) Paper 1H

*PMT*

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## NOTES ON MARKING PRINCIPLES

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**7 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**11 Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**12 Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | | $\frac{2}{21}$ | 1 | B1 for $\frac{2}{21}$ |
| | (b) | | $\frac{4}{15}$ | 2 | M1 for attempting to use a suitable common denominator with at least one of the two fractions correct<br>A1 for $\frac{4}{15}$ oe |
| 2 | | | 0 \| 5 9<br>1 \| 3 5 6 8 9 9<br>2 \| 1 2 3 3 5 7 8 9<br>3 \| 1 2 4<br>4 \| 0 | 3 | B2 for fully correct diagram. Accept a stem of 10, 20, etc.<br>(B1 for ordered with at most 2 errors or omissions or for correct unordered diagram)<br>B1 for a correct key (units may be omitted) consistent with diagram. |
| 3 | | Sq G S Tot<br>F **2** **4** **15** 21<br>M 6 **14** 9 **29**<br>Tot 8 18 **24** 50 | 4 | 4 | M1 for a correct first step which results in a value that could be in the table: eg. 50 – 18 – 8 (= 24) or 50 – 21 (= 29) or 8 – 6 (= 2)<br>M1 for a correct method to find a second value that could be in the table using their first value eg "29" – 9 – 6 (=14) or "24" – 9 (=15)<br>M1 for a fully correct and complete method.<br>A1 cao |
| 4 | | | 25.60 | 4 | M1 for a correct method to find $\frac{1}{3}$ of 24 (=8) or $\frac{2}{3}$ of 24 (=16)<br>M1 for a correct method to find 60% (= 7.2) or 40% (= 4.8) of 12 or 60% (=14.4) or 40% (= 9.6) of 24<br>M1 (dep on at least M1) for a method to find the sum of their discounted adult ticket + 2 × their discounted child ticket<br>A1 25.6(0) |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | | | Question given | 2 | B1 for a suitable question which includes a time frame (the time frame could appear with the response boxes)<br>B1 for at least 3 non-overlapping exhaustive response boxes with no use of inequality symbols |
| 6 | (a) | | $2m^2 + 6m$ | 1 | B1 for $2m^2 + 6m$ |
| | (b) | | $3xy(y - 2)$ | 2 | B2 for $3xy(y - 2)$<br>(B1 for $3x(y^2 - 2y)$ or $3y(xy - 2x)$ or $xy(3y - 6)$ or $3xy$(a two term algebraic expression)) |
| *7 | | | 3 | 4 | M1 for a method to calculate at least one area eg $10 \times 7$ (=70) or $16 \times 10$ (=160)<br>M1 for a method to find the total area (=124)<br>M1 (dep on M1) for "124" ÷ 36<br>C1 (dep on M3) for 3 (pigs) clearly identified and supported by correct calculations<br>Or<br>M1 for an area of $36m^2$ drawn with dimensions shown<br>M1 for 3 areas of $36m^2$ drawn with dimensions shown<br>M1 (dep on M1) for method to find the area left (=16)<br>C1 (dep on M3) for 3 (pigs) clearly identified and supported by correct calculations |
| 8 | | | Correct region | 3 | B1 for full line drawn 1.5 cm from edge of patio and parallel to it<br>B1 for full arc of circle radius 3 cm centre the centre of the pond<br>B1 ft for shading region to the right of their vertical line **and** outside the arc of their circle with correct centre |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | (a) | | Shape drawn | 2 | B2 for shape with vertices at (0, –1), (–1, – 3), (–2, –3), (–2, –1)<br>(B1 for rotation of 180° about the wrong centre) |
| | (b) | | Triangle drawn | 2 | B2 for triangle with vertices at (6, 9), (9, 9), (9, 3)<br>(B1 for 2 vertices correct or enlargement sf 3 in wrong position or enlargement, centre (0, 0), but sf >1, ≠ 3) |
| *10 | | 1.18 ÷ 4 = 0.295<br>(118 ÷ 4 = 29.5)<br>1.74 ÷ 6 = 0.29<br>(174 ÷ 6 = 29)<br>1.18 ÷ 2 = 0.59<br>1.74 ÷ 3 = 0.58<br>1.74 × 4 = 6.96<br>1.18 × 6 = 7.08<br>1.74 × 2 = 3.48<br>1.18 × 3 = 3.54<br>1.18÷2×3=1.77<br>1.74÷3×2=1.16<br>4÷1.18=3.3(…)<br>6÷1.74=3.4(…) | 6 pints | 3 | M1 for division of price by quantity for both bottles or division of quantity by price for both bottles or complete method to find price of same quantity of milk<br>A1 for two correct values that could be used for a comparison<br>C1 ft (dep on M1) for comparison of their values with a correct conclusion. |
| 11 | | | 36 | 3 | M1 for a correct method to find either an interior or an exterior angle; eg. (180 × 3) ÷ 5 or 540 ÷ 5 (=108) or 360 ÷ 5 (=72)<br>M1 (dep) for a complete method to find angle *CFD*.<br>A1 cao |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 12 | *(a) | | No, temp is 25°C | 3 | M1 for substitution of 77 into the RHS of the formula<br>A1 for 25 cao or for 225/9 and 180/9 cao<br>C1 (dep on M1) for conclusion (ft) following from working shown<br>OR<br>M1 for substitution of 20 into LHS of formula and correct process to find $F$<br>A1 for 68 cao<br>C1 (dep on M1) for conclusion (ft) following from working shown |
| | (b) | | $F = \frac{9C}{5} + 32$ | 3 | M1 for expansion of the brackets (eg $5 \times F - 5 \times 32$) or an attempt to multiply both sides by 9, or divide both sides by 5 as the first step.<br>M1 (dep) for a correct second step<br>A1 for $F = \frac{9C}{5} + 32$ oe |
| *13 | | | Answer in range<br>35 – 50 | 4 | M1 for a method to either find the exact or approximate number of seconds in one day, e.g. $24 \times 60 \times 60$ (=86400) or the number of minutes in 2014 seconds, e.g. $2014 \div 60$ or $2000 \div 60$ (≈30)<br>M1 for a correct method to find the number of prizes; eg. '$24 \times 60 \times 60$' $\div$ 2014 oe or $60 \div$ "30" $\times 24$ oe<br>B1 for rounding at least one appropriate value in the working to 1 sf, e.g. 24 rounded to 20 or 2014 rounded to 2000 or 86400 rounded to 90000<br>C1 (dep on M2) for answer in 35 – 50 clearly identified |
| 14 | | | 6 hours | 4 | B1 for 5 miles = 8 km or equivalent statement or for $\frac{8}{5}$ or $\frac{5}{8}$ used correctly<br>M1 for $50 \times r$ with $1.5 \leq r \leq 1.7$ oe or $480 \times s$ with $0.6 \leq s \leq 0.7$ oe<br>M1 for $480 \div$ speed or distance $\div 50$<br>A1 oe |

<table>
<tr><th colspan="6">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>15</td><td>(a)</td><td></td><td>2, –1, 2, 7</td><td>2</td><td>B2 for all correct<br>(B1 for 2 or 3 correct)</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Correct graph</td><td>2</td><td>M1 (dep on at least B1) for at least 6 points from their table plotted correctly<br>A1 cao for fully correct graph</td></tr>
<tr><td></td><td>(c)</td><td>$x^2 - 3x - 4 = 0$<br>$(x - 4)(x + 1) = 0$</td><td>–1, 4</td><td>2</td><td>M1 for line $y = x + 3$ drawn correctly or for reduction to correct 3 term quadratic (=0) and :<br>$(x \pm 1)(x \pm 4)$<br>or formula using $a = 1$, $b = -3$ and $c = -4$, allow one sign error in the formula,<br>or $\left(x - \frac{3}{2}\right)^2 = 4 + \left(\frac{3}{2}\right)^2$<br>A1 cao</td></tr>
<tr><td>16</td><td>(a)</td><td></td><td>0.75</td><td>2</td><td>M1 for “5.6” – “4.85” with at least one value correct<br>A1 cao</td></tr>
<tr><td></td><td>(b)</td><td></td><td>20</td><td>2</td><td>M1 for a complete method e.g. 80 ÷ 4<br>A1 cao</td></tr>
<tr><td></td><td>(c)</td><td><table><tr><th></th><th>1st half</th><th>2nd half</th></tr><tr><td>Med</td><td>5.3</td><td>4.75</td></tr><tr><td>Range</td><td>2.2</td><td>2.45</td></tr><tr><td>IQR</td><td>0.75</td><td>0.75</td></tr></table></td><td>2 comparisons</td><td>2</td><td>B1 ft from (a) for a correct comparison of a measure of spread<br>B1 for a correct comparison of medians (accept averages)<br>For the award of both marks at least one of the comparisons made must be in the context of the question.</td></tr>
</table>

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 17 | (a) | | 1 | 1 | B1 cao |
| | (b) | | $\frac{1}{100}$ | 1 | B1 for $\frac{1}{100}$ or 0.01 |
| | (c) | | 0.00273<br>$27.3 \times 10^{-3}$<br>$2.73 \times 10^{3}$<br>$273 \times 10^{2}$ | 2 | M1 for converting all numbers to same form with at least one conversion correct<br>A1 for fully correct order with correct numbers in any correct form<br>(SC B1 if one number incorrectly placed or all 4 numbers listed in reverse order) |
| 18 | | | $x = 7$<br>$y = -3$ | 3 | M1 for correct process to eliminate one variable (condone one arithmetic error)<br>M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error)<br>A1 for $x = 7$ and $y = -3$ |
| 19 | | | $y = \frac{1}{2}x - 5$ | 3 | M1 for method to find gradient of $L_1$ e.g $\frac{6-3}{6-0}$ $\left(=\frac{1}{2}\right)$<br>M1 for $y =$ "$\frac{1}{2}$"$x + c$ or $y = mx - 5$ ($c$, $m$ do not have to be numerical, or correct numerical values) or for $(L =)\frac{1}{2}x - 5$<br>A1 $y = \frac{1}{2}x - 5$ oe |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | | | 6 | 3 | M1 for $\frac{15}{10}$ (=1.5) or $\frac{10}{15}$ (=0.66..) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625)<br>M1 for $\frac{15}{10}$ × 16 (=24) oe<br>A1 cao<br>OR<br>M1 for $\frac{15}{16}$(=0.9375) or $\frac{16}{15}$ (=1.066…) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625)<br>M1 for $\frac{15}{16}$× 10 (=9.375) oe<br>A1 20.625 oe |
| 21 | | | 55 | 3 | M1 for angle ABO = 90 or angle ADO = 90, or angle OBC = 15 or angle FDO = 90 or angle EBO = 90 (could be marked on the diagram)<br>M1 for reflex angle BOD = 360 – (360 – 90 – 90 – 40) (= 220)<br>or angle BCD = (360 – 90 – 90 – 40) ÷ 2 (= 70)<br>or angle BDO or angle DBO = 90 – (180 – 40)/2 (= 20)<br>or angle BOC = 180 – (15 + 15) (=150)<br>A1 cao |
| 22 | (a) | | $27x^6y^{12}$ | 2 | B2 cao<br>(B1 for any two terms correct in a product, e.g. $9x^6y^{12}$) |
| | (b) | | $\frac{x-3}{2x-1}$ | 3 | M1 for $(x-3)(x+3)$<br>M1 for $(2x-1)(x+3)$<br>A1 for $\frac{x-3}{2x-1}$ cao |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 23 | (a) | | $\frac{3}{10}, \frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$ | 2 | B1 for $\frac{3}{10}$ on LH yellow branch<br>B1 for $\frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$ correct on tree diagram |
| | (b) | | $\frac{48}{90}$ | 3 | M1 for $\frac{7}{10} \times "\frac{3}{9}"$ or $"\frac{3}{10}" \times "\frac{7}{9}"$ or $"\frac{3}{10}" \times "\frac{2}{9}"$<br>M1 for $\frac{7}{10} \times "\frac{3}{9}" + "\frac{3}{10}" \times "\frac{7}{9}" + "\frac{3}{10}" \times "\frac{2}{9}"$<br>A1 for $\frac{48}{90}$ oe<br>OR<br>M1 for $\frac{7}{10} \times "\frac{6}{9}"$<br>M1 for $1 - \frac{7}{10} \times "\frac{6}{9}"$<br>A1 for $\frac{48}{90}$ oe |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *24 | | | Proof | 3 | M1 for $\overrightarrow{MN} = \overrightarrow{MO} + \overrightarrow{ON}$ (= **n** – **m**)<br>or $\overrightarrow{NM} = \overrightarrow{OM} + \overrightarrow{NO}$ (= **m** – **n**)<br>or $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ (= 2**n** – 2**m**) or $\overrightarrow{BA} = \overrightarrow{OA} + \overrightarrow{BO}$ (= 2**m** – 2**n**)<br>M1 for $\overrightarrow{MN}$= **n** – **m** and $\overrightarrow{AB}$= 2**n** – 2**m** oe<br>C1 (dep on M1, M1) for fully correct proof, with $\overrightarrow{AB}$= $2\overrightarrow{MN}$ or $\overrightarrow{AB}$ is a multiple of $\overrightarrow{MN}$<br>[SC M1 for $\overrightarrow{MN}$ = 0.5**n** – 0.5**m**<br>and $\overrightarrow{AB}$ = **n** – **m**<br>C1 (dep on M1) for fully correct proof, with $\overrightarrow{AB}$= $2\overrightarrow{MN}$ or $\overrightarrow{AB}$ is a multiple of of $\overrightarrow{MN}$] |
| 25 | (a) | | $4\sqrt{3}$ | 2 | M1 for $\frac{12}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$<br>A1 for $\frac{12\sqrt{3}}{3}$ oe with a rational denominator |
| | (b) | | 18 | 2 | M1 for $\sqrt{2}\times\sqrt{2} + \sqrt{2}\times\sqrt{8} + \sqrt{8}\times\sqrt{2} + \sqrt{8}\times\sqrt{8}$ oe<br>A1 cao<br>OR<br>M1 for $(\sqrt{2} + 2\sqrt{2})^2$<br>A1cao |

| PAPER: 1MA0_1H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 26 | (a) | | 180, 0 | 1 | B1 for 180, 0 Accept π, 0 |
| | (b) | | 270, –1 | 1 | B1 for 270, –1 accept $\frac{3\pi}{2}$, –1 |
| | (c) | | $a = 2$<br>$b = 3$<br>$c = 1$ | 3 | B1 cao<br>B1 cao<br>B1 cao |

## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA0_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q08 | | Diagram made x 2 size. 3 metres changed to 6 metres. 6 metres changed to 12 metres. | B1 for full line drawn 3 cm from edge of patio and parallel to it<br>B1 for full arc of circle radius 6 cm centre the centre of the pond<br>B1 ft for shading region to the right of their vertical line **and** outside the arc of their circle with correct centre |
| Q09 | (a)<br><br>(b) | 2 cm grid. A cut-out shape is provided.<br><br>Axis removed. 2 cm plain grid. L shape put on grid. 3 squares down and an extra square across. Total 4 squares.<br>Candidates asked to enlarge the shape by SF3 | B2 for shape with vertices at (0, –1), (–1, – 3), (–2, –3), (–2, –1)<br>(B1 for rotation of 180° about the wrong centre)<br>B2 for a correct enlargement<br>( B1 for an enlargement with a SF other than 3 or for 3 sides correct) |
| Q10 | | No pictures | M1 for division of price by quantity for both bottles or division of quantity by price for both bottles or complete method to find price of same quantity of milk<br>A1 for two correct values that could be used for a comparison<br>C1 ft (dep on M1) for comparison of their values with a correct conclusion. |

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| PAPER: 1MA0_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q14 | | No picture, just a box giving the distances | B1 for 5 miles = 8 km or equivalent statement or for $\frac{8}{5}$ or $\frac{5}{8}$ used correctly<br>M1 for $50 \times r$ with $1.5 \leq r \leq 1.7$ oe or $480 \times s$ with $0.6 \leq s \leq 0.7$ oe<br>M1 for 480 ÷ speed or distance ÷ 50<br>A1 oe |
| Q15 | | Grid x 2 – 2 cm squares. Top row removed. | B2 for all correct<br>(B1 for 2 or 3 correct)<br><br>M1 (dep on at least B1) for at least 6 points from their table plotted correctly<br>A1 cao for fully correct graph<br><br>M1 for line $y = x + 3$ drawn correctly or for reduction to correct 3 term quadratic (=0) and :<br>$(x \pm 1)(x \pm 4)$<br>or formula using $a = 1$, $b = -3$ and $c = -4$, allow one sign error in the formula,<br>or $\left(x - \frac{3}{2}\right)^2 = 4 + \left(\frac{3}{2}\right)^2$<br>A1 cao |

| PAPER: 1MA0_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q16 | (a) | Box plots: "first half" – relevant figures are 4.25, 4.75, 5.25, 5.5, 6.4. | M1 for "5.5" – "4.75" with at least one value correct<br>A1 cao |
| | (c) | "Second half" figures are<br>3.6, 4.25, 4.75, 5, and 6. 2 cm squares | B1 ft from (a) for a correct comparison of a measure of spread<br>B1 for a correct comparison of medians (accept averages)<br>For the award of both marks at least one of the comparisons made must be in the context of the question. |
| Q19 | | 2 cm grid | M1 for method to find gradient of $L_1$ e.g $\frac{6-3}{6-0}$ $\left(=\frac{1}{2}\right)$<br>M1 for $y =$ "$\frac{1}{2}$"$x + c$ or $y = mx - 5$ ($c$, $m$ do not have to be numerical, or correct numerical values) or for $(L =)\frac{1}{2}x - 5$<br>A1 $y = \frac{1}{2}x - 5$ oe |

| PAPER: 1MA0_1H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q20 | | Picture removed – box with the word "Photo inserted"<br>Diagram labelled Diagram (i) and (ii) | M1 for $\frac{15}{10}$ (=1.5) or $\frac{10}{15}$ (=0.66..) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625)<br>M1 for $\frac{15}{10} \times 16$ (=24) oe<br>A1 cao<br>OR<br>M1 for $\frac{15}{16}$(=0.9375) or $\frac{16}{15}$ (=1.066…) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625)<br>M1 for $\frac{15}{16} \times 10$ (=9.375) oe<br>A1 20.625 oe |
| Q22 | (b) | MLP only : x changed to y | M1 for $(y-3)(y+3)$<br>M1 for $(2y-1)(y+3)$<br>A1 for $\frac{y-3}{2y-1}$ cao |
| Q25 | | x 2 size, solid answer lines<br><br>Braille only – Roman numerals inserted on the five answer lines | Standard mark scheme |

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# Mark Scheme (Results)

## November 2014

## Pearson Edexcel GCSE
## In Mathematics A (1MA0)
## Higher (Calculator) Paper 2H

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## NOTES ON MARKING PRINCIPLES

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

**12 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

**14** The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark for appropriate method in the context of the question<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | | 360 | 2 | M1 30 ÷ 10 (= 3) or 120 ÷ 10 (=12) or 120 + 120 + 120 oe<br>A1 cao |
| | (b) | | 25 | 2 | M1 for $\frac{750}{300}$ (=2.5) oe<br>A1 cao |
| 2 | (a) | | Relationship | 1 | B1 for description of relationship eg "As the length of the pine cone increases the width increases" oe (accept positive correlation) |
| | (b) | | 6.1 to 6.4 | 2 | M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a vertical line from 8.4 or a point at (8.4, $y$) where $y$ is from 6.1 to 6.4<br>A1 for given answer in the range 6.1 to 6.4 |
| 3 | (a) | | –1 | 2 | M1 for $3 \times -5 + 7 \times 2$<br>A1 cao |
| | (b) | | $3(x + 2)$ | 1 | B1 cao |
| | (c) | | $7y - 16$ | 2 | M1 for intention to expand a bracket eg $5y - 10$ or $2y - 6$<br>A1 cao |
| | (d) | | $m^8$ | 1 | B1 cao |
| | (e) | | $p^4$ | 1 | B1 cao |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 4 | (a) | | Correct shape | 2 | B2 cao<br>(B1 for shape in the correct orientation below the line $y = x$ or for 2 vertices correct) with vertices at (2, 1), (4, 1), (4, 0), (3, 0) |
| | (b) | | Translation by $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$ | 2 | B1 for translation<br>B1 for $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$<br>NB: B0 if more than one transformation given |
| 5 | (a) | | 0.2 | 2 | M1 for 1 – 0.16 – 0.4 – 0.24 oe<br>A1 cao |
| | (b) | | 20 | 2 | M1 for 0.16 × 125 oe<br>A1 cao |
| 6 | | | 2.10 euros or £1.81 | 3 | M1 for 2.5 × 1.16 (= 2.9)<br>M1 (dep) for 5 – "2.9" (=2.1)<br>A1 for 2.1(0) euros<br>OR<br>M1 for 5 ÷ 1.16 (= 4.31...)<br>M1 (dep) for "4.31" – 2.50 (=1.81)<br>A1 for £1.81 |
| 7 | (a) | | $4n - 2$ | 2 | B2 for $4n - 2$ oe<br>(B1 for $4n + k$, $k \neq -2$ or $k$ is absent, or $n = 4n - 2$) |
| | *(b) | | Yes + reason | 1 | C1 ft from (a) for decision and explanation, e.g. equating 86 with $n$th term **and** "Yes, its the 22nd term" or continuing the sequence up to 86 **and** "Yes, 86 is in the sequence" oe |

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|---|---|---|---|---|---|
| Question | | Working | Answer | Mark | Notes |
| 8 | | | Polygon drawn | 2 | B2 for fully correct frequency polygon - points plotted at the midpoint<br>(B1 for all points plotted accurately but not joined with straight line segments)<br>**or**<br>all points plotted accurately and joined with last joined to first to make a polygon<br>**or**<br>all points at the correct heights and consistently within or at the ends of the intervals and joined (can include joining last to first to make a polygon)<br>NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn. |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *9 | | | Decision (No the attendance target was not met) | 3 | M1 for attempting to find total number of students or 1210 seen<br>M1 for $\frac{'1092'}{'1210'} \times 100$ oe or $\frac{'118'}{'1210'} \times 100$ oe<br>C1 for correct decision with 90.(2479...) or correct decision with 6 and 9.(752...)<br>**OR**<br>M1 for attempting to find total number of students or 1210 seen<br>M1 for $\frac{94}{100} \times$ '1210' oe<br>C1 for correct decision with 1137 (.4) and 1092 or correct decision with 72(.6) and 118<br>**OR**<br>M1 for a correct % method for one year,<br>e.g. $\frac{192}{208} \times 100$ or $\frac{94}{100} \times 208$<br>M1 for a correct % method for each year<br>C1 for correct decision with 92.(30...), 90.(87...), 89.(31...), 89.(27...), 89.(91...) or 195(.5..), 226.(9…), 246.(2..), 245.(3…), 223.(7…) |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 10 | | 5 115<br>6 204<br>5.1 122.(451)<br>5.2 130.(208)<br>5.3 138.(277)<br>5.4 146.(664)<br>5.5 155.(375)<br>5.6 164.(416)<br>5.7 173.(793)<br>5.8 183.(512)<br>5.9 193.(579)<br>5.11 123.2(12..)<br>5.12 123.9(77..)<br>5.13 124.7(45..)<br>5.14 125.5(16..)<br>5.15 126.2(90..) | 5.1 | 4 | B2 for a trial $5.1 \leq x \leq 5.2$ evaluated<br>(B1 for a trial $5 \leq x \leq 6$ evaluated)<br>B1 for a different trial $5.1 < x \leq 5.15$ evaluated<br>B1 (dep on at least one previous B1) for 5.1<br><br>Accept trials correct to the nearest whole number (rounded or truncated) if the value of $x$ is to 1 dp but correct to 1dp (rounded or truncated) if the value of $x$ is to 2 dp.<br>(Accept 124 for $x = 5.12$)<br><br>NB : no working scores no marks even if the answer is correct. |
| *11 | | | No + reason | 4 | M1 for intention to find the circumference<br>eg $140 \times \pi$ (= 439.82...)<br>A1 for circumference = 439 - 440<br>M1 (dep on M1) for a complete method shown that could arrive at two figures that are comparable eg "C"÷60×12 (=87.96..) , 90÷12×60 (=450) , 90×60÷"C" (=12.27), "C"÷90×12 (=58.64..)<br>C1 (dep on both M marks) for No and explanation that shows a correct comparison eg only 84 people could sit around the tables or that 13 tables are needed or that 480 cm is needed. |

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| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 12 | | <table><tr><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>-7</td><td>-5</td><td>-3</td><td>-1</td><td>1</td><td>3</td></tr></table> | Straight line from (–2, –7) to (3, 3) | 4 | **(Table of values)**<br>C1 for axes scaled and labelled<br>M1 for at least 2 correct attempts to find points by substituting values of $x$<br>M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly)<br>A1 for correct line between $x = -2$ and $x = 3$<br><br>**(No table of values)**<br>C1 for axes scaled and labelled<br>M1 for at least 2 correct points with no more than 2 incorrect points<br>M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 2x - 3$ drawn<br>A1 for correct line between $x = -2$ and $x = 3$<br><br>**(Use of $y = mx+c$)**<br>C1 for axes scaled and labelled<br>M1 for line drawn with gradient of 2 OR line drawn with a $y$ intercept of –3<br>M1 for line drawn with gradient of 2 AND with a $y$ intercept of –3<br>A1 for correct line between $x = -2$ and $x = 3$<br><br>SC : B2 for the correct line from $x = 0$ to $x = 3$ |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 13 | (a) | | 65 | 5 | M1 for splitting up the cross section into separate areas and a method to find the area of one part<br>OR for splitting up the pool into smaller prisms and a method to find the volume of one small prism, e.g. a cuboid<br>M1 (dep) for a complete method to find the area of the cross section [with correct dimensions] OR for a method to find the total volume of more than one correct prism<br>M1 (dep) for a complete method to find the volume of the pool [with correct dimensions] (= 195)<br>M1 for "195" × 1000 ÷ 50 (=3900) oe where "195" comes from a volume<br>A1 cao |
| | (b) | | C | 1 | B1 cao |
| *14 | | $1.025^2 = 1.050625$<br>$1.04 \times 1.015$<br>$= 1.0556$ | Bonus Saver with correct comparable values | 4 | M1 for a method to calculate 4% or 2.5% of 20000 (= 800 or 20800 or 500 or 20500)<br>M1 for a method to calculate using a compound interest method, eg $1.025^2$ oe or 1.04 followed by 1.015 oe<br>A1 for 1.050625 or 1.0556 or 10556 or 556 or 21112 or 21012.5 or 1112 or 1012.5<br>C1 for a correct decision in a statement with two correct comparable values.<br>**NB** all final money values can be rounded or truncated to nearest integer or left unrounded. |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | | $3x + y = 30$<br>$x + 3y = 22$ | 8.50<br>4.50 | 4 | M1 for forming two algebraic equations<br>M1 for a correct process to eliminate one variable (condone one arithmetic error)<br>M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error)<br>A1 for 8.5(0) and 4.5(0) |
| 16 | | $AC^2 = 5^2 + 3^2$<br>$AC = \sqrt{25+9}$ (=5.83)<br>$\frac{5}{5.83} = \frac{DB}{3}$<br>$DB = \frac{5}{5.83} \times 3$ (= 2.57)<br>5 + 3 + 5.83 + 2.57 =<br>**OR**<br>$AC = \sqrt{25+9}$ (=5.83)<br>$\tan A = \frac{3}{5}$<br>$A = 30.96$<br>$\sin 30.96 = \frac{DB}{5}$<br>$DB = 5 \times \sin 30.96$ (= 2.57)<br>5 + 3 + 5.83 + 2.57 = | 16.4 | 5 | M1 for $(AC^2) = 5^2 + 3^2$ (=34)<br>M1 for $\sqrt{25+9}$ or $\sqrt{34}$ (=5.83)<br>M1 for $\frac{5}{'5.83'} = \frac{DB}{3}$ or $DB \times AC = 5 \times 3$<br>M1 for $(DB =) \frac{5}{'5.83'} \times 3$<br>A1 for 16.4 to 16.41<br>**OR**<br>M1 for $(AC^2) = 5^2 + 3^2$ (=34)<br>M1 for $\sqrt{25+9}$ or $\sqrt{34}$ (=5.83)<br>M1 for using a correct trig ratio in an attempt to find angle $A$ or angle $C$, e.g. $\tan A = \frac{3}{5}$, $\sin A = \frac{3}{'5.83'}$, $\cos C = \frac{3}{'5.83'}$<br>M1 for using $DB$ in a a correct trig ratio, e.g. sin'30.96' = $\frac{DB}{5}$<br>A1 for 16.4 to 16.41 |

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| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 17 | | | 35° | 4 | M1 for $ABC = 90$<br>M1 for ($ACB =$) 180 – 90 – 25 (= 65)<br>M1 for ($DBC =$) 180 – '65' – 80 (=35)<br>A1 cao supported by working<br>OR<br>M1 for ($AOB =$) 180 – 2 × 25 (= 130)<br>M1 for ($ADB =$) 130 ÷ 2 (=65)<br>M1 for ($DAC =$) 180 – 65 – 80<br>A1 cao supported by working. |
| 18 | (a) | 5 × 8 = 40<br>12.5 × 15 = 187.5<br>17.5 × 11 = 192.5<br>25 × 10 = 250<br>40 × 6 = 240<br>910 ÷ 50 = 18.2 | 18.2 | 4 | M1 for $fx$ consistently within interval including ends (allow 1 error)<br>M1 consistently using appropriate midpoints<br>M1 (dep on first M1) for $\Sigma fx \div \Sigma f$<br>A1 for 18.2 cao |
| | (b) | $0 \le t < 10$ fd 0.8<br>$10 \le t < 15$ fd 3<br>$15 \le t < 20$ fd 2.2<br>$20 \le t < 30$ fd 1<br>$30 \le t < 50$ fd 0.3 | Correct histogram | 3 | B3 fully correct histogram with vertical axis correctly scaled.<br>(B2 for 4 correct blocks or 5 correct blocks with incorrect or no scale)<br>(B1 for 2 correct blocks of different widths or any 3 correct blocks or correct FD values for at least 3 frequencies) eg fd of 0.8, 3, 2.2, 1, 0.3 |
| 19 | (a) | | 0.3<br>0.3, 0.7, 0.3 | 2 | B1 for 0.3 as first spin oe<br>B1 for 0.3, 0.7, 0.3 in correct positions for second spin oe |
| | (b) | | 0.42 | 3 | M1 for '0.3' × '0.7' or 0.7 × '0.3' (=0.21)<br>M1 for '0.3' × '0.7 + 0.7 × '0.3<br>(OR M2 for $1 - 0.7^2 - 0.3^2$)<br>A1 for 0.42 oe |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | | | 1.85 and – 0.180 | 3 | M1 for $\frac{--5\pm\sqrt{-5^2-4\times3\times-1}}{2\times3}$ (condone one sign error)<br>M1 for $\frac{5\pm\sqrt{37}}{6}$ (=1.8 to1.85 or −0.18 to −0.181)<br><br>A1 for answers in the ranges 1.8 to1.85,<br>and −0.18 to −0.181 |
| 21 | | | 8.52 | 5 | M1 for $\frac{BD}{\sin45}=\frac{7.4}{\sin80}$ oe<br>M1 for $(BD=)\frac{7.4}{\sin80}\times\sin45$ (= 5.3133..)<br>M1 for $5.8^2$ + '5.31'$^2$ – 2 × 5.8 × '5.31' cos100<br>M1 (dep) for correct order of evaluation or 72.5(73...)<br>A1 for 8.51 – 8.52<br><br>OR<br><br>M1 for $\frac{AD}{\sin(180-80-45)}=\frac{7.4}{\sin80}$ oe<br>M1 for $(AD=)\frac{7.4}{\sin80}\times\sin(180-80-45)$ (= 6.15...)<br>M1 for $7.4^2$+ ('6.15' + 5.8)$^2$ – 2 × 7.4 × ('6.15' + 5.8) × cos45<br>M1 (dep) for correct order of evaluation or 72.5(7398...)<br>A1 for 8.51 – 8.52 |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 22 | (a) | $\frac{(2x-3)(x-1)}{(x+6)(x-1)}$ | $\frac{2x-3}{x+6}$ | 3 | M1 for $(2x-3)(x-1)$<br>M1 for $(x+6)(x-1)$<br>A1 cao |
| | (b) | $\frac{mb-tv}{vb}=\frac{m-t}{R}$<br>$mbR-tvR=mvb-tvb$<br>$mbR-mvb=tvR-tvb$<br>$m(bR-vb)=tvR-tvb$<br>OR<br>$\frac{m}{v}-\frac{t}{b}=\frac{m}{R}-\frac{t}{R}$<br>$\frac{m}{v}-\frac{m}{R}=\frac{t}{b}-\frac{t}{R}$<br>$\frac{mR-mv}{vR}=\frac{tR-tb}{bR}$<br>$\frac{m(R-v)}{vR}=\frac{tR-tb}{bR}$ | $m=\frac{tv(R-b)}{b(R-v)}$ | 4 | M1 for putting LHS over a common denominator with at least one correct numerator (ignore signs) or for showing an intention to multiply each term on both sides by $R$ or $v$ or $b$<br>M1 for rearranging correctly to isolate terms in $m$<br>M1 for factorising with common factor $m$ from 2 terms<br>A1 for $m=\frac{tv(R-b)}{b(R-v)}$ oe |
| *23 | | | Yes, average speed could have been as high as 80.622... | 5 | B1 for 4535 or 4534.999... or 202.5<br>M1 for 4535 (oe) ÷ 202.5<br>M1 for ×3600 and ÷1000<br>A1 for 80.622...<br>C1 (dep on first M1) for correct conclusion from their calculations |

## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| 2 | (b) | 2 cm grid<br><br>8.4 changed to 8.5 | |
| 3 | (b) | MLP – *x* changed to *y* | |
| 4 | (a)<br><br>(b) | 2 cm grid<br><br>2 cm grid | |
| 8 | | Table frequencies changed: 2 5 10 25 15 5<br>Grid – X axis 3 cm for 5 with an intermediate line<br>Y axis 1.5 cm for 5 | |
| 11 | | No model – table top only drawn showing the diameter | |
| 12 | | 2 cm grid<br>Braille axes put on grid and labelled | |

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# Mark Scheme (Results)

## Summer 2015

## Pearson Edexcel GCSE
## In Mathematics A (1MA0)
## Higher (Calculator) Paper 2H

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## NOTES ON MARKING PRINCIPLES

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

**12 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

**14** The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark for appropriate method in the context of the question<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

**PAPER: 1MA0_2H**

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| 1 | (a) | | $\frac{1}{30}$ | 1 | B1 for $\frac{1}{30}$ oe |
| | (b) | | $\frac{3}{10}$ | 2 | M1 for method to sum the number of white chocolates in the bag, eg 4 + 4 + 1 (= 9),<br>A1 for $\frac{3}{10}$ or $\frac{9}{30}$ oe |
| | (c) | | 0.48 | 2 | M1 for 1− (0.35 + 0.17) oe<br>A1 for 0.48 oe |
| 2 | | $x$ \| $x^3-x^2$<br>3 \| 18<br>3.1 \| 20.(181)<br>3.2 \| 22.(528)<br>3.3 \| 25.(047)<br>3.4 \| 27.(744)<br>3.5 \| 30.(625)<br>3.6 \| 33.(696)<br>3.7 \| 36.(963)<br>3.8 \| 40.(432)<br>3.9 \| 44.(109)<br>4 \| 48<br>3.45 \| 29.1(61125)<br>3.46 \| 29.4(50136)<br>3.47 \| 29.7(41023)<br>3.48 \| 30.0(33792)<br>3.49 \| 30.3(28449) | 3.5 | 4 | B2 for a trial $3.4 \le x \le 3.5$ evaluated correctly<br>(B1 for a trial evaluated correctly for $3 \le x \le 4$ )<br><br>B1 for a different trial evaluated correctly for $3.45 \le x < 3.5$<br><br>B1 (dep on at least one previous B1) for 3.5<br><br>[Note: Trials should be evaluated to at least accuracy shown in table, truncated or rounded]<br><br>[NB No working scores 0 marks] |

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| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 3 | (a) | | 4.58006(9567) | 2 | M1 for 1.83 or 8.381(527307) or 4.6 or 4.58 or 4.580 or 4.5801<br>A1 for 4.58006(9567) |
| | (b) | | 4.5801 | 1 | B1 ft provided at least 5 decimal places in (a) |
| 4 | | | Enlargement | 2 | B2 for fully correct triangle<br>(B1 for 2 vertices correct or enlargement scale factor 2 in the wrong position or enlargement, centre *A*, with a different scale factor) |
| *5 | | 1155 ÷ 15 = 77<br>$x + 2x + x - 7 = 77$<br>$4x - 7 = 77$<br>$4x = 84$; $x = 21$<br><br>OR<br><br>$15x + (15 \times 2x) + 15(x - 7) = 1155$<br>$60x - 105 = 1155$<br>$60x = 1260$<br>$x = 21$ | Redlands 21<br>St Samuels 42<br>Francis Long 14 | 5 | M1 for $2x$ or $x-7$<br>M1 for 1155 ÷ 15 (= 77)<br>M1 (dep M2) for equation summing their three expressions to "77"<br>A1 for 21, 42 and 14<br>C1 for fully correct answer with correct labels<br><br>OR<br><br>M1 for an expression for the cost of the pupils from Redlands<br>M1 for expression for the cost of the pupils from either St Samuels or Francis Long<br>M1 (dep M2) for equation summing their three expressions to 1155<br>A1 for 21, 42, and 14<br>C1 for fully correct answer with correct labels |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *6 | | | Large box | 4 | M1 for a complete method to find the cost per sachet or the number of sachets per £1 for one size of box<br>M1 for a complete method to find all three comparable figures<br>A1 for 0.47(08. .), 0.46, 0.45 or 2.12(3...), 2.17(..), 2.22 (2..) oe<br>C1(dep on M2) for a comparison of their answers leading to a correct deduction<br>OR<br>M1 for 3 multiples of each of 12, 20 and 35<br>or a common multiple of 12, 20 and 35, eg 420<br>or multipliers to compare the same number of sachets from each box, eg $\times\frac{35}{12}$ and $\times\frac{35}{20}$<br>M1 for a complete method to find three comparable costs<br>A1 for three correct costs, eg 197.75 and 193.20 and 189.00<br>C1(dep on M2) for a comparison of their answers leading to a correct deduction |
| 7 | (a) | | $7x + 35$ | 1 | B1 cao |
| | (b) | | $12y^2 - 9y$ | 1 | B1 cao |
| | (c) | $t^2 + 2t + 4t + 8$ | $t^2 + 6t + 8$ | 2 | M1 for all 4 terms (and no additional terms) correct with or without signs or 3 out of no more than 4 terms correct with signs<br>A1 for $t^2 + 6t + 8$ |
| 8 | | | 68<br>34<br>51 | 3 | M1 for $153 \div (4 + 2 + 3)$ (=17) or for a correct method to scale up to at least 44:22:33 without error<br>M1 (dep M1) for "17" × 4 or "17" × 2 or "17" × 3 or for a complete method to build up to 68:34:51 with at least two of these values correct<br>A1 for 68, 34, 51 in any order<br>(If M0,SC B2 for two correct lengths) |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | (a) | | Polygon drawn | 2 | B2 for correct plotting of 5 points and joining with line segments<br>(B1 for points plotted correctly at midpoints of intervals **OR** joining points with line segments at the correct heights and consistent within the class interval (including end values) **OR** correct frequency polygon with one point incorrect **OR** correct frequency polygon with first and last point joined)<br>NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted |
| | *(b) | | Yes with reason | 2 | M1 for finding a quarter of 51 and for finding how many teachers sent more than 30 emails<br>C1 for 12.75 or 13 compared to 15 and yes she is correct<br><br>OR<br><br>M1 for finding how many teachers sent more than 30 emails and '15'× 4<br>C1 for comparing 60 with 51 and yes she is correct<br><br>OR<br><br>M1 for 15 ÷ 51 (= 0.29...) or $\frac{15}{51}$ × 100 (= 29…%)<br>C1 for comparing 0.29.. with $\frac{1}{4}$ or 0.25 OR 29….% with 25% and yes she is correct |
| 10 | | | Loci drawn | 3 | B1 for line parallel to *BC* and 3 cm from *BC*<br>B1 for arc drawn, centre *C*, with radius 4 cm<br>B1 ft for shading a region below their horizontal line **and** inside their arc |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *11 | | | No supported by working | 4 | M1 for $\pi \times 7$ (= 21.9 to 22) or $\pi \times 7 \times 2.54$ = (55.5 to 56)<br>M1 (dep) for a complete method that could lead to two figures that are comparable eg $\pi \times 7 \times 2.54$; $\pi \times 7$ and $50 \div 2.54$<br>A1 for correct comparable figures eg 55.5 to 56 (cm);<br>21.9 to 22 (in) and 19.6 to 19.7 (in)<br>C1 (dep M2) for a correct conclusion based on their comparable figures<br><br>OR<br><br>M1 for eg $50 \div \pi$ ( = 15.9 to 15.92) or $50 \div 2.54\pi$ (=6.26 to 6.27)<br>M1 (dep) for a complete method that could lead to two figures that are comparable eg $(50 \div \pi) \div 2.54$; $50 \div \pi$ and $7 \times 2.54$<br>A1 for correct comparable figures eg 6.26 to 6.27 (in);<br>15.9 to 15.92 (cm) and 17.7 to 17.8 (cm)<br>C1 (dep M2) for a correct conclusion based on their comparable figures |
| 12 | | | $p = 8$, $q = 10$ | 3 | M1 for finding the difference between the $x$ or $y$ coordinates<br>eg $4 - 2$ (= 2) or $17 - 5$ (= 12)<br>M1 for a complete method to find the value of $p$ or the value of $q$<br>A1 cao |
| 13 | | | 245 | 2 | M1 for method to identify the angle required, including on a diagram<br>A1 cao |
| 14 | | $10 \times 75 + 14 \times 105 + 9 \times 135 + 5 \times 165 + 2 \times 195$<br><br>$750 + 1470 + 1215 + 825 + 390$<br>$4650 \div 40$ | 116.25 | 4 | M1 for finding at least 4 products $ft$ consistently within interval (including end points)<br>M1 (dep) for use of at least 4 correct midpoints.<br>M1 (dep on 1st M) for '$\Sigma ft$' $\div 40$<br>A1 for 116.25 |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | (a) | | 0.000064 | 1 | B1 for 0.000064 or $\frac{1}{15625}$ or $6.4\times10^{-5}$ oe |
| | (b) | | $4.2875\times10^{7}$ | 2 | B2 cao<br>(B1 for digits 42875 or $4.3\times10^{7}$ or $4.29\times10^{7}$ or $4.288\times10^{7}$) |
| 16 | | Volume of A = $\frac{140}{0.7}$ = 200<br>Volume of B = $\frac{128}{1.6}$ = 80<br>Mass of C = 140+128<br>= 268<br>Density of C = $\frac{268}{280}$ | 0.957 | 4 | M1 for finding the volume of either liquid A or B or the mass of liquid C<br>M1 for a complete method to find the volume AND mass of liquid C<br>M1 (dep M2) for "total mass" ÷ " total volume"<br>A1 for 0.957 to 0.96 |
| 17 | | Gradient of N = 3<br>Gradient of perpendicular to line N = $-\frac{1}{3}$ | $y=-\frac{1}{3}x+1$ | 3 | M1 for complete method to find gradient of line N or for drawing a perpendicular line<br>M1 for method to find the gradient of a perpendicular line<br>A1 $y=-\frac{1}{3}x+1$ oe |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | (a) | | Diagram type | 1 | B1 for box plot or box and whisker or cumulative frequency |
| | *(b) | | Comparison given | 2 | C1 for a correct comparison of medians<br>C1 for a correct comparison of a measure of spread with correct figures<br>NB for the award of both marks at least one of the comparisons must be in context |
| 19 | | BC = $\frac{12}{\tan 60}$ = 6.92(8…)<br>DE = 6.92(…) × tan 30 = 4<br>CE = 12 + 4<br>AC = $\frac{12}{sin60}$ = 13.8(5…)<br>CE = $\frac{13.8(5\ldots)}{cos30}$ | 16 with supporting working | 4 | M1 for a method to find BC or AC or AD<br>B1 for angle EAD = 30˚ or AED = 60° or ACD = 30˚ or CAD = 60°<br>M1 for a method to find CE<br>A1 for 15.9-16.1 with supporting working |

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|---|---|---|---|---|---|
| Question | | Working | Answer | Mark | Notes |
| 20 | | | Shown | 3 | M1 for correct expansion of $(n+3)^2$ or $(n-3)^2$<br>eg $(n+3)^2 = n^2+6n+9$ or<br>$(n-3)^2 = n^2-6n+9$<br>M1 for correct expansion of complete expression,<br>eg $(n^2+6n+9) - (n^2-6n+9)$<br>A1 for $12n$ and conclusion<br><br>OR<br><br>M1 for $[n+3+n-3][n+3-(n-3)]$<br>M1 for $2n \times 6$<br>A1 for conclusion |
| 21 | | $3^2 \times 180$ | 1620 | 2 | M1 for using a scale factor of $3^2$ (= 9)<br>A1 cao |
| 22 | | | 1.25 | 3 | M1 100 – 12 (= 88) or 0.88 or 1.1 ÷ 88 (= 0.0125)<br>M1 for complete method, eg 1.1 ÷ 0.88<br>A1 cao<br>(SC B2 for 1250 as answer) |
| 23 | | | 22.5 | 3 | M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$<br>M1 (dep M1) for doubling the area of the triangle<br>A1 for 22.4 – 22.5<br><br>OR<br><br>M1 for complete method to find height of parallelogram, eg $5 \sin 40°$<br>M1 (dep M1) for complete method to find the area of the parallelogram, eg $7 \times 5\sin 40°$<br>A1 for 22.4 – 22.5 |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 24 | | $\frac{232.5}{202.5} \times 60$ | 68.9 | 4 | M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours)<br>M1 for correct conversion of "upper bound of time" from minutes to hours, (202.5 to 205) ÷ 60<br>M1 for "lower bound of distance" ÷ "upper bound of time"<br>(230 to 232.5) ÷ (3.375 to 3.41(6…))<br>A1 for 68.8 to 69 from correct working<br><br>OR<br><br>M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours)<br>M1 for "lower bound of distance" ÷ "upper bound of time"<br>(230 to 232.5) ÷ (202.5 to 205)<br>M1 for correct conversion of "lower bound of speed" from miles per minute to miles per hour, ((1.12(1...) to 1.14(8...)) × 60<br>A1 for 68.8 to 69 from correct working |
| 25 | | $\frac{-4 \pm \sqrt{4^2 - 4 \times 3 \times -12}}{2 \times 3}$ | 1.44 and −2.77 | 3 | M1 for substitution of $a = 3$, $b = 4$, $c = -12$ into the formula (condone one sign error) or for completing the square<br>M1 for $\frac{-4 \pm \sqrt{160}}{6}$ or in simplified form<br>A1 for answers in the ranges 1.43 to1.45 and −2.76 to −2.78 |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 26 | (a) | | (4), 9, 8, 10, 12 | 2 | M1 for correct calculation to find one frequency<br>e.g. $0.9 \times 10$ or $1.6 \times 5$ or $1 \times 10$ or $0.8 \times 15$ or for one frequency correct or shows that 1 $cm^2 = 1$<br>A1 for all frequencies correct |
| | (b) | | $\frac{8}{43}$ | 2 | M1 for 8 (people) or $\frac{2}{3}$ of "12"<br>A1ft for 8 out of 43 stated as a percentage or fraction or decimal |
| | (c) | | 26000 | 2 | M1 ft for finding the interval in which the "21.5th" or "22nd" value lies or 26 or 25.5<br>A1 for 26000 or 25500 |
| 27 | | $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$<br>$= \mathbf{a} + \mathbf{b}$<br>$\overrightarrow{AC} = \frac{7}{2}\overrightarrow{AB}$<br>$\overrightarrow{OC} = \overrightarrow{OA} + \overrightarrow{AC}$<br>$= 2\mathbf{a} + \mathbf{b} + \frac{7}{2}(\mathbf{a} + \mathbf{b})$ | $\frac{11}{2}\mathbf{a} + \frac{9}{2}\mathbf{b}$ | 4 | M1 for $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ $(= -(2\mathbf{a} + \mathbf{b}) + (3\boldsymbol{a} + 2\boldsymbol{b}))$ or $\mathbf{a} + \mathbf{b}$<br>M1 for $\overrightarrow{AC} = \frac{7}{2}\overrightarrow{AB}$ or $\overrightarrow{BC} = \frac{5}{2}\overrightarrow{AB}$, may be in terms of **a** and **b**<br>M1 (dep M2) for complete method to find $\overrightarrow{OC}$ in terms of **a** and **b**<br>A1 for $\frac{11}{2}\mathbf{a} + \frac{9}{2}\mathbf{b}$ or equivalent simplest form<br>( SCB2 for $\frac{11}{2}\mathbf{a} + \frac{23}{2}\mathbf{b}$ or $\frac{11}{2}\mathbf{a} + \frac{19}{2}\mathbf{b}$) |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 28 | (a) | | Circle drawn | 2 | B2 fully correct circle drawn<br>(B1 for circle drawn with centre (0,0) or circle drawn with radius 4)<br>OR<br>M1 at least 5 correct points calculated and plotted<br>A1 fully correct circle drawn |
| | (b) | | $x = 1.4$, $y = 3.8$<br>$x = -2.2$, $y = -3.4$ | 3 | M1 for $y = 2x + 1$ drawn or for elimination of one variable<br>A1 for one correct pair of values given or for $x = 1.4, -2.2$ ($\pm 0.2$) or ft from graph provided 2 marks in (a)<br>A1 for second correct pair of values given (±0.2) or ft from graph provided 2 marks in (a) |

## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q4 | | Grid is enlarged. 2 rows at the top and 2 columns on the right are removed.<br>The enlargement is drawn on the diagram and the question is reversed. 'Describe fully the single transformation that maps shape P onto<br>shape Q.' | B2 for enlargement, scale factor 2, centre A<br>(B1 for enlargement, or scale factor 2) |

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q6 | | Diagrams removed. | M1 for a complete method to find the cost per sachet or the number of sachets per £1 for one size of box<br>M1 for a complete method to find all three comparable figures<br>A1 for 0.47(08. .), 0.46, 0.45 or 2.12(3...), 2.17(..), 2.22 (2..) oe<br>C1(dep on M2) for a comparison of their answers leading to a correct deduction<br>**OR**<br>M1 for 3 multiples of each of 12, 20 and 35<br>or a common multiple of 12, 20 and 35, eg 420<br>or multipliers to compare the same number of sachets from each box, eg $\times\frac{35}{12}$ and $\times\frac{35}{20}$<br>M1 for a complete method to find three comparable costs<br>A1 for three correct costs, eg 197.75 and 193.20 and 189.00<br>C1(dep on M2) for a comparison of their answers leading to a correct deduction |
| Q7 | (a) | MLP only: x changed to p. | B1 cao |

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| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q9 | (a) | In text 51 is changed to 55.<br>Frequencies changed to : 5, 20, 15, 10, 5.<br>Grid is simplified and enlarged.<br>Both axes – 3cm grid with an intermediate line.<br>Label for horizontal axis left aligned.<br>Label for vertical axis placed above the axis. | B2 for correct plotting of 5 points and joining with line segments<br>(B1 for points plotted correctly at midpoints of intervals **OR** joining points with line segments at the correct heights and consistent within the class interval (including end values) **OR** correct frequency polygon with one point incorrect **OR** correct frequency polygon with first and last point joined)<br>NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted |
| Q9 | (b) | In text 51 is changed to 55.<br>Frequencies changed to : 5, 20, 15, 10, 5.<br>Grid is simplified and enlarged.<br>Both axes – 3cm grid with an intermediate line.<br>Label for horizontal axis left aligned.<br>Label for vertical axis placed above the axis. | M1 for finding a quarter of 55 and for finding how many teachers sent more than 30 emails<br>C1 for 13.75 or 14 compared to 15 and yes she is correct<br>**OR**<br>M1 for finding how many teachers sent more than 30 emails and '15'× 4<br>C1 for comparing 60 with 55 and yes she is correct<br>**OR**<br>M1 for 15 ÷ 55 (= 0.27...) or $\frac{15}{55} \times 100$ (= 27…%)<br>C1 for comparing 0.27.. with $\frac{1}{4}$ or 0.25 OR 27….% with 25% and yes she is correct |
| Q10 | | Rectangle has been widened so that AD and BC are 12 cm.<br>In text, 8 metres has been changed to 10 metres. | B1 for line parallel to *BC* and 3 cm from *BC*<br>B1 for arc drawn, centre *C*, with radius 5 cm<br>B1 ft for shading a region below their horizontal line **and** inside their arc |

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q11 | | Diagram is enlarged. | M1 for $\pi \times 7$ (= 21.9 to 22) or $\pi \times 7 \times 2.54$ = (55.5 to 56)<br>M1 (dep) for a complete method that could lead to two figures that are comparable eg $\pi \times 7 \times 2.54$; $\pi \times 7$ and $50 \div 2.54$<br>A1 for correct comparable figures eg 55.5 to 56 (cm);<br>21.9 to 22 (in) and 19.6 to 19.7 (in)<br>C1 (dep M2) for a correct conclusion based on their comparable figures<br>**OR**<br>M1 for eg $50 \div \pi$ ( = 15.9 to 15.92) or $50 \div 2.54\pi$ (=6.26 to 6.27)<br>M1 (dep) for a complete method that could lead to two figures that are comparable eg $(50 \div \pi) \div 2.54$; $50 \div \pi$ and $7 \times 2.54$<br>A1 for correct comparable figures eg 6.26 to 6.27 (in);<br>15.9 to 15.92 (cm) and 17.7 to 17.8 (cm)<br>C1 (dep M2) for a correct conclusion based on their comparable figures |
| Q14 | | Frequency column has been widened to allow for working. | M1 for finding at least 4 products *ft* consistently within interval (including end points)<br>M1 (dep) for use of at least 4 correct midpoints.<br>M1 (dep on 1st M) for '$\Sigma ft$' $\div$ 40<br>A1 for 116.25 |
| Q17 | | Diagram is enlarged. | M1 for complete method to find gradient of line N or for drawing a perpendicular line<br>M1 for method to find the gradient of a perpendicular line<br>A1 $y = -\frac{1}{3}x + 1$ oe |
| Q19 | | Diagram is enlarged.<br>Angle arc put inside the angle size. | M1 for a method to find BC or AC or AD<br>B1 for angle EAD = 30° or AED = 60° or ACD = 30° or CAD = 60°<br>M1 for a method to find CE<br>A1 for 15.9-16.1 with supporting working |

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q23 | | Diagram is enlarged.<br>Angle arc put inside the angle size. | M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$<br>M1 (dep M1) for doubling the area of the triangle<br>A1 for 22.4 – 22.5<br>**OR**<br>M1 for complete method to find height of parallelogram, eg 5 sin40°<br>M1 (dep M1) for complete method to find the area of the parallelogram, eg 7 × 5sin40°<br>A1 for 22.4 – 22.5 |
| Q26 | (a) | Braille only: (i) to(iv) put in the spaces in the frequency table.<br>Diagram enlarged.<br>Label for horizontal axis left aligned.<br>Label for vertical axis placed above the axis.<br>Top row of grid removed. | M1 for correct calculation to find one frequency<br>e.g. 0.9 × 10 or 1.6 × 5 or 1 × 10 or 0.8 × 15 or for one frequency correct or shows that 1 $cm^2$ = 1<br>A1 for all frequencies correct |
| Q26 | (b) | Diagram enlarged.<br>Label for horizontal axis left aligned.<br>Label for vertical axis placed above the axis.<br>Top row of grid removed. | M1 for 8 (people) or $\frac{2}{3}$ of "12"<br>A1ft for 8 out of 43 stated as a percentage or fraction or decimal |
| Q26 | (c) | Diagram enlarged.<br>Label for horizontal axis left aligned.<br>Label for vertical axis placed above the axis.<br>Top row of grid removed. | M1 ft for finding the interval in which the "21.5$^{th}$" or "22$^{nd}$" value lies or 26 or 25.5<br>A1 for 26000 or 25500 |

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| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q27 | | Diagram enlarged. Lowercase vectors are increased further in size for emphasis. | M1 for $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ $(= -(2\mathbf{a} + \mathbf{b}) + (3\boldsymbol{a} + 2\boldsymbol{b}))$ or $\mathbf{a} + \mathbf{b}$<br>M1 for $\overrightarrow{AC} = \frac{7}{2}\overrightarrow{AB}$ or $\overrightarrow{BC} = \frac{5}{2}\overrightarrow{AB}$, may be in terms of **a** and **b**<br>M1 (dep M2) for complete method to find $\overrightarrow{OC}$ in terms of **a** and **b**<br>A1 for $\frac{11}{2}\mathbf{a} + \frac{9}{2}\mathbf{b}$ or equivalent simplest form<br>( SCB2 for $\frac{11}{2}\mathbf{a} + \frac{23}{2}\mathbf{b}$ or $\frac{11}{2}\mathbf{a} + \frac{19}{2}\mathbf{b}$) |
| Q28 | (a) | Grid enlarged and simplified. | B2 fully correct circle drawn<br>(B1 for circle drawn with centre (0,0) or circle drawn with radius 4)<br>**OR**<br>M1 at least 5 correct points calculated and plotted<br>A1 fully correct circle drawn |
| Q28 | (b) | Grid enlarged and simplified. | M1 for $y = 2x + 1$ drawn or for elimination of one variable<br>A1 for one correct pair of values given or for $x = 1.4, -2.2$ ($\pm 0.2$) or ft from graph provided 2 marks in (a)<br>A1 for second correct pair of values given (±0.2) or ft from graph provided 2 marks in (a) |

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# Mark Scheme (Results)

## November 2015

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Calculator) Paper 2H

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## NOTES ON MARKING PRINCIPLES

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**7 With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8 Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

**10 Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**11** **Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

**12** **Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13** **Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

**14** The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

| **Guidance on the use of codes within this mark scheme** |
| --- |
| M1 – method mark for appropriate method in the context of the question<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | 2 3 5 8 9<br>3 2 5 7 8 9<br>4 1 2 4<br>5 1<br>6 1 3 | Stem and leaf with key | 3 | B2 for a fully correct ordered stem and leaf<br>(B1 for a correct unordered stem and leaf or for an ordered stem and leaf with at most 1 error or omission)<br>B1 (indep) for a correct key (units not required) |
| 2 | (a) | | Point plotted | 1 | B1 cao |
| | (b) | | positive | 1 | B1 cao |
| | (c) | | 18 - 22 | 2 | M1 for a single line segment with a positive gradient that could be used as a line of best fit or a vertical line from 10 or a point plotted at (10, $y$) where $y$ is in the range 18 - 22<br>A1 18 - 22 |
| | (d) | | 45 | 1 | B1 cao |
| 3 | | | 32<br>64<br>29 | 4 | M1 for $2y$ or $y - 3$<br>M1 for adding their three expressions and setting equal to 125<br>M1 for correct method to solve $ay + b = 125$<br>A1 Ali 32, Bhavara 64 and Ceris 29 |
| 4 | | | 49 | 3 | M1 for converting calculations to common units (either system is acceptable)<br>M1 for dividing their total capacity by the refuelling rate<br>A1 48.9 - 49.1 |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | | 0.65×80 = 52<br>$\frac{5}{8}$×80 = 50<br>52 - 50<br><br>Or<br>$\frac{5}{8}$=0.625<br>0.65 − 0.625=0.025<br>0.025×80 | 2 | 4 | M1 for method to calculate the time Celina sings<br>M1 for method to calculate the time Zoe sings<br>M1(dep on at least M1) for finding the difference between two times<br>A1 cao<br>Or<br>M1 for a conversion to a common representation<br>M1 (dep on M1) for finding the difference in their chosen representation<br>M1 for using their proportional difference multiplied by 80<br>A1 cao |
| 6 | | | 40 000 | 2 | M1 for 100 × 100 isolated or 4 × 100 × 100<br>A1 cao |
| *7 | | | No not enough | 5 | M1 for substituting into Pythagoras' theorem<br>M1 for complete correct use of Pythagoras' theorem<br>M1 for a complete method to find the perimeter of their trapezium<br>A1 51.(20655..)<br>C1 (dep on correct first 2 M marks) for correct conclusion dependent upon supporting calculations |
| *8 | | | 125m*l* | 4 | M1 for a complete method to find the cost per m*l* or the number of m*l* per £1 for one tube or for a method that results in at least 2 values that can be used to compare 2 tubes<br>M1 for a complete method to find all three equivalent figures<br>A1 3 correct figures suitable for comparison<br>C1(dep on M2) for stating the correct tube size from their calculations |

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| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | | | Correct line drawn | 2 | M1 for two pairs of relevant arcs drawn<br>A1 correct line drawn ( with arcs)<br><br>SC B1 Correct line no arcs visible |
| 10 | (a) | 9×6 | 54 | 2 | M1 for a method to find the speed e.g 9 ÷ 10, 9 ÷ 0.16<br>A1 cao |
| | (b) | | Graph completed | 3 | B1 horizontal line from (30,21) to (45,21)<br>M1 for a complete method to show the return journey is 30 mins or ½ hour evidenced by the line on the graph or by calculation<br>A1 Correct line drawn from Luscoe ($x$,21) to ($x$ + 30,0) |
| 11 | (a) | | ±7 | 2 | M1 for intent to divide both sides by 3 as a first step or answer of 7 or -7<br>A1 ±7 |
| | (b) | | 0.125 or $\frac{1}{8}$ | 1 | B1 cao |
| | (c) | | $27x^6$ | 2 | M1 for either 27 or $x^6$ in a two term product<br>A1 cao |
| | (d) | | $p = \frac{w + 16}{4}$ | 2 | M1 for ÷ 4 throughout or adding 16 to both sides as a first step<br>A1 $p = \frac{w+16}{4}$ oe |

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| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 12 | | | Rotation about (2,1) through 180˚ | 3 | B1 rotation<br>B1 about (2,1)<br>B1 through 180˚<br>Or<br>B2 enlargement scale factor −1<br>B1 about (2,1)<br><br>Note Award no marks if more than one transformation is given<br>. |
| 13 | (a) | | 5 and 6 | 2 | M1 for evidence that ($x$ =) 4, 5, 6 or evidence that ($y$ =) 5,6,7, 8<br>A1 cao |
| | (b) | | Region identified | 4 | M1 for two of the lines $y = -1$,$y = 3x - 1$ and $y = 4 - x$ drawn<br>M1 for three of the lines $y = -1$, $y = 3x - 1$ and $y = 4 - x$ drawn<br>M1 any correct shading(in or out) satisfying at least two of the inequalities where the shading must extend from the appropriate line<br>A1 Fully correct region shown by either shading in, shading out or the use of R<br>Accept lines that are solid or dashed |
| 14 | (a) | | 76 | 3 | M1 for 89% = 68<br>M1 for 68 ÷ 0.89 oe<br>A1 for 76 – 76.41 |
| | (b) | | 11.8 | 2 | M1 for (68 − 60) ÷ 68 × 100 oe<br>A1for 11.7 - 12 |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *15 | (a) | | | 1 | C1 for a complete reason eg Angles in a semicircle are $90^o$, alternate segment theorem |
| | (b) | | 2.75 | 4 | M1 for $7 \times \sin 35$<br>M1 for $7 \times \sin 35 \times 2$<br>M1 (indep) for "*DB*"$\times \cos 70$<br>A1 2.74 - 2.75 |
| 16 | (a) | | $6.4 \times 10^8$ | 1 | B1 cao |
| | (b) | | $5 \times 10^2$ | 2 | M1 for $3 \div 6 \times 10^{7-4}$ or $0.5 \times 10^3$ or 500 or 30 000 000÷60 000<br>A1 cao |
| 17 | | | $y = 3x-5$ | 3 | M1 for recognition that the gradient of $\mathbf{L_2}$ is 3<br>M1 for substitution of $x$=3 and $y$=4 into $y$= "$m$"$x$+c<br>A1 $y = 3x-5$ oe<br>( SC B2 for '$3x-5$ ' or $L_2 = 3x-5$ ) |
| 18 | (a) | | 37 | 1 | B1 cao |
| | (b) | | 36 | 2 | M1 for identifying LQ and UQ e.g 35 – 71<br>A1 cao |
| | *(c) | | | 2 | C1 for a correct comparison of medians ft (a)<br>C1 for a correct comparison of a measure of spread with correct figures ft (b)<br>For the award of both marks at least one of the comparisons must be interpretative |

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|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 19 | (a) | | 4.25 | 1 | B1 cao |
| | (b) | | 7.20-7.21 | 3 | B1 4.35 or 0.35<br>M1 for $4.35+\frac{1}{0.35}$<br>A1 7.2(0)-7.21 or $\frac{1009}{140}$ from a correct method seen |
| 20 | | $\pi 2^2\times 2=8\pi$<br>$\pi 2^2\times\frac{20}{360}\times 3+\pi 2^2\times\frac{340}{360}\times 2$<br>$8\pi : \frac{74}{9}\pi$:<br>72 : 74<br><br>Or<br><br>$\frac{20}{360}\times 3+\frac{340}{360}\times 2=\frac{37}{18}$<br>2: $\frac{37}{18}$<br>36:37 | 36:37 | 4 | M1 method to find relative cost of design A e.g. $\pi 2^2$, $k\times\pi 2^2$<br>M1 for a complete method to find the relative cost of the watch face for design B e.g. $\pi 2^2\times\frac{20}{360}\times\frac{3}{5}+\pi 2^2\times\frac{340}{360}\times\frac{2}{5}$<br>M1 (dep on M1, M1) for the cost of design A: cost of design B<br>A1 cao<br>Or<br><br>M1 for method to find fraction of the sectors in design B $\frac{20}{360},\frac{340}{360}$<br>M1 for complete method to find the relative cost of the watch face for design B<br>M1 (dep on M1,M1) for the cost of design A: cost of design B<br>A1 cao |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 21 | | | 9 or 10 | 2 | M1 for 35÷148×40<br>A1 9 or 10 |
| 22 | | | $2x^2 + 7x + 4 = 0$ | 3 | M1 for finding a correct coefficient<br>M1 for a method to find $a$ and $c$ or $b$ and $c$<br>A1 $2x^2 + 7x + 4 = 0$ or $a = 2$, $b = 7$, $c = 4$ |
| 23 | (a) | | Graph drawn | 2 | B2 correct graph drawn<br>(B1 for a graph translated up/down) |
| | (b) | | Graph drawn | 2 | B2 for correct graph drawn<br>(B1 for a graph reflected in the $x$ axis or stretched by sf 2 parallel to the $y$ axis) |
| 24 | | | 31.1 | 5 | M1 for $\frac{1}{2} \times 8.4 \times x \times \sin 40 = 100$<br>M1 for 100÷(0.5×8.4×sin 40) (= 37.(041...))<br>M1 (dep on 1st M1) for substituting the appropriate figures into the cosine rule eg $8.4^2+'37.041'^2-2\times8.4\times'37.041'\cos40^\circ$<br>M1 (dep on previous M1) for correct order of evaluation or ($c^2$=) 965.(897...)<br>A1 31.07 - 31.1 |

| PAPER: 1MA0_2H | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 25 | | $\frac{18}{30}\times\frac{12}{29}+\frac{7}{30}\times\frac{23}{29}+\frac{5}{30}\times\frac{25}{29}$<br>or<br>$1-(\frac{18}{30}\times\frac{17}{29}+\frac{7}{30}\times\frac{6}{29}+\frac{5}{30}\times\frac{4}{29})$<br>or<br>$\frac{18}{30}\times\frac{7}{29}+\frac{18}{30}\times\frac{5}{29}+\frac{7}{30}\times\frac{18}{29}$<br>$+\frac{7}{30}\times\frac{5}{29}+\frac{5}{30}\times\frac{18}{29}+\frac{5}{30}\times\frac{7}{29}$ | $\frac{502}{870}$ | 4 | B1 for a second 'branch' probability seen (could be seen in a tree)<br>M1 for a product of any first and second stage correct probabilities<br>M1 for a complete method to find the required probability<br>A1 for $\frac{502}{870}$ oe<br>Note if decimals used they must be correct to 2 decimal places<br><br>SC with replacement<br>B2 for $\frac{502}{900}$ oe<br>B0<br>M1 $\frac{18}{30}\times\frac{12}{30}$ or $\frac{7}{30}\times\frac{23}{30}$ or $\frac{5}{30}\times\frac{25}{30}$<br>M1 $\frac{18}{30}\times\frac{12}{30}+\frac{7}{30}\times\frac{23}{30}+\frac{5}{30}\times\frac{25}{30}$<br>A0 |

| Q8 | **Per 25ml** | **Per ml** | **Per £** |
|---|---|---|---|
| **50ml** | 54.5 | 2.18 | 45.87155… |
| **75ml** | 56 | 2.24 | 44.64285.. |
| **125ml** | 53.8 | 2.152 | 46.46840.. |

## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q01 | | MLP only: basis given for stem and leaf diagram. | B2 for a fully correct ordered stem and leaf<br>(B1 for a correct unordered stem and leaf or for an ordered stem and leaf with at most 1 error or omission)<br>B1 (indep) for a correct key (units not required) |
| Q02 | | Grid enlarged. Crosses changed to filled in circles. Right axis labelled | B1 cao<br><br>B1 cao<br><br>M1 for a single line segment with a positive gradient that could be used as a line of best fit or a vertical line from 10 or a point plotted at (10, *y*) where *y* is in the range 18 - 22<br>A1 18 - 22<br><br>B1 cao |

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q07 | | Diagram enlarged and labelled ABCD clockwise from the top right. Measurement lines removed. Information about the length of lines given in the text. | M1 for substituting into Pythagoras' theorem<br>M1 for complete correct use of Pythagoras' theorem<br>M1 for a complete method to find the perimeter of their trapezium<br>A1 51.(20655..)<br>C1 (dep on correct first 2 M marks) for correct conclusion dependent upon supporting calculations |
| Q08 | | Diagram removed. | M1 for a complete method to find the cost per m*l* or the number of m*l* per £1 for one tube or for a method that results in at least 2 values that can be used to compare 2 tubes<br>M1 for a complete method to find all three equivalent figures<br>A1 3 correct figures suitable for comparison<br>C1(dep on M2) for stating the correct tube size from their calculations |
| Q09 | | AB = 9 cm. | M1 for two pairs of relevant arcs drawn<br>A1 correct line drawn ( with arcs)<br><br>SC B1 Correct line no arcs visible |
| Q15 | | Diagram enlarged. Measurement line remove – MLP. 7 cm and measurement line removed – Braille only. | C1 for a complete reason eg Angles in a semicircle are $90^{o}$, alternate segment theorem<br><br>M1 for 7 × sin 35<br>M1 for 7 × sin 35 × 2<br>M1 (indep) for "*DB*"× cos 70<br>A1 2.74 - 2.75 |

| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q18 | | Diagrams enlarged<br>Dotty shading added | B1 40 cao<br><br>M1 for identifying LQ and UQ e.g 35 – 70<br>A1 35 cao<br><br>C1 for a correct comparison of medians ft (a)<br>C1 for a correct comparison of a measure of spread with correct figures ft (b)<br>For the award of both marks at least one of the comparisons must be interpretative |
| Q20 | | Diagrams enlarged. | M1 method to find relative cost of design A e.g. $\pi 2^2$, $k \times \pi 2^2$<br>M1 for a complete method to find the relative cost of the watch face for design B e.g. $\pi 2^2 \times \frac{20}{360} \times \frac{3}{5} + \pi 2^2 \times \frac{340}{360} \times \frac{2}{5}$<br>M1 (dep on M1, M1) for the cost of design A: cost of design B<br>A1 cao<br>Or<br><br>M1 for method to find fraction of the sectors in design B $\frac{20}{360}, \frac{340}{360}$<br>M1 for complete method to find the relative cost of the watch face for design B<br>M1 (dep on M1,M1) for the cost of design A: cost of design B<br>A1 cao |

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| PAPER: 1MA0_2H | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q23 | | Diagrams enlarged. | B2 correct graph drawn<br>(B1 for a graph translated up/down)<br><br>B2 for correct graph drawn<br>(B1 for a graph reflected in the *x* axis or stretched by sf 2 parallel to the *y* axis) |
| Q24 | | Diagrams enlarged. | M1 for $\frac{1}{2} \times 8.4 \times x \times \sin 40 = 100$<br>M1 for 100÷(0.5×8.4×sin 40) (= 37.(041...))<br>M1 (dep on 1st M1) for substituting the appropriate figures into the cosine rule eg $8.4^2+'37.041'^2-2\times 8.4\times '37.041'\cos 40^\circ$<br>M1 (dep on previous M1) for correct order of evaluation or ($c^2$=) 965.(897...)<br>A1 31.07 - 31.1 |

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# Mark Scheme (Results)

# November 2015

## Pearson Edexcel GCSE
## In Mathematics B (2MB01)
## Higher (Non-Calculator) Unit 2

**Edexcel and BTEC Qualifications**

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The strands are as follows:

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Comprehension and meaning is clear by using correct notation and labelling conventions.

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Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

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The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
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It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
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| --- |
| M1 – method mark for appropriate method in the context of the question<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1. | | | 6<br>525<br>900<br>450 | 3 | M1 for × 6 ÷ 4 oe or $\frac{6}{4}$ or 1.5 or 1 correct answer<br>A2 for all correct<br>(A1 for 2 or 3 correct) |
| 2. | | | $8n + 24$ | 3 | M1 for generating at least 3 terms of sequence 32, 40, 48 or sequence 4, 5, 6<br>M1 for $8n \pm k$ or $8(n \pm m)$ where $k \neq 24$, $m \neq 3$<br>A1 for $8n + 24$ or $8(n + 3)$ oe |
| 3. | | | 105<br>$cm^3$ | 4 | M1 for writing factor pairs of 35, 21 or 15<br>M1 for "3" × "5" × "7" using their lengths<br>dep on one at least one correct factor pair<br>A1 ft for 105 (dep on one correct factor pair)<br>B1 for $cm^3$ |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 4. | | $y = \frac{1}{2}x + 3$<br><br>$x$ : −2, −1, 0, 1, 2, 3, 4<br>$y$ : 2, 2.5, 3, 3.5, 4, 4.5, 5 | Correct line from (−2, 2) to (4, 5) | 3 | **(Table of values / calculation of values)**<br>M1 for at least 2 correct attempts to find points by substituting values of $x$.<br>M1 ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted)<br>A1 for correct line between $x = -2$ and $x = 4$<br><br>**(No table of values)**<br>M1 for at least 2 correct points with no more than 2 incorrect points plotted<br>M1 for at least 2 correct points (and no incorrect points) plotted **OR** line segment of $y = \frac{1}{2}x + 3$ drawn<br>A1 for correct line between $x = -2$ and $x = 4$<br><br>**(Use of $y = mx + c$)**<br>M1 for line drawn with gradient of $\frac{1}{2}$ **OR** line drawn with a $y$ intercept of 3<br>M1 for line drawn with gradient of $\frac{1}{2}$ **AND** line drawn with a $y$ intercept of 3<br>A1 for correct line between $x = -2$ and $x = 4$<br><br>**SC** : B2 for correct line from $x = 0$ to $x = 4$ |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5. | | | 68 | 5 | B1 for correct conversion of units<br>M1 for 250 ÷ 25 (= 10) or 300 ÷ 20 (= 15)<br>M1 for "10" × "15"<br>M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0)<br>A1 for 68<br><br>OR<br>B1 for correct conversion of units<br>M1 for 250 ÷ 20 (= 12.5) or 300 ÷ 25 (= 12)<br>M1 for "12.5" × "12"<br>M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0)<br>A1 for 68<br><br>OR<br>B1 for correct conversion of units<br>M1 for 3 × 2.5 (= 7 .5) or 20 × 25 (= 500)<br>M1 for "3 × 2.5" ÷ "0.2 × 0.25" or "300 × 250" ÷ "20 × 25"<br>M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0)<br>A1 for 68 |
| *6 | | 1, 4, 7, 10, 13<br>8, 6, 4, 2, 0 | Explanation | 2 | M1 for listing at least 3 terms of both sequences<br>C1 for Yes and explanation from fully correct working<br>that 4 is in both sequences; numbers in A are increasing; numbers in B are decreasing |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 7 | | | 7.21 (am) | 3 | M1 for listing multiples 9,18,27,36 and 12,24,36 (condone 1 arithmetic error) or method to find LCM<br>M1 for identifying 36 as LCM<br>A1 cao<br><br>OR<br><br>M1 for listing times 6.54, 7.03, 7.12, 7.21<br>or for listing times 6.57, 7.09, 7.21<br>(condone one arithmetic error)<br>M1 for listing times 6.54, 7.03, 7.12, 7.21<br>**and** 6.57, 7.09, 7.21 (condone one arithmetic error)<br>A1 cao |
| 8 | (a) | | 4(3e +1) | 1 | B1 cao |
| | (b) | | 15c – 10d | 1 | B1 cao |
| | (c) | | $28a^4b^3$ | 2 | B2 for $28a^4b^3$<br>(B1 for two of 28, $a^4$ , $b^3$ as a product) |
| | (d) | | $(x + 7)(x – 7)$ | 1 | B1 cao |
| | (e) | $2y^2 – 6y + 7y – 21$ | $2y^2 + y – 21$ | 2 | M1 for 3 out of no more than 4 terms correct with correct signs or the 4 terms $2y^2$, $6y$, $7y$ and 21 seen, ignoring signs<br>A1 cao |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 | | 360 – 64<br>140 + 40 + 296 + 40 = 516<br>540 − 516 = 24 | 24° | 4 | M1 for 1 correct relevant angle calculation<br>A1 for 24 cao<br><br>C2 for all reasons<br>(C1 (dep M1) for reason relating to parallel lines or parallelogram which is relevant to their chosen method)<br><br>eg angles on a straight line add to 180°<br>angles at a point add to 360°<br>angles in a triangle add to 180°<br>angles in a quadrilateral add to 360°<br>alternate angles are equal<br>corresponding angles are equal<br>allied angles / co-interior angles add up to 180°<br>opposite angles in a parallelogram are equal |
| 10 | | | $4\frac{8}{35}$ | 3 | M1 for converting both fractions to get a common denominator of a multiple of 35 with at least one correctly converted.<br>M1 (dep on M1) for $3+\frac{"28"}{35}+\frac{"15"}{35}(=3\frac{43}{35})$ oe<br>A1 for $4\frac{8}{35}$ cao |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 11 | (a) | | $7.8 \times 10^{-3}$ | 1 | B1 cao |
| | (b) | | 6 710 000 | 1 | B1 cao |
| | (c) | $-9,\ 0.9,\ 1,\ 3$ | $-9,\ 0.9,\ 9^0,\ 9^{\frac{1}{2}}$ | 2 | M1 for either $9^{\frac{1}{2}}$ or $9^0$ evaluated correctly<br>A1 for fully correct list from correct working,<br>accept original numbers or evaluated.<br>(SC: B1 for 1 error in position or a correct list in reverse order) |
| 12. | (a) | | (0, 5, 5) | 1 | B1 cao |
| | (b) | | $(2\frac{1}{2}, 5, 2\frac{1}{2})$ | 1 | B1 for $(2\frac{1}{2}, 5, 2\frac{1}{2})$ oe |
| 13. | | | 120 | 3 | M1 for $80\% = 480$ or $\frac{480}{80}(=6)$ or $\frac{480}{80} \times 100\ (=600)$ oe<br>M1 for $600 - 480$ or $\frac{480}{80} \times 20$ oe<br>A1 cao |
| 14. | | | $A = 9x^2 + 19x - 6$ | 4 | B1 for one of $5x - 2$ or $x$ found<br>M1 for correct method to find area of one relevant rectangle.<br>M1 for complete method to find whole area<br>or simplified expression $9x^2 + 19x - 6$<br>or correct but not simplified formula<br>A1 for correct, simplified formula $A = 9x^2 + 19x - 6$ |

| 5MB2H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15. | | | $y = \frac{3}{2}x - \frac{5}{2}$ | 4 | M1 for attempt to find gradient of AB<br>M1 (dep) for attempt to find gradient of perpendicular line eg use of $-\frac{1}{m}$<br>M1 for substituting $x = 3, y = 2$ into $y =$ "$m$" $x + c$<br>A1 for complete correct equation<br>$y = \frac{3}{2}x - \frac{5}{2}$ oe |
| 16. | | | $2\sqrt{7}$ | 3 | M1 for multiplying numerator and denominator by $\sqrt{7}$<br>M1 for correct method to expand $(4+\sqrt{2})(4-\sqrt{2})$ with 3 out of no more than 4 terms correct with correct signs or the 4 terms seen, ignoring signs<br>A1 for $2\sqrt{7}$ (accept $\sqrt{28}$) |
| 17. | | $\frac{(x-5)(x+3)}{(x+3)(2x+1)}$ | $\frac{x-5}{2x+1}$ | 3 | M1 for correct factorisation of numerator<br>M1 for correct factorisation of denominator<br>A1 for $\frac{x-5}{2x+1}$ |

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# Mark Scheme (Results)

## November 2015

## Pearson Edexcel GCSE
## In Mathematics B (2MB01)
## Higher (Calculator) Unit 3

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| 5MB3H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) | | 2.47 | 2 | M1 for 7.66…<br>A1 for 2.47 – 2.48 |
| | (b) | | 400 | 1 | B1 for 400 or $4 \times 10^2$ |
| 2 | (a) | | Correct point marked | 3 | M1 for line bearing $300^o$<br>M1 for line bearing $40^o$<br>A1 cao |
| | (b) | | 4.15 | 2 | M1 for "8.3" × 50 000 (=415 000)<br>A1 for 4.10 – 4.25 |
| *3 | | | Bottle with reason | 5 | **Cans**<br>M1 for 30×0.28 – 10×0.25 (=5.9) oe<br>**Bottles**<br>M1 0.15 × 1.60 (=£0.24) oe or 0.15 × 6.40 (=0.96) oe<br>M1 (dep) for 1.60 – 0.24 (=£1.36 per bottle, or £5.44 for 4 bottles) oe<br>**Best value**<br>M1 for "1.36" ÷ 2.5 (=0.544 £/litre) and "5.9" ÷ 9.9 (=0.595…£/litre) oe<br>C1 (dep on M1) for 0.544 and 0.595… and bottle identified<br>OR<br>M1 for 2.5 ÷ "1.36 (=1.83… litres/£) and 9.9 ÷"5.9" (=1.67… litres/£)<br>C1 (dep on M1) for 1.67... and 1.83… and bottle identified |
| 4 | (a) | | translation $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$ | 2 | B1 for translation<br>B1 for $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$<br>(B0 if not single transformation) |
| | (b) | | Triangle | 2 | B2 cao<br>(B1 for rotation a 180 degrees about any point or for a rotation about (0, 1)) |

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<table>
<tr><th colspan="5">5MB3H_01 November 2015</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>5</td><td></td><td></td><td>17.6</td><td>3</td><td>M1 for 8 ÷ 5 (=1.6) or 5÷8 (=0.625)<br>M1 for (16 – 5) × “1.6” or for (16 – 5) ÷ “0.625” oe<br>A1 cao</td></tr>
<tr><td>6</td><td></td><td></td><td>bisector</td><td>2</td><td>M1 for an appropriate pair of arcs or correct line drawn without construction arcs<br>A1 for perpendicular bisector of AB drawn with a pair of construction arcs</td></tr>
<tr><td>7</td><td></td><td>
<table>
<tr><th>$x$</th><th>$x^3 - 9x$</th></tr>
<tr><td>4</td><td>28</td></tr>
<tr><td>4.1</td><td>32.(021)</td></tr>
<tr><td>4.2</td><td>36.(288)</td></tr>
<tr><td>4.3</td><td>40.(807)</td></tr>
<tr><td>4.4</td><td>45.(584)</td></tr>
<tr><td>4.5</td><td>50.(625)</td></tr>
<tr><td>4.6</td><td>55.(936)</td></tr>
<tr><td>4.7</td><td>61,(523)</td></tr>
<tr><td>4.8</td><td>67.(392)</td></tr>
<tr><td>4.9</td><td>73.(549)</td></tr>
<tr><td>5</td><td>80</td></tr>
<tr><td>4.41</td><td>46.0(7612)</td></tr>
<tr><td>4.42</td><td>46.5(7089)</td></tr>
<tr><td>4.43</td><td>47.0(6831)</td></tr>
<tr><td>4.44</td><td>47.5(6838)</td></tr>
<tr><td>4.45</td><td>48.0(7113)</td></tr>
</table>
</td><td>4.4</td><td>4</td><td>B2 for a trial $4.4 \le x \le 4.5$<br>(B1 for a trial evaluated correctly for $4 \le x \le 5$)<br>B1 for a different trial evaluated correctly for $4.41 \le x \le 4.5$<br>B1 (dep on at least one previous B1) for 4.4<br><br>[Note trials should be evaluated to at least accuracy indicated in the table, truncated or rounded]<br><br>[NB B0 No working scores 0 marks]</td></tr>
</table>

| 5MB3H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 8 | | | 180 | 3 | M1 for area of cross section, eg 3×2 + 3×4 + 3×6 (=36) or 9×6 − 3×3×2 (=36)<br>M1 for "36" ×5<br>A1 cao<br>OR<br>M1 for area of one cuboid eg 3 × 2 × 5 (=30)<br>M1 for 6 × "30"<br>A1 cao<br>OR<br>M1 for 4.5 × 8 (=36)<br>M1 for "36" × 5<br>A1 cao |
| 9 | (a) | | 0, 4, 3, −5 | 2 | M1 for one correct value, could be taken from graph<br>A1 cao |
| | (b) | | correct curve | 2 | M1 for at least 4 points plotted correctly from table<br>A1 for correct curve drawn |
| 10 | | | 11 | 4 | M1 for introducing variable eg $x$ or $x+3$ or $2x+6$<br>M1 (dep) for "$x$" + "$(x+3)$" + "$(2x+)$" = 53<br>M1 for complete method to isolate $x$<br>A1 cao |
| 11 | (a) | | $x > -4$ | 1 | B1 cao |
| | (b) | | $y \leq 3$ | 2 | M1 for intention to isolate $y$ or for $y = 3$ or $y < 3$<br>A1 cao |
| | (c) | | −1,0,1 | 2 | M1 for listing −3, −2, −1,0,1 or −1, 0,1,2,3 or for $-2 < ? < 2$<br>A1 for −1,0,1 |
| 12 | | | 1.01 | 3 | M1 for 1.2 × 15 (= 18) or 1 × 250 clearly defined as mass<br>M1 for $\frac{"18" + "250"}{15+250}$<br>A1 for 1.01(1…) |

| 5MB3H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| *13 | | | 36% depreciation | 3 | M1 for 0.8 × 0.8 (=0.64)<br>M1 for 1 – "0.64" (=0.36)<br>C1 for 36% (depreciation) oe or compares cost with 40% reduction<br>OR<br>(uses a trial value, eg 1000)<br>M1 for $1000\times(0.8)^2$ (=640)<br>M1 for (1000 – 640) ÷ 1000 (=0.36)<br>C1 for 36% (depreciation) oe or compares cost with 40% reduction<br>OR<br>M1 for 0.2 × 0.2 (=0.04)<br>M1 for 0.2 + 0.2 – "0.04" (=0.36)<br>C1 for 36% (depreciation) oe or compares cost with 40% reduction<br>OR<br>C1 only for identifying the 2nd 20% reduction is off the reduced amount at the end of the first year |
| 14 | | | $t = \frac{ap^2}{3}$ | 3 | M1 for squaring both sides of the equation as the first step<br>M1 (dep) for isolating the *t* term<br>A1 for $t = \frac{ap^2}{3}$ oe |
| 15 | | | 20.94 | 5 | M1 for method to find circumference of circle,<br>eg. $2\times\pi\times2.45$ or $\pi\times4.9$ (= 15.393....)<br>M1 (dep) for $\frac{105}{360}\times$ "15.393 ... (= 4.4898...)<br>M1 for "4.4898.." ÷ 1.75 (= 2.565...) or "4.9" ÷ 1.75 (= 2.8) oe or "9.3898…" ÷ 1.75 (=5.3656…)<br>M1 for total cost = "6" × 3.49 (=20.94) or cost of arc or straight edges = "3" × 3.49 (=10.47)<br>A1 cao |

| 5MB3H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 16 | | | $\frac{4}{7}$ | 4 | M1 for multiplication of all terms by a multiple of 6 eg $3(x+1) + 2(2x-1) = 5$<br>M1 for $3\times x+3\times 1 (=3x+3) + 2\times 2x -2\times 1 (=4x-2)$ oe or $3x+3+4x-2=5$<br>M1 (dep) for collecting like terms on each side of the equation eg $3x+4x = 5 -3 +2$ or $7x + 1 = 5$ or $7x = 4$<br>A1 for $\frac{4}{7}$ or 0.57… |
| *17 | | | 56<br>supported | 3 | M1 for 180 – 85 (=95)<br>A1 for 56<br>C1 for opposite angles of a cyclic quadrilateral add up to 180 |
| 18 | | | $-\frac{3}{2}, \frac{5}{3}$ | 3 | M1 for $(2x \pm 3)(3x \pm 5)$<br>M1 for $(2x + 3)(3x - 5)$<br>A1 for $-\frac{3}{2}$ and $\frac{5}{3}$ oe accept 1.66 – 1.67<br><br>OR<br><br>M1 for $\frac{-(-1)\pm\sqrt{(-1)^2-4\times 6\times -15}}{2\times 6}$, condone one sign error<br>M1 for $\frac{1\pm\sqrt{361}}{12}$<br>A1 for $-\frac{3}{2}$ and $\frac{5}{3}$ oe accept 1.66 – 1.67<br>OR<br><br>M1 for $\left(x-\frac{1}{12}\right)^2 \pm \left(\frac{1}{12}\right)^2 \pm a = 0$<br>M1 for $\left(x-\frac{1}{12}\right)^2 = b$<br>A1 for $-\frac{3}{2}$ and $\frac{5}{3}$ oe accept 1.66 – 1.67 |
| 19 | | | 36 | 3 | M1 for $100 = k \times 5^2$ oe or $(k=)$ 4<br>M1 for $(y =) \frac{100}{5^2} \times 3^2$ or "4" $\times 3^2$<br>A1 cao |

| 5MB3H_01 November 2015 | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 20 | | | 0.063 | 3 | B1 for 252.5 or 247.5 or 3950 or 3850<br>M1 for 247.5 ÷ 3950 or ft "lower bound for 250" ÷ "upper bound for 3900"<br>A1 for 0.062−0.063 (from correct working) |
| 21 | | Eg<br>$BQ=\sqrt{(5^2+6^2)}=\sqrt{61}$<br>Angle $ABQ=\tan^{-1}(6\div5)=50.194^o$<br>$BP=\sqrt{61}\div\cos30=9.018$ cm<br>Angle $PBC=90–30–50.194^o=9.806^o$<br>$BC=9.018\times\cos9.806=8.886...$<br>**OR**<br>$BQ=\sqrt{(5^2+6^2)}=\sqrt{61}$<br>$PQ=\sqrt{61}\tan30=4.509$<br>Angle $BQA=\tan^{-1}(5\div6)=39.806$<br>Angle $PQD=180–90–39.806=50.194^o$<br>$QD=4.509\times\cos50.194=2.886...$ | 8.89 | 5 | M1 for correct use of Pythagoras<br>M1 for correct use of appropriate trig ratio<br>M1 for correct use of appropriate inverse trig ratio<br>M1 for correct method to calculate angle *CBP* or *PQD*<br>A1 for 8.88 – 8.89 |
| 22 | (a) | | (0, 1) | 1 | B1 cao |
| | (b) | P(−1, 0), Q(1, 0) | 2 | 2 | M1 for "$a$" – "$-a$" or ($x$ =) –1 or ($x$ =) 1 or "8" ÷ 4<br>A1 cao |

## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q02 | | Harbour to Lighthouse = 10 cm. Harbour and Lighthouse are joined with a dashed line. North line extended. | |
| Q04 | (a) | Grid enlarged. | |
| Q04 | (b) | Question reversed. Triangle W given on grid. Candidates asked to describe the transformation of triangle T to triangle W. | |
| Q06 | | AB = 8 cm. | |
| Q08 | | Model provided for all candidates. MLP also given an enlarged diagram. | |
| Q09 | (a) | Wording added above the table. There are four spaces to fill. | |
| Q09 | (b) | Grid enlarged. | |
| Q11 | (a) | Diagram enlarged. | |

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| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q14 | | All candidates, a changed to n. | |
| Q15 | | Diagram enlarged. | |
| Q16 | | MLP only: x changed to y. | |
| Q17 | | Diagram enlarged. Wording added: “Angle BAP is marked x.” | |
| Q21 | | Diagram enlarged. Wording added: “BA = 5 cm. AQ = 6 cm. Angle PBQ = $30°$ . | |
| Q22 | | Diagram enlarged. | |

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## Question 7

It was pleasing that many students gained full marks for finding the length of $AB$, often making use of the diagram as part of their working. Most students gained at least one mark with relatively few students unable to use the information that the area of $PQRS$ is 45 $cm^2$ and $QR = 10$ cm to work out that $PQ = 4.5$ cm. Having found $PQ = 4.5$ cm the next step for many students was $26 – 9$. Some formed an equation such as $2x + 9 = 26$ but algebraic approaches were quite rare. Whichever approach was used most students were able to show a complete process to find the length of $AB$ although a few got as far as $26 – 9 = 17$ and stopped. Arithmetic errors when subtracting 9 from 26 ($26 – 9 = 15$ was common) or when dividing 17 by 2 meant that the accuracy mark was sometimes lost. A small number of students thought that $BC$ is equal to $QR$ or tried to work with the area of $ABCD$ rather than with the perimeter and gained no marks.

## Question 9

Part (a) posed a challenge to many, including some of the highest achieving students. It goes to show that students still sometimes struggle to apply skills such as the relationship between length and area scale factors to unfamiliar situations. Most successful students started with a suitable ratio of the two circumferences, for example, 1 : 0.9 or more commonly 10 : 9. From here students had to square the values to achieve the ratio for areas, commonly seen as 100 : 81. The question didn't state that the ratio had to be in its simplest form so any equivalent ratio was acceptable for the accuracy mark.

Much like part (a), part (b) also caused problems. This time the first step was to write down a ratio of the two areas. Students struggled more with this first step than in part (a). Often 0.44 or 0.56 was used and no credit was given. Many students did not have the ratios the correct way round. Many appeared to think that $f^2$ was in fact greater than $e^2$. As in the previous part, once this first ratio was set up, the second mark was gained by applying knowledge of scale factors, in this case taking the square root to gain the ratio of lengths.

## Question 12

This question required students to be able to link the area and perimeter of sectors. There were two main routes through the problem. The most popular was to find the angle of the sector using the formula for the area of a sector, and then to apply this to the arc length of a sector. This left simply the need to add $2 \times 7$ to finish the problem. The other common method was to work with proportion, for example $\frac{40}{49\pi}$ and then find this proportion of the circumference. Both these methods were regularly seen and used well. There was a simple first mark that almost all were able to achieve, for finding the area of the circle. Quite a large number of students dropped the final mark for failing to add the $2 \times 7$ to the arc length to complete the perimeter. Several wrong responses started with the angle being 110°, presumably from measuring. Students need to be aware of that, unless stated, diagrams are not accurately drawn.

## Question 14

A small minority of students scored full marks for their responses to this question. Weaker students often showed little or no working and if they did show working, it was often characterised by assuming that the triangles were right angled and using trigonometry to fit such a situation. More able students often did realise that references to area in the question together with the diagram showing non right angled triangles suggested use of the formula $\frac{1}{2}ab\sin C$. However, some of these students tried to find the length of $AE$ instead of using the ratio $AB : AE$ to express $AE$ as an unknown variable, for example $3x$. Students who used $AB = x$ and $AE = 3x$ scored at least one mark and often went on to write down and solve an equation using the given fact that the sum of the areas of the triangles was equal to the area of the rectangle. Examiners were surprised at the number of students who equated the area of one triangle to the area of the rectangle which led to the incorrect final answer of 18.

## Question15

Some students appeared to have little knowledge about the content covered in this question and either did not attempt the question or revealed little understanding through their responses to the question. In general, little working was seen and students may have benefited from writing down the transformations represented by the equations $y = f(-x)$ and $y = f(x) - 3$.
Very few students did this and so some denied themselves the award of a mark for showing an understanding of the types of transformation involved in the question. However, examiners were able to award a good number of students at least one mark for getting an $x$ coordinate as $-7$ or a $y$ coordinate as $-1$. Students who gave a final answer of $(-10, -5)$ following on from an intermediate stage of $(-7, -2)$ could not be awarded any marks because they had not discriminated between which coordinates were changed by which transformation. Some students attempted to substitute values for $x$ and $y$, often 7 and 2 respectively. The best students did show a good understanding of the notation and transformations involved and gave a fully correct answer.

## Question 14

Very few students were able to derive a correct quadratic equation from which a complete solution could be found. A common mistake was in finding the area of the triangle, $(x - 2)(x + 4)$ and $(x - 2) + (x + 4)$ were often seen, many times without brackets shown. One mark was available in a special case for a correct product expanded and equated to 27.5.

Many students after seeing a right-angled triangle, often started their solutions by attempting to use Pythagoras' theorem. When a trial and improvement method was employed, credit could only given if the final answer was correct.

Those students who realised that the area of the rectangle of sides $(x - 2)$ and $(x + 4)$ was 55 were often successful in getting the correct answer.

## Question 23

In part (a) very few responses gained any credit. Nearly all students failed to recognise the sine rule for area was needed and instead just multiplied the two sides of the parallelogram. Just expanding the two brackets was the most common strategy adopted or students did the work for part (b) and just tried to solve the quadratic.

Part (b) was more successfully attempted as students could either factorise, or more often use the quadratic formula to solve the equation. Once the two answers were found, all too often they were expressed as $x =$ or with an incorrect inequality, especially with 2.5. Students who gave the correct inequality often did so by sketching a curve and using it to assist them in interpreting their answer. Some students just used the brackets from the parallelogram, evaluating them to zero.

## Question 25

It was clear that many students knew what to do but lacked the skills to do what they wanted. As a result this question was rarely attempted at all. Where the question was attempted and credit was achieved it was usually for finding the gradient of line L, although several forgot to divide the whole expression by 2. Once a gradient had been established, it was common for students to then use $-1/m$ to find the gradient of the perpendicular, although -2/3 was seen. It was common to see the correct equation here, but then students did not know how to progress further, although some then sketched

the equation identifying the $y$ coordinate of $B$. Even in the rare cases when the coordinate of $C$ was established forming the correct triangle and then successfully calculating the area was infrequent.

## Summary

Based on their performance on this paper, students should:

- ensure that figures taken from the question, and from their own work, are transcribed accurately.
- avoid rounding or truncating answers part way through a solution and use the most accurate values where possible.
- ensure that calculators are used correctly.
- remember to include working out to support their answers.
- spend time on topics such as algebraic manipulation and proof, and application of ratios, bounds, iteration and histograms when preparing for future examinations.
- spend time on practicing response type questions where a written explanation is required.

**Question 22**

This proved to be a challenging question and finding the value of $x$ proved to be beyond most students. Although there were relatively few fully correct solutions a number of students did gain at least one mark. This was usually for expanding and simplifying an expression for the area of shape **B**. A common error was not applying $\pi$ to all 3 terms of an expanded quadratic expression, omitting brackets and writing $\pi$ only before the first term or after the last term. Students struggled to find an expression for the area of shape **A**. Even when students realised that they needed to subtract the area of the white sector from the area of the whole sector they often failed to find a correct expression. Some students used areas of whole circles, not areas of sectors, and some forgot to square the radii.

**Question 7**

The last of the common questions found most students being able to gain some credit. A good proportion of students realised that the first step was to use Pythagoras' Theorem to find the missing length of the right-angled triangle. However, to this end there were many students who used Pythagoras' Theorem incorrectly, adding rather than subtracting. The third process mark was available then for any student, even those unable to find the missing length, and it was good to see many examples of good exam technique to access this mark. Stating or using the correct formula for the area of a quadrant was all that was required and it was awarded to many students. The demand in the question asked for students to show all of their working and it was pleasing to see this instruction followed by this cohort.

**Question 14**

This problem required students to first set up an equation based upon the areas for the two squares. This equation initially appeared to be quadratic, but simplified to a linear equation. It was in this first step that most students started to struggle. In many cases those who attempted to form an equation did so with one involving lengths rather than areas, and so were unable to score. Likewise, a large number of students attempted to guess values and proceeded with a trial and improvement method, normally with little or no success.

Those who were able to form a suitable equation normally went as far as gaining at least three marks for getting to the side length of one of the two squares. Those who got this far were split quite equally between those who gave these lengths as the final answer, and those who completed the last step and found the area of **B** to gain four marks.

**Question 18**

This problem allowed a relatively simple first mark, that a good number of students gained, for finding the curved surface area of the larger cone. It was surprising how many did not take into any account the formula that had been proffered, though. To gain any further credit students had to be able to understand that the smaller cone is a similar solid and use the sloping lengths and proportionality to find the radius or diameter of the smaller cone. It was at this step where most students stopped gaining marks. Those who had some understanding often used the proportion $\frac{10}{25}$ rather than $\frac{15}{25}$ and therefore were unable to get the 2nd and 3rd process marks. Some students who were able to complete the entire process correctly, lost the final mark as they gave their answer as a number rather than a multiple of pi as requested in the question.

**Question 4**

A good discriminator, part (a) of this question attracted many fully correct solutions. There were a number of possible routes that students could take to solve the problem. By far the most common route taken was for students to find the number of kilograms of grass seed needed for the 10m by 14m lawn (9.$\dot{3}$ kg) by first calculating the area that could be covered with 1 kg of seed. This route was usually successfully completed with students stating a correct conclusion from correct figures. A second popular route was to find the area which can be seeded with the 5 full boxes of seed (150 m$^2$) and compare it with 140 m$^2$, the area of the larger lawn. Of those attempts where a solution was not complete, at least one mark could usually be awarded for a correct process to find either the total amount of seed in 5 boxes or the area of one of the lawns.

A large proportion of students successfully answered part (b) of the question. Reasons given were usually based on finding and stating the area (135 m$^2$) which could be seeded with 9 kg seed or by comparing the 9 kg of seed now available with the 9.$\dot{3}$ kg of seed needed for the larger lawn.

More than two in every five students obtained full marks for their solution to this question.

**Question5**

The vast majority of students successfully completed the tree diagram correctly to score the two marks available in part (a) of this question.

Part (b) was less well done. However, a good proportion of students also scored two marks here. A significant number of students indicated the intention to multiply $\frac{1}{3}$ by $\frac{2}{3}$ thereby scoring one mark but then evaluated this incorrectly. Showing the intention to add the fractions meant that some students could not be awarded any credit in this part of the question. A number of students thought they needed to consider two combinations, and gave an answer of $\frac{4}{9}$. Unfortunately, the additional work involved spoilt their method and no marks could be awarded.

**Question 10**

Since students were asked to find an estimate for the length of one side of each square in part (a) it should have been evident to them that they would need to use a rounded value. Some students did this at the start of the process, rounding the total area to 5400 before dividing by 6. Others started by dividing 5406 by 6 and then rounded 901 to 900 before attempting to find the square root. Many students gained the first mark for dividing by 6 but the next stage in the process proved to be beyond a considerable number of these students. Those who recognised that they needed to find the square root often went on to get full marks for an answer of 30 but the incorrect processes seen were many and varied. Often these involved division by 4 or by 2. Some students gained the first mark and gave 900 or 901 as the final answer.

The mark in part (b) was not dependent on a complete process in part (a). To be in a position to say whether their answer was an underestimate or an overestimate, students must have used a rounded value in a calculation. Many students did state that their answer was an underestimate and gave a suitable reason; for example they had rounded the total area down or they had rounded 901 to 900.

Some students chose underestimate or overestimate but gave no reason for their choice. Overall, part (b) was not answered particularly well.

**Question 11**

This question was not well answer with relatively few students managing to gain more than the first two marks. Writing an expression for the area of each rectangle and forming an equation ought to have been a straightforward process for the first mark, particularly as missing brackets were condoned. Some students wrote two expressions and failed to form an equation but many students were unable to write two correct expressions. A significant number of students worked with perimeter rather than with area. Having gained the first mark, many students were not able to make any further correct progress. Those without brackets in their equation usually failed to expand correctly. Some with brackets made errors expanding and some expanded correctly but then simplified incorrectly. Many students did not know how to deal with the fact that $y$ appeared on both sides of the equation. Those who isolated the terms in $y$ often went on to factorise correctly and were able to find a correct expression for $y$ in terms of $w$.

**Question 14**

It was pleasing to see many fully correct answers with clear accurate algebra but there were also very many responses where algebraic weaknesses were apparent. Most of the students who indicated that they were going to find the area of the L-shape by splitting it up into two rectangles were able to score at least one mark for a correct expression for the area of one rectangle. A complete expression for the total area was needed for the second mark; most commonly this was given as $4(x + 1) + (x + 7)(2x + 6)$, with $(x + 1)(x + 11) + (x + 7)(x + 5)$ and $(x + 11)(2x + 6) – 4(x + 5)$ used less often. Incorrect expressions for the total area were often the result of working out missing lengths in the shape incorrectly. Many students could not handle the algebra accurately enough to show a complete chain

of reasoning leading to $A = 2x^2 + 24x + 46$. Omitting necessary brackets and expanding brackets incorrectly were common errors.

**Question 18**

This proved to be a challenging question and finding the length of *AB* proved to be beyond most students. Some of those who attempted the question identified that they need to find the perpendicular height of the trapezium and gained the first mark for writing a correct trigonometric statement such as sin30 = *h*/6. Some students could not recall the value of sin30 and did not complete the process to find the height. After finding the height many students struggled to make any further progress, failing to realise that they should use the formula for the area of a trapezium. It was common to see the trapezium split into two triangles and a rectangle and attempts at using Pythagoras. A good proportion of those that did substitute correctly into the formula went on to show a complete process to find the length of *AB*. A small number of students gave $\frac{88}{5}$ as the final answer and lost the accuracy mark.

**Question 5**

The first real problem question on the paper and it was good to see the majority of students were able to spot the need to use Pythagoras' Theorem to find the length of the hypotenuse. It was also really pleasing to see that once that had been identified, most were then able to score 2 marks for completing the process to find the missing length of the triangle. At this stage many understood the need to add the sides to find the perimeter, but a significant number were unable to complete this process successfully. A common misconception was to find the perimeter of one triangle and then double it, thus not dealing with the overlapping sides.

**Question 7**

This question was done well by a majority of students who were awarded all 4 marks. Some students found the area of the triangle and/or the area of the quadrant but could not complete the solution to get full marks. It was encouraging to see that nearly all students could recall how to find the area of a circle.

**Question 21**

A good number of students demonstrated how to estimate the area under the curve by using 3 trapeziums though some students used only one or two trapeziums.

Unfortunately, a large number of students were unable to access full marks for their answers because they used incorrect $y$ values for $t = 3$ and/or for $t = 4$. Most students did gain some credit for a correct expression for at least one of the areas, usually for the trapezium between $t = 1$ and $t = 2$. It was encouraging to see students using the formula for the area of a trapezium rather than splitting the trapezium into a rectangle and triangle. These students were usually more successful in terms of the number of marks they got for their answers.

Answers to part (b) were often correct though there were a significant number of answers stating that the area represented either acceleration or speed. Units of measurement for the distance were not required but where these were given they were invariably correct.

**Question 13**

This was an unfamiliar type of question but even so it was not answered as well as might have been expected. Many students recognised that the question required the use of Pythagoras and wrote down Pythagoras' theorem, often as it appears on the formula sheet. This alone was not sufficient for the first mark – the statement of Pythagoras needed to be linked in some way to the question. Many students did this by labelling the sides of the

triangle in the diagram and using these letters in Pythagoras' theorem, some students explained what the letters they used represented. Some students labelled the sides as $a^2$, $b^2$ and $c^2$ and used these incorrectly or used the labels from the diagram to form their Pythagoras equation which was not worthy of any marks unless A, B and C were either clearly linked to the diagram or clearly defined as being the diameters of the semi-circles. It was very disappointing that relatively few students scored the second mark for writing correct expressions for the areas of at least two of the three semicircles. It was very common to see the diameters being used instead of the radii in $\pi r^2$ and for expressions to be given for the areas of circles instead of semicircles. Students who labelled the sides $2a$, $2b$ and $2c$ found it easier to write correct expressions for the areas but harder to write a Pythagoras statement. Those who did write correct expressions for the areas were then often not able to complete the chain of reasoning to give a fully correct answer. Students should be encouraged to use brackets correctly. The omission of brackets was rarely recovered and resulted in a loss of marks. Students who used numerical values for the sides of the triangle were still able to access the first two marks but a surprising number of these students were unable to write correct expressions for the areas and gained the first mark only.

**Question 14**

Where tangents were drawn they were generally accurate and students often went on to gain all three marks for working out an estimate of the gradient that was within the acceptable range. Some answers were given in the form $a/b$ and the final mark was lost when $a$ and $b$ were not integers. Errors were often the result of reading the scales incorrectly although some students divided the change in $x$ by the change in $y$. A significant number of students drew a tangent, thus gaining the first method mark, but could not then complete the method to find the gradient. Many students used the coordinates of the point on the curve at $t = 2$ and simply divided 2.8 by 2. Some of these students had already drawn a tangent to the curve at $t = 2$.

In part (b) many students knew that the area under the graph represents the distance travelled. Incorrect answers often referred to acceleration or to time. Some students gave the answer as velocity or speed.

**Question 21**

This proved to be a challenging question with very few students showing any understanding of what was required to find the total area of the two shaded regions. Most students failed to find a successful strategy and working out was often messy and difficult for examiners to follow. Fully correct answers were seen only rarely but nevertheless it was pleasing to see some excellent solutions from the most able students taking this paper. The students who scored marks had generally drawn appropriate triangles on the diagram to help formulate their approach. Those who used $\frac{1}{2}ab\sin C$ to find the area of a triangle were usually able to recall the exact value of $\sin 60^o$ or $\sin 120^o$. Some students made a good start and gained the first two marks by finding either the area of a triangle or the area of a sector but often they did not find both and were unable to make any further progress. It was pleasing to see many students attempting this question but often they simply found the area of one circle as $16\pi$ or the area of three circles and then made incorrect assumptions about the proportion shaded in searching for a solution.

**Summary**

Based on their performance on this paper, students should:

- take care when carrying out arithmetic operations and check their working to avoid careless errors
- consider whether or not an answer is reasonable and of a sensible size
- read each question carefully and ensure that their final answer matches the question asked
- show their methods clearly when using graphs
- ensure that they know the difference between surface area and volume
- practise working out an estimate for the mean from a grouped frequency table
- practise answering probability questions that require the use of algebra and ratio

**Question 4**

Part (a) was the first problem question on the paper and was looking for students to compare the people per unit area at two festivals. To be able to do so students had to first find the area at one of the festivals. However, students could gain the second and third marks even if they were unsuccessful in finding this area. These two marks were for finding the area per person at one or both festivals.

Part (b) required students to understand the mistake made in the unit conversion. To gain the mark students needed to explain that, for the conversion from $cm^2$ to $m^2$, the conversion factor is 10000 or $100^2$. This was done with varying degrees of success with a good number able to work with the correct conversion factor, often showing the correct conversion for $3m^2$ to $cm^2$ or $300cm^2$ to $m^2$. The most common incorrect answer was to show that $300 \times 300 = 90{,}000$.

**Question 7**

This question was a good discrminator. There were a number of routes which could be followed in order to show the given result. The most popular method was to use the formula for the area of the trapezium *QUVR*. Once a student had found the length of *QU* (= $x + 5$), they could make substitutions into the formula then simplify it to show $A = 2x^2 + 20x$. Many students found this to be quite straightforward.

A second commonly seen and generally successful method was to use
Area of trapezium *QUVR* = Area of rectangle *TUVS* − Area of trapezium *TQRS*.
Perhaps the most straightforward way was to find the area of the rectangle with length and width $4x$ and 5 then add the area of a triangle of base $x$ and height $4x$. It was surprising how few students took this approach.

The presentation of students answers was often not very clear with examiners having to search the working space for relevant working. However, many students did use algebra in a confident way to show the given result. The absence of brackets to make working clear sometimes led to a student losing marks but examiners were sympathetic where intentions were clear.

**Question 7**

Many students gained the first mark for using the area of the base in the pressure formula. The accuracy mark was sometimes lost because of arithmetic errors when dividing 10 000 by 8 or because of an inability to divide 10 000 by 8. A few students used the formula incorrectly and worked out 10 000 × 8 rather than 10 000 ÷ 8. Many attempts failed at the first hurdle when students used an incorrect method to find the area of the base, e.g. 4 + 4 + 2 + 2= 12, or did not realise that they needed to find the area of the base. These students gained no marks.

**Question 4**

This is the first AO3 question on the paper and required 3 main processes. The first of which was to find the total area, and there were two marks assigned to this, the first for correctly finding 3 areas and the second for finding all 4. The second process was to find the number of bags of grass seed that is needed. This could be gained for finding this for a single area or a combination. Finally, the candidates had to round the number of bags up to gain the number needed to buy, and multiply by £10.95 to find the total cost.

Almost all candidates were able to gain some marks, even if just for correct areas. This was as often seen for 2 rectangles and the quadrant, as it was for 2 rectangles and the triangle. Most were then able to gain the mark for dividing by 14. The two major causes of errors were learners not having all four areas correct, as this was needed to gain the 3rd mark. The other common error was for candidates to not round the number of bags up to the nearest integer and so found a cost that was inaccurate.

**Question 5**

This was the first problem solving question on the paper and almost all candidates gained some credit. There were three steps in setting up an equation to solve. Finding an expression for the area of each shape, assigning the '10' as a plus or minus to one of the terms, and putting an equation together. Typically, candidates got 2 of these 3 parts correct. Normally either failing to half for the triangle or adding 10 to the triangle rather than subtracting. The mark scheme this time was generous here and allowed candidates to miss the brackets from the expression for the

area of the rectangle for all three method marks, meaning many candidates were able to score well. Those who formed the correct equation, did then gain the final mark for the correct answer.

**Question 12**

This problem-solving question was answered really well, with a good proportion getting 2 or even all 4 marks. Many spotted the need for Pythagoras and typically gained the 2 marks for a full process. There were a number then that used the formula for the circumference incorrectly and used the wrong value of radius or diameter and gained no further credit. Some candidates also calculated area instead of circumference, particularly disappointing given the formula are on the Exam Aid given to candidates for this series. Those who did not spot the need for Pythagoras unfortunately scored no marks unless they applied trigonometry correctly.

**Question 24**

The final question on the paper was a challenging shape problem requiring candidates to find an expression for the area of an unfamiliar shape. The most common approach was to split the shape into a square and 4 identical triangles. By doing this and correctly identifying an angle inside or outside of the triangle, candidates were able to gain the first mark. To gain the second and third they needed an expression for the area of one of the triangles, or the length of the side of the square. The former was awarded more regularly, as many spotted that the triangles were right-angles and isosceles. The length of the square proved more challenging as it involved using Pythagoras and surds. The final process mark was to put it altogether to form an expression for the total area, before simplifying it to the given form. Although there were some excellent responses, some candidates were let down by the accuracy of their algebra, and we also saw candidates guessing the value of $p$, but without supporting algebra, this gained no credit. A successful method seen, other than the square and four triangles split, was to split the shape into 8 triangles, 2 trapezia and 1 rectangle. Several responses started with finding the hypotenuse of the small triangle or the area but did not get beyond this. There was evidence that candidates were not very confident at manipulating numbers inside a square root. Some had trouble with

simplifying $\sqrt{2a^2}$ to $a\sqrt{2}$ after using Pythagoras theorem to find the length of the hypotenuse of the small triangle.
If candidates did correctly expand the expression for the area of the square and added on the triangle areas, they were usually able to work backwards from the final answer to rearrange their expression correctly.

**Summary**

Based on the performance on this paper, students should:

- ensure they are using efficient calculator methods
- take extra care when working in algebra and show each step carefully, and remember the importance of brackets and the length of the lid on root signs
- spend more time interpreting statistical diagrams such as cumulative frequency curves and histograms with unequal class intervals
- read the demand of questions carefully so as to fully understand what the question expects in terms of approach for answering, and also the form in which the answer is expected
- remember that trial and improvement methods should be discouraged
- work on geometrical topics such as the sine rule and ensure that angles are labelled correctly, either using 3 letter notation or on the diagram if introducing a new variable such as $x$
- ensure candidates are fully prepared for the planned withdrawal of the exam aid for future series

**Question 12**

About one third of students scored both marks on this question. Students who found the angle for the minor sector were awarded 1 mark. Some students used the formula for the circumference of a circle rather than the area. There were also some students who combined different measures, for example working out the area of the circle then subtracting it from $360^{(\circ)}$.

**Question 15**

This question was not answered as well as might have been expected and a surprising number of students failed to gain any marks at all. Many of those with some knowledge of sectors of circles went wrong at the first step, using $\pi r^2$ or $\pi r$ instead of $2\pi r$ and gained no marks. A good proportion of those who did make a correct start went on to get full marks. Marks were often lost because of arithmetic errors or poor algebraic manipulation. Students who cancelled down fractions before multiplying worked more accurately than those who left cancelling until the end. Those who started by forming the equation $\frac{x}{360} \times 2 \times \pi \times 6 = 5\pi$ gained the first mark but rearranging the equation correctly to find the value of $x$ was a problem for some. Students who worked with proportion and found that the arc length is $\frac{5}{12}$ of the circumference of the circle gained the first two marks. They could then complete the process to find the area of the sector by working out $\frac{5}{12} \times \pi \times 6^2$ although many chose to first work out the size of angle $AOB$. After gaining the first three marks for a complete process to find the area of the sector a significant number of students failed to get an answer of $15\pi$ because they could not evaluate $\frac{150}{360} \times \pi \times 6^2$ correctly. Those who used $\frac{5}{12} \times \pi \times 6^2$ made fewer arithmetic errors. Some students assumed that the sector was one third of a circle and worked with an angle of $120^o$ and some measured the angle and used $130^o$ in their calculations. These students gained no marks.

**Question 8**

There were two processes in this question, a use of scale and a use of the formula for the area of a triangle. The more successful students used the scale first on *RQ* to get a drawing length of 8 cm. This was then used correctly with the area of the scale drawing to find *PQ*, which was then scaled back up to get the real length.
The other method was to scale up the area first, and then use the real length of *RQ* to find the real length of *PQ*. This method was the better of the two as it seems to have less steps.

However, most who attempted this method only multiplied the area by the length scale factor of 5, not the area scale factor of $5^2$, and as a result could only gain the one mark. It was common to see a correct scaling of 8 for the length together with an incorrect scaling of 140 for the area, and this was considered to be a choice of methods.

**Question 8**

Many learners made a good start, most often dividing 720 by 80 to find the area of the base of the rectangle and this earned them the first process mark. To complete the solution, they needed to divide the area of the base by 2 to find the length of the rectangle. A good proportion managed to work out the length as 4.5 cm and scored full marks. Some lost the accuracy mark due to an arithmetic error, most commonly $720 \div 80 = 90$, but they could still gain the second process mark for dividing by 2. After finding the area of the base many learners made no further correct progress and some gave 9 as the final answer or multiplied by 2 instead of dividing by 2. It was very common to see $b \times h \div 2$ being used in an attempt to find the length of the base. Presumably this was prompted by the triangular cross section of the prism. Some learners used the pressure formula incorrectly, working out $720 \times 80$, and gained no marks.

**Question 7**

Another problem-solving question, and this one worth five marks. The first is for forming an appropriate equation using the information on the diagram. Either summing all sides to 72, or for equating the two equal sides. The second for the process to isolate the terms in $x$.
Many learners were able to gain both marks. It was more common to see the longer equation set to 72, but most were able to then manipulate the algebra and typically solve to find the value of $x$.
The next two marks were then for a process to find the area of the triangle. This could be done in two main ways. The first, and most common, was to use Pythagoras' theorem to find the perpendicular height of the triangle and then use the standard formula for the area of a triangle. The second method was to use either standard trigonometry or the cosine rule to find one of the angles in the triangle and then $\frac{1}{2}ab\sin C$ to find the area. These marks were less commonly earned than the previous two. Of those who attempted Pythagoras, many forgot to halve the base of the large triangle when finding the height. Even if was the case, the final mark could still be awarded if what they believed to be the height was clearly stated, and not one of the other lengths in the question. Those who attempted some forms of trigonometry were often the more accomplished mathematicians and as such typically went on to complete the question successfully.
Overall, the full range of marks was awarded and the majority scored at least 2.

## Question 11

Responses on this question showed quite a lot of confusion between area and perimeter as it was not uncommon for learners to equate the area of the sector to 34.3 or even 24.9. Of the learners that were most successful in answering this question, most started with a complete equation.

**Question 13**

The majority of those who identified that the triangles were similar proceeded efficiently with answering this question and gained full marks. However, many incorrectly assumed that the lengths of $AB$ and $BC$ or the lengths of $BC$ and $BE$ were

equal. Of those who didn't initially recognise that the triangles were similar, some did successfully navigate to a correct answer using trigonometry. The majority of learners appeared confident in using the formula for area of a trapezium, with only a small number choosing to split it into a rectangle and triangle.

## Question 3

Part (a) gave learners their first opportunity to tackle a problem, and most were able to gain some good credit. The first two marks were for finding the shaded area, with 1 being awarded for a correct partial area. In many cases at least 1 of these marks were awarded. We saw mistakes in both the calculation for the circle, often using $r \times \pi^2$ or finding the circumference. A significant number of responses with the wrong radius, such as 4.5, with no working to gain that value shown. For the triangle we saw the common error of forgetting to half. The third mark was for dividing an area by the coverage of one bag of gravel. We awarded this mark even if the area was incorrect, so those who made mistakes and perhaps only gained 1, or even none, of the first 2 marks were able to gain some credit for this process. The final mark was an accuracy mark, so we needed to see the correct rounded value of 6 coming from correct and accurate calculations.
Part (b) was the first reasoning question on the paper and was looking for leaners to realise that a lower coverage per bag meant that more bags would be needed. Many responses did gain this mark which was pleasing to see. In some cases, if the answer in part (a) was incorrect, the decrease in coverage didn't affect the number of bags. If that was the case and responses correctly identified that and supported this with a calculation, they were still able to gain credit.

**Question 8**

Most responses began by either applying the formula for the area of a trapezium or by dividing the shape into a rectangle and a triangle to calculate the area. Both methods were generally successful in gaining the first two marks, either for identifying the length of *CD* or the length from point *C* to the point where the perpendicular from *B* meets *CD*. The trapezium formula route was more complex and occasionally led to errors, such as using 12 and 8 as the parallel sides or incorrect rearrangement of the formula, resulting in an inaccurate value for *CD*. Some responses used an incorrect triangle area formula, often omitting the division by 2 after multiplying the base and height.

Where the initial steps were not completed accurately, many responses still gained marks through correct use of Pythagoras' Theorem. While this was generally applied correctly, some responses involved subtracting rather than adding the squares of the sides, which prevented progress. A small number attempted trigonometry to find the length of *BC,* but this method was rarely successful. A few responses began by forming a right-angled triangle *DAB* and used Pythagoras' Theorem to calculate *BD*, which did not lead to further progress.

Some responses could not gain the final accuracy mark due to incorrectly including the internal length of 8 cm in the total or by leaving the correct answer in surd form. Use of the formula sheet and practice with substituting values and rearranging formulae would support improved accuracy. Arithmetic errors were also noted and often affected the final mark, highlighting the importance of checking calculations carefully.