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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 14

Algebraic fractions

Higher tier

Answers and examiner comments

53	2003-2024	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 11

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

Original question 17

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

Original question 6

The full source mark scheme begins on page 96. Use the original paper code, tier and question number shown above.

Original question 18

The full source mark scheme begins on page 96. Use the original paper code, tier and question number shown above.

Original question 21

The full source mark scheme begins on page 157. Use the original paper code, tier and question number shown above.

25	(a)		Vertices at (2, -2), (7, -2), (7, -6), (4, -6), (4, -4), (2, -4)	2	B2 for a fully correct rotation [B1 for correct shape with correct orientation **OR** a 90° anticlockwise rotation about *O* **OR** a 180° rotation about *O* **OR** for any 3 correct sides in the correct position]
	(b)		Translation by $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$	2	B1 for translation B1 (indep) for $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ or 3 right and 1 down

1380/1F

16	(a)	$3x + 15 + 10x - 12$	$13x + 3$	2	M1 for correct expansion of one bracket A1 cao
	(b)		$x + 2$	1	B1 (accept $\frac{x+2}{1}$)
	(c)		$5(x + 2)$	1	B1 cao
	(d)		$xy(x + y)$	2	M1 for $x(xy + y^2)$ **or** $y(x^2 + xy)$ **or** xy as one of two factors with other factor incorrect but with two terms (eg. $xy(x^2 + y^2)$) A1 cao

25	(a)	$(2x + 4y)(4x - 5y)$ $= 8x^2 - 10xy + 16xy - 20y^2$	$8x^2 + 6xy - 20y^2$	2	B2 cao (B1 for 3 out of 4 terms correct or all 4 correct ignoring signs)
	(b)		$x + 10$	1	B1 for $x + 10$ or $(x + 10)$ or $(x + 10)^1$
	(c)	$= \frac{(x+5)(x-5)}{(x+5)(x+2)}$	$\frac{x-5}{x+2}$	3	M1 for $(x+5)(x-5)$ M1 (indep) for $(x+5)(x+2)$ A1 cao
	(d)	$x^2 + 6x - 2 = (x + 3)^2 - 9 - 2$	$p = 3$ $q = -11$	2	M1 for $(x + 3)^2 \pm k$ or $x^2 + 2px + p^2 + q$ oe or $p = 3$ or $q = -11$ A1 cao

1380_4H

1380/4H

5MB2H_01

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

5MB2H_01

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
15	Alternative method $\frac{2x}{x-1}-\frac{7x-3}{x^2-1}$ $=\frac{2x\left(x^2-1\right)}{(x-1)(x^2-1)}-\frac{(7x-3)(x-1)}{(x-1)(x^2-1)}$ $=\frac{2x(x^2-1)-(7x+3)(x-1)}{(x-1)(x^2-1)}$ $=\frac{2x^3-2x-7x^2+7+3x-3}{(x-1)(x^2-1)}$ $=\frac{2x^3-7x^2+8x-3}{(x-1)(x^2-1)}$ $=\frac{(2x-3)(x-1)^2}{(x+1)(x-1)^2}$ $=\frac{2x-3}{x+1}$	$\frac{2x-3}{x+1}$	4	Alternative Method M1 for correct process to obtain any common denominator B1 for $2x^3-2x-7x^2+7+3x-3$ M1 (dep on first M1) for correct expansion and simplification of numerator A1 cao

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
16*	$AOT = 90 - x$ (Angle between tangent and radius is 90°) $AOC = 90 + x$ (Tangents from an external point are equal) $ACB = 2(180 - (90 + x)) \div 2 = 90 - x$ Or Obtuse angle $BOA = 180 - 2x$ (Angle between tangent and radius is 90°) Reflex angle $BOA = 180 + 2x$ (Tangents from an external point are equal) $ACB = (360 - (180 + 2x)) \div 2 - 90 - x$		5	B1 for $AOT = 90 - x$ or OAT = 90° or OBT= 90° (may be shown on diagram) B1 for $AOC = 90 + x$ B1 for completing the proof C2 for 2 reasons: Angle between tangent and radius is 90° **and** Tangents from an external point are equal. **QWC: proof should be clearly laid out with technical language correct** [C1 for 1 of: Angle between tangent and radius is 90° **or** Tangents from an external point are equal, **QWC: proof should be clearly laid out with technical language correct**] **OR** B1 for obtuse angle $BOA = 180 - 2x$ or OAT = 90° or OBT= 90° (may be shown on diagram) B1 for reflex angle $BOA = 180 + 2x$ B1 for completing the proof C2 for 2 reasons: Angle between tangent and radius is 90° **and** Tangents from an external point are equal. **QWC: proof should be clearly laid out with technical language correct** [C1 for 1 of: Angle between tangent and radius is 90° **or** Tangents from an external point are equal, **QWC: proof should be clearly laid out with technical language correct**]

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
16*	Alternative method $AOB = 360 - 2x - 90 - 90 = 180 - 2x$ (Angle between tangent and radius is 90°) $ACB = (180 - 2x)/2$ (Angle at the circumference is half angle at the centre)			Alternative method B1 for $AOB = 360 - 2x - 90 - 90$ B1 for $ACB = (180 - 2x)/2$ B1 for completing the proof C2 for 2 reasons: Angle between tangent and radius is 90° **and** Angle at the circumference is half angle at the centre **QWC: proof should be clearly laid out with technical language correct** [C1 for 1 of: Angle between tangent and radius is 90° **or** Angle at the circumference is half angle at the centre **QWC: proof should be clearly laid out with technical language correct**] B3 maybe awarded for a fully correct alternative method.

5MB2H_01

5MB2H_01

Question	Working	Answer	Mark	Notes
14	$\frac{x^2-2x-15}{x^2-4x-21}=\frac{(x-5)(x+3)}{(x-7)(x+3)}$	$\frac{x-5}{x-7}$	3	M1 attempt to factorise numerator (at least one bracket correct) or $(x \pm 5)(x \pm 3)$ M1 attempt to factorise denominator (at least one bracket correct) or $(x \pm 7)(x \pm 3)$ A1 oe

Original question 16

The full source mark scheme begins on page 209. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
19		$x^2 + 3 = 7x$ $x^2 - 7x + 3 = 0$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4\times 3}}{2}$ OR $(x - 3.5)^2 = 3.5^2 - 3 = 9.25$ $x - 3.5 = \pm\sqrt{9.25}$	$= \frac{7 \pm \sqrt{37}}{2}$ OR $3.5 \pm\sqrt{9.25}$	3	M1 for $x^2 + 3 = 7x$ oe **or** clear intention to multiply all terms by x M1 for $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4\times 3}}{2}$ ft from a quadratic equation of the form $ax^2 + bx + c = 0$ where $a,b,c \neq 0$; condone wrong signs for a, b, c in substitution A1 for $= \frac{7 \pm \sqrt{49 - 12}}{2}$ or for $= \frac{7 \pm \sqrt{37}}{2}$ as the final exact solution **OR** M1 for $x^2 + 3 = 7x$ oe **or** clear intention to multiply all terms by x M1 for $(x - 3.5)^2 - 3.5^2 + 3 = 0$ ft from a quadratic equation of the form $ax^2 + bx + c = 0$ where $a,b,c \neq 0$ A1 for $3.5 \pm\sqrt{9.25}$ SC : B2 for both 6.54(1381265..) **and** 0.458(6187349…)

1380_4H

Question		Working	Answer	Mark	Notes
23	(a)	$x(x+p)+q(x+p)$	$(x+p)(x+q)$	2	M1 for $x(x+p)+q(x+p)$ **or** $x(x+q)+p(x+q)$ A1 cao
	(b)		$(m-2)(m+2)$	1	B1 cao
	(c)	$\frac{2(x+3)-(x-4)}{(x-4)(x+3)}$ $=\frac{2x+6-x+4}{(x-4)(x+3)}$	$\frac{x+10}{(x-4)(x+3)}$	3	M1 for common denominator of $(x-4)(x+3)$ M1 for $\frac{2(x+3)}{(x-4)(x+3)}-\frac{(x-4)}{(x-4)(x+3)}$ $\frac{2(x+3)-(x-4)}{(x-4)(x+3)}$ oe condone missing brackets around $x-4$ A1 for $\frac{x+10}{(x-4)(x+3)}$ or $\frac{x+10}{x^2-x-12}$

17		$\frac{3(a-b)+2b}{b(a-b)}$ $\frac{3a-3b+2b}{b(a-b)}$	$\frac{3a-b}{b(a-b)}$	3	M1 for a common denominator of $b(a-b)$ oe M1 for $\frac{3(a-b)+2b}{'b(a-b)'}$ or $\frac{3(a-b)}{'b(a-b)'}+\frac{2b}{'b(a-b)'}$ A1 for $\frac{3a-b}{b(a-b)}$ or $\frac{3a-b}{ba-b^2}$

Original question 23

The full source mark scheme begins on page 222. Use the original paper code, tier and question number shown above.

Original question 18

The full source mark scheme begins on page 242. Use the original paper code, tier and question number shown above.

20		$\frac{3(x+1)}{6}+\frac{2(x+3)}{6}=\frac{3x+3+2x+6}{6}$	$\frac{5x+9}{6}$	3	M1 Use of common denominator of 6 (**or** any other multiple of 6) and at least one numerator correct Eg. $\frac{3(x+1)}{6}$ or $\frac{2(x+3)}{6}$ M1 $\frac{3(x+1)}{6}+\frac{2(x+3)}{6}$ oe A1 cao

1MA0_2H

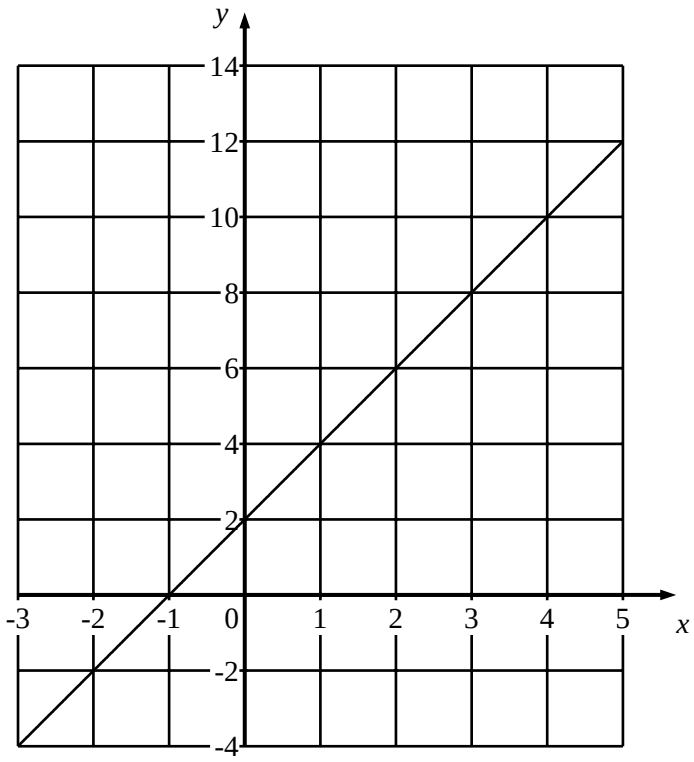
Question		Working	Answer	Mark	Notes
14	(a)		$(x + 1)(\boldsymbol{x} + 4)$	2	B2 for $(x + 1)(\boldsymbol{x} + 4)$ (B1 for $(x + a)(\boldsymbol{x} + b)$ with one factor correct or $(x - 1)(\boldsymbol{x} - 4)$ or $x(\boldsymbol{x} + 4)+1(\boldsymbol{x} + 4)$ or $x(\boldsymbol{x} + 1)+4(\boldsymbol{x} + 1)$)
	(b)	$3x(2x + 5) - 1(2x + 5)$ $6x^2 + 15x - 2x - 5$	$6x^2 + 13x - 5$	2	B2 for fully correct (B1 for 3 out of not more than 4 terms including signs or 4 terms correct ignoring signs)
	(c)	$\frac{15}{30x} + \frac{6}{30x} - \frac{10}{30x}$	$\frac{11}{30x}$	2	M1 for attempt to use a correct common denominator with at least 2 correct equivalent fractions A1 for $\frac{11}{30x}$ oe

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*15			Proof	5	B1 for *OM* = *ON* or (*OMN* is) isosceles triangle or OMB = 90° or AMO = 90° B1 for *OMN* = *ONM* or either = $\frac{1}{2}(180 - y)$ oe B1 for (Angle) *BMN* = 90 – "$\frac{1}{2}(180 - y)$" [if algebraic in *y*] C1 for statement angle between tangent and radius = 90° (or perpendicular or right angle) C1 for correct conclusion with BMN stated, accompanied by correct working clearly laid out and in a logical sequence with correct calculations Acceptable alternative: B1 for angle at circumference = $\frac{1}{2}y$ B1 for 'angle at centre is twice the angle at the circumference' oe B1 for angle *BMN* = $\frac{1}{2}y$ C1 for statement 'alternate segment theorem' C1 for correct conclusion with BMN stated, accompanied by correct working clearly laid out and in a logical sequence with correct calculations

5MB2H_01

17			$\frac{x}{2x+1}$	3	B1 for $x(x-3)$ B1 for $(2x+1)(x-3)$ B1 for $\frac{x}{2x+1}$

1.



23		$\frac{4(x+5)}{(x+5)(x-3)}$	$\frac{4}{x-3}$	2	M1 for $(x \pm 5)(x \pm 3)$ A1 for $\frac{4}{x-3}$

18		$\frac{2x(x+3)}{(x-5)(x+3)} =$	$\frac{2x}{x-5}$	3	B1 for $2x(x + 3)$ B1 for $(x - 5)(x + 3)$ oe 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: 5MB2H_01			
Question		**Modifications**	**Notes**
2	(c)	MLP only: (a) letter a changed to letter *e* and b changed to *f*. *a* changed to *y* .	M1 for partial simplification $5e$ **or** $+3f$ A1 cao B1 cao for y^9
6		2cm grid top row of grid remove d	
7		Models as well as diagram provided	
9		Models as well as diagram provided	
12		MLP only: x changed to y	
14		Models as well as diagram provided. Line LN joined	

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
20	(a)		4	3	M1 for correct expansion to $32x - 8$ or multiplying both sides by $3x$ or dividing both sides by 4 M1 for a compete and correct method to isolate the x terms and the number terms (condone one arithmetic error in multiplying out the bracket) A1 cao
	(b)	$\frac{2(y-6)-(y+3)}{(y+3)(y-6)}$	$\frac{y-15}{(y+3)(y-6)}$	3	M1 for common denominator of $(y+3)(y-6)$ M1 for $\frac{2(y-6)}{(y+3)(y-6)} - \frac{y+3}{(y+3)(y-6)}$ oe or $\frac{2(y-6)-(y+3)}{(y+3)(y-6)}$ oe A1 for $\frac{y-15}{(y+3)(y-6)}$ or $\frac{y-15}{y^2-3y-18}$

22	(a)		$27x^6y^{12}$	2	B2 cao (B1 for any two terms correct in a product, e.g. $9x^6y^{12}$)
	(b)		$\frac{x-3}{2x-1}$	3	M1 for $(x-3)(x+3)$ M1 for $(2x-1)(x+3)$ A1 for $\frac{x-3}{2x-1}$ cao

PAPER: 1MA0_1H

18			$\frac{3x}{x+4}$	3	M1 for $3x(x-2)$ M1 for $(x-2)(x+4)$ A1 cao

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PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q02		MLP only. x changed to y	
Q04		2cm grid. label right axis	
Q05a		MLP only. x changed to y	
Q06		2 models provided as well as diagram	
Q10a		MLP only. x changed to y	
Q10b		MLP only. x changed to e and y to f	
Q12		BC joined with a dashed line	

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
22	(a)		1	1	B1 cao
	(b)		$\frac{5y}{8x^3}$	2	M1 for correct square root or correct use of reciprocal eg $\frac{8x^3}{5y}$ **or** $\frac{25y^2}{64x^6}$ A1 for $\frac{5y}{8x^3}$ **or** $\frac{5}{8}yx^{-3}$ oe
	(c)		$\frac{x+27}{(x-3)(x+3)}$	3	M1 for denominator $(x-3)(x+3)$ **or** x^2-9 M1 for $\frac{5(x+3)}{(x-3)(x+3)}$ oe **or** $\frac{4(x-3)}{(x-3)(x+3)}$ oe (NB The denominator must be $(x-3)(x+3)$ or x^2-9 **or** another suitable common denominator) A1 for $\frac{x+27}{(x-3)(x+3)}$ **or** $\frac{x+27}{x^2-9}$

PAPER: 1MA0_1H

13			$\frac{7x-6}{x(2-x)}$	3	M1 for intention to use $x(2-x)$ as the denominator M1 for $\frac{4x-3(2-x)}{x(2-x)}$ oe A1 cao allow $2x-x^2$ as a denominator

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*14			Proof	5	B1 for matching two lines of the same length with reasons B1 for matching two sides of the kite with reasons B1 for showing $AD = AB$ and $DC = CB$ with reasons C1 for "Tangents from an external point are equal in length." C1 for a complete proof

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

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Angles: ±5º
Measurements of length: ±5 mm

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
4		2 cm grid – inside spaces will be slightly less but equal Q5. Picture removed	
6		Model given – MLP also have diagram Wording inserted: The box is 100 cm long, 40 cm wide and 60 cm high	
11	(a)	x changed to e y changed to f	
	(d)	x changed to y	

1MA0 1H November 2015

Question		Working	Answer	Mark	Notes
21	(a)		$\frac{9x-8}{x(2-x)}$	3	M1 for method to use a common denominator, e.g. $\frac{5(x)-4(2-x)}{x(2-x)}$ M1 (dep on M1) for correct expansion of brackets and combination of numerators e.g. $5x-8+4x$ $(=9x-8)$ A1 for $\frac{9x-8}{x(2-x)}$ or $\frac{9x-8}{2x-x^2}$
	(b)		$y=\frac{2-2t}{t+3}$	4	M1 for intention to multiply both sides by $y+2$ as a first step e.g. $t \times y+2=2-3y$ M1 for intention to correctly isolate their y terms on one side and the other terms on the other side, e.g. $ty+3y=2-2t$ M1 for intention to factorise, e.g. $y(t+3)$ $(=2-2t)$ A1 for $y=\frac{2-2t}{t+3}$ oe
*22			Similarity and proof	5	B1 for method matching a pair of opposite angles, e.g. if $EAB = x$, $BDE = 180-x$, $EAB + BDE = 180$ B1 for linking angles between quad and triangle, e.g. if $BDE = 180-x$ then $BDC = x$ B1 for stating or implying $ACE = BCD$ (same angle) C1 for Opposite angles of a cyclic quadrilateral add up to 180° or statement linking three angles for similarity C1 for complete proof

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

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Measurements of length: ±5 mm

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q06		Diagram is enlarged.	Standard mark scheme
Q09		Model is provided for all candidates. Diagram also provided for MLP.	Standard mark scheme
Q10	(a)	MLP only: x changed to y Diagram is enlarged.	Standard mark scheme
Q12	(a) (b)	Wording added "There are four spaces to fill." 1.5 cm grid..Small squares removed.	Standard mark scheme
Q14		Diagram enlarged.	Standard mark scheme
Q15	(c)	Frequencies changed to 25, 20, 15, 10, 5, 5. Grid: 1.5 cm 3.4 kg changed to 3.5 kg.	Standard mark scheme
Q16		"trapezium" and "rectangle" put inside the shapes. MLP only: x changed to y.	Standard mark scheme
Q19		Model provided for all candidates. Diagram also provided for MLP.	Standard mark scheme

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q20		Diagram is enlarged. Lower case vectors enlarged.	Standard mark scheme
Q22		Diagram is enlarged.	Standard mark scheme

Original question 17

The full source mark scheme begins on page 261. Use the original paper code, tier and question number shown above.

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
24	(a)		$\frac{-1}{3x+4}$	2	M1 for $(3x \pm 4)(x \pm 3)$ or $(-3x \pm 4)(-x \pm 3)$ A1 for $\frac{-1}{3x+4}$, accept $\frac{1}{-3x-4}$
	(b)		$\frac{2x}{x^2-1}$	3	M1 for common denominator $(x-1)(x+1)$ or x^2-1 M1 for $\frac{x(x+1)}{(x-1)(x+1)} - \frac{x(x-1)}{(x-1)(x+1)}$ oe or $\frac{x(x+1)-x(x-1)}{(x-1)(x+1)}$ oe (NB: The denominator must be $(x-1)(x+1)$ or x^2-1 or another suitable common denominator) A1 for $\frac{2x}{(x-1)(x+1)}$ or $\frac{2x}{x^2-1}$

PAPER: 1MA0_2H

17			$\frac{2x-1}{x-3}$	3	M1 for $(2x - 1)(x + 3)$ M1 for $(x - 3)(x + 3)$ A1 cao

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

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Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q4		Model provided for all candidates. Diagram enlarged and provided for MLP.	M1 for attempt to divide corresponding sides eg 500 ÷ 50 (=10) or 250 ÷ 50 (=5) or 200 ÷ 50 (=4) M1 (dep) multiplying divisors eg "10" × "5" × "4" (=200) [consistent units] M1 for use of 3 containers eg "200" × 3 (=600) or use of 500 boxes eg 500 ÷ "200" (=2.5) C1 for yes and 600 (boxes) or 2.5 (containers) oe OR M1 for attempt to find the volume eg 500 × 250 × 200 (=25 000 000) or 50 × 50 × 50 (=125 000) M1 (dep) for dividing volumes [consistent units] eg "25 000 000" ÷ "125 000" (=200) or "125 000" × 500 (=62 500 000) M1 for use of 3 containers eg "25 000 000" × 3 (=75 000 000) or "200" × 3 (=600) or use of 500 boxes eg for "125 000" × 500 (= 62 500 000) and "25 000 000" × 3 (= 75 000 000) or 500 ÷ "200" (=2.5) C1 for yes and 600 (boxes) or 2.5 (containers) or 62 500 000 and 75 000 000 oe

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q5		Diagram enlarged. MLP only – x changed to y.	M1 for $5(2x + 1)$ or $3(x + 1)$ or $5 \times 2x + 1 + 3 \times x + 1$ M1 for $5(2x + 1) + 3(x + 1)$ or $13x + 8$ oe A1 for $A = 13x + 8$ oe OR M1 for $8(x + 1)$ or $5x$ or $8 \times x + 1 + 5x$ M1 for $8(x + 1) + 5x$ or $13x + 8$ oe A1 for $A = 13x + 8$ oe OR M1 for $8(2x + 1)$ or $3x$ or $8 \times 2x + 1 - 3x$ M1 for $8(2x + 1) - 3x$ or $13x + 8$ oe A1 for $A = 13x + 8$ oe
Q6		Grid enlarged.	B3 for correct line between $x = -2$ and $x = 3$ OR B2 for a correct straight line segment through at least 3 of $(-2,-8)$, $(-1, -5)$, $(0, -2)$, $(1, 1)$, $(2, 4)$, $(3, 7)$ **or** for all of these plotted but not joined **or** for a line drawn with a positive gradient through $(0, -2)$ and clear intention to use a gradient of 3 OR B1 for at least 2 correct points stated or plotted **or** for a line drawn with a positive gradient through $(0, -2)$ **or** a line with gradient 3

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q8		Diagram enlarged. Wording added 'Angle *TPQ* is a right angle. Angle *PQR* is marked *x*.'	M1 for (*APT* =) 180 − (32 + 90) (=58) M1 for (*PTR* =) "58" M1 for 360 − ("58" + 124 + 90) A1 cao OR (line *XY* drawn through *Q* parallel to *AB*) M1 for (*QRD* =) 180 − 124 (=56) M1 for (*XQR* =) "56" M1 for (*PQX* =) 32 A1 cao
Q9		Model provided for all candidates. Diagram enlarged and provided for MLP.	M1 for 3 × 7 (=21) or 3 × 5 (=15) or 5 × 7 (=35) M1 (dep on M1) for 2 × ('21' + '15' + '35') A1 cao
Q10	(a)	MLP only – *a* changed to *y*. Braille only – *a* changed to *m*.	B1 cao
	(b)	Braille only – *b* changed to *q*.	B1 cao
Q12	(a)	Braille only – *a* changed to *p*, *b* changed to *q* $2ax - 2ay + bx - by$ changed to $2px - 2py + qx - qy$	M1 for $2a(x - y)$ or $b(x - y)$ or $x(2a + b)$ or $y(2a + b)$ A1 for $(2a + b)(x - y)$ oe

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q14		Diagram enlarged. Dot added to centre.	M1 for (POS =) $360 - (90 + 90 + 2x)$ $(= 180 - 2x)$ ie using angles around O or (QOR =) $360 - (90 + 90 + y)$ $(= 180 - y)$ M1 (dep) for (POQ =) $\frac{1}{2}$ [360 − ("POS" + "QOR")] A1 for (POQ =) $x + \frac{y}{2}$ oe C1 (dep M1 and supported) for circle theorem angle between tangent and radius is 90 C1 for full reasons and supported eg sum of angles in a quadrilateral is 360 and sum of angles at a point is 360 OR M1 for (POA=) $180 - 90 - x$ $(= 90 - x)$ ie after having drawn line AOC or (QOC=) $180 - 90 - \frac{y}{2}$ $(= 90 - \frac{y}{2})$ M1 (dep and supported) for (POQ =) 180 − "POA" − "QOC" A1 for (POQ =) $x + \frac{y}{2}$ oe C1 (dep M1 and supported) for circle theorem for angle between tangent and radius is 90 C1 for full reasons and supported eg sum of angles in a triangle is 180 and sum of angles on straight line is 180 OR M1 for (ABC or ADC =) $\frac{1}{2}(360 - 2x - y)$ ie using similar triangles M1 (dep)for (POQ =) $360 - 90 - 90 -$ "ABC" A1 for (POQ =) $x + \frac{y}{2}$ oe C1 (dep M1 and supported) for circle theorem for angle between tangent and radius is 90 C1 for full reasons and supported eg sum of angles in a quadrilateral is 360 and eg ΔABC similar to ΔADC

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q15		Diagram enlarged. Crosses changed to filled in circles.	M1 for M = $\left(\frac{2+4}{2}, \frac{5+9}{2}\right)$ (= 3,7) M1 for gradient = $-\frac{1}{m}$ or $-\frac{1}{2}$ oe M1 (dep on 1st M1) for substitution of x = "3", y = "7" into their equation A1 for $y = -\frac{1}{2}x + \frac{17}{2}$ oe
Q16		MLP only – *a* changed to *p*. Braille only – *a* changed to *m*.	M1 for rationalising a denominator M1 for finding same denominator (dep M1 or with √3) A1 oe Accept $\frac{13}{15}\sqrt{3}$

Original question 24

The full source mark scheme begins on page 274. Use the original paper code, tier and question number shown above.

15		$\frac{7x}{x+5}$	3	M1 for $7x(x-3)$ M1 for $(x-3)(x+5)$ A1 for $\frac{7x}{x+5}$	E

5MB2H November 2016

PAPER: 5MB3H_01

Question	Working	Answer	Mark	Notes
19 (a)		5 and −7	3	M1 for $(x \pm 5)(x \pm 7)$ M1 for $(x - 5)(x + 7)$ A1 cao OR M1 for correct substitution into formula M1 for reduction to $\frac{-2 \pm \sqrt{144}}{2}$ A1 cao
(b)		$\pm\sqrt{3}$	4	M1 for multiplying through by a common denominator eg by $(x + 1)(2x + 3)$ M1 (dep) for reduction eg to $4x + 6 + x^2 + x$ or $2x^2 + 3x + 2x + 3$ M1 for $x^2 - 3 (= 0)$ A1 cao for both answers; accept decimals to at least 2 dp

Question	Working	Answer	Mark	Notes
17 (a)		$\frac{3}{x+1}$	1	B1 oe
(b)		–2.5	3	M1 for attempting to multiply both sides by 5 as a first step and cancelling the LHS (can be implied by equations of the form $15 - x = 15x + ?$ or $15 - x = ?x + 55$) M1 for method to isolate terms in x and number terms from $ax + b = cx + d$ A1 for –2.5 oe OR M1 for splitting the LHS correctly into two parts $\frac{15}{5} - \frac{x}{5} = 3x + 11$ M1 for method to isolate terms in x and number terms from $ax + b = cx + d$ A1 for –2.5 oe
(c)		$m = \frac{2E}{v^2}$	3	M1 for a method to remove square root or clear fraction as a first step M1 for a method to remove square root **and** clear fraction A1 for $m = \frac{2E}{v^2}$

19		$a = 4$, $b = -42$	M1 M1 M1 A1	for at least two terms from $2(x-3)(x+3)$, $(x+2)(x+3)$, $(x-6)(x-3)$ (dep) for the correct expansion of at least two expressions, irrespective of signs, eg. $2x^2-18$, $x^2+2x+3x+6$, $x^2-6x-3x+18$ oe for $2x^2-18-x^2-5x-6-x^2+9x-18$ for $a = 4$, $b = -42$ (accept $4x-42$)

Paper: 1MA1/2H

17	$\frac{3x+1}{2x}$	M1 A1 A1	for $(3x + 1)(x – 3)$ **or** $2x(x – 3)$ for $(3x + 1)(x – 3)$ **and** $2x(x – 3)$ $\frac{3x+1}{2x}$ oe	Accept $(2x + 0)$ for the first two marks but not for the final answer

10	(a)	$\frac{1}{5(x-1)}$	B1	for $\frac{1}{5(x-1)}$ or $\frac{1}{5x-5}$	
	(b)	$2(5+y)(5-y)$	M1	for partial factorisation, eg $2(25-y^2)$ oe or $(10+2y)(5-y)$ oe or $(5+y)(10-2y)$ oe or $-2(y^2-25)$ oe	
			A1	for $2(5+y)(5-y)$ or $-2(5+y)(y-5)$	

Paper: 1MA1/1H

12	(a)	$\frac{4x-6}{3x-9}$	M1	factorises numerator of $4x^2 - 9$ eg $(2x-3)(2x+3)$ oe	$\frac{2x(2x-3)(2x+3)}{3x(2x+3)(x-3)}$
			M1	factorises denominator eg $x(x-3)$ or $3(2x+3)$ or for $3x(2x^2 - 3x - 9)$	
			A1	cancels to give $\frac{4x-6}{3x-9}$	Accept $a = 4$, $b = -6$, $c = 3$, $d = -9$
	(b)	$\frac{-x+8}{x(x+1)(x-2)}$	M1	method to use a common denominator eg $x(x+1)(x-2)$ by multiplying terms	Method must involve finding equivalents for all three separate terms; may be done in several stages.
			M1	deduce numerator eg $3x(x-2) + x(x+1) - 4(x+1)(x-2)$	
			A1	oe	Equivalents must be algebraically equivalent and must have involved full simplification.

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
13	$\frac{7x-13}{x-2}$	B1	for factorising eg $(x+5)(x-2)$	
		M1	for a method to divide $(x+5)$ by the algebraic fraction eg $(x+5)\times\frac{(x-1)}{x^2+3x-10}$	Condone incorrect factorising
		M1	for finding 2 fractions with a common denominator or a single fraction eg $\frac{6(x-2)}{x-2}+\frac{(x-1)}{x-2}$ **or** $\frac{6(x-2)+(x-1)}{x-2}$ **or** $\frac{6(x^2+3x-10)}{x^2+3x-10}+\frac{(x+5)(x-1)}{x^2+3x-10}$ **or** $\frac{6(x^2+3x-10)+(x+5)(x-1)}{x^2+3x-10}$	Condone incorrect factorising
		A1	$\frac{7x-13}{x-2}$	

Paper: 1MA1/2H

13	(a)	$\frac{17x+2}{3x(x+1)}$	M1	for a correct common denominator with at least one correct numerator eg. $\frac{5\times3x}{3x(x+1)}+\frac{2(x+1)}{3x(x+1)}$	
			A1	for a single simplified fraction, eg. $\frac{17x+2}{3x(x+1)}$ or equivalent eg. $\frac{17x+2}{3x^2+3x}$	$\frac{15x+2(x+1)}{3x(x+1)}$ gets M1 only
	(b)	$(x+y)(x+y+3)$	B1	cao	

Paper: 1MA1/1H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
22	$7x$	M1	multiplication by reciprocal, eg $\frac{7(x-2)}{(x-2)(x+6)} \times \frac{x(x+6)(x-6)}{x-6}$	Independent mark, may be awarded at any point
		M1	for factorising the numerator or denominator of the 1st fraction, eg $\frac{7(x-2)}{(x-2)(x+6)}$ **or** $\frac{7(x-2)}{x^2+4x-12}$ **or** $\frac{7x-14}{(x-2)(x+6)}$	
		M1	for factorising the denominator of the second fraction, eg $\frac{x-6}{x(x+6)(x-6)}$ $(=\frac{1}{x(x+6)})$	
		A1	completing the algebra to reach $7x$	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	$\frac{3x^2}{(x-4)(x+2)}$	M1	for method to identify a common denominator, eg $(x-4)(x+2)$	
		M1	for method to combine the fractions, eg $\frac{2x(x+2)+x(x-4)}{(x-4)(x+2)}$	Accept $\frac{2x(x+2)}{(x-4)(x+2)}+\frac{x(x-4)}{(x-4)(x+2)}$
		A1	for $\frac{3x^2}{(x-4)(x+2)}$ or $\frac{3x^2}{x^2-2x-8}$	
(b)	$8x^3-2x^2-51x-45$	M1	for method to find the product of two linear expressions, eg 3 correct terms out of 4 terms or 4 terms ignoring signs	Note that, for example, $-3x-9$ in expansion of $(x-3)(2x+3)$ is to be regarded as 3 correct terms.
		M1	for a complete method to obtain all terms, half of which are correct (ft their first product) eg $8x^3-12x^2-15x+10x^2-36x-45$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
		A1	cao.	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
15	$\frac{26x+15}{10x}$	M1	for method to write at least one of the fractions with a suitable denominator, eg $\frac{4x+3}{2x}\times\frac{5}{5}\left(=\frac{20x+15}{10x}\right)$ **or** $\frac{3}{5}\times\frac{2x}{2x}\left(=\frac{6x}{10x}\right)$	
		M1	for method to combine the fractions, eg $\frac{5(4x+3)}{5\times 2x}+\frac{3\times 2x}{5\times 2x}$ **or** $\frac{5(4x+3)+3\times 2x}{5\times 2x}$ **or** $\frac{20x+15}{10x}+\frac{6x}{10x}$	
		A1	for correct algebra leading to $\frac{26x+15}{10x}$ oe in form $\frac{ax+b}{cx}$	

22	$\frac{1}{x(x+4)}$	M1 M1 A1	inverting the fraction and multiplying eg $\frac{6x^3}{(9x^2-144)} \times \frac{3(x-4)}{2x^4}$ for factorising $9x^2 - 144$, eg $(3x - 12)(3x + 12)$ cao	

Paper: 1MA1/3H	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
19	$\frac{5\pm\sqrt{15}}{2}$	M1	for using a common denominator eg $\frac{x-1}{(2x-1)(x-1)}+\frac{3(2x-1)}{(2x-1)(x-1)}$ (= 1) **or** $(x-1)+3(2x-1)=(2x-1)(x-1)$	
		M1	for expanding and rearranging to get $2x^2-10x+5$ (= 0)	Note we don't need to see "= 0"; just the LHS is sufficient Accept other forms of the 3 term quadratic, eg $2x^2-10x=-5$
		M1	(dep M1) ft for a method to solve their 3 term quadratic equation eg $\frac{10\pm\sqrt{(-10)^2-4\times2\times5}}{2\times2}$ or $\frac{10\pm\sqrt{60}}{4}$ **or** $2\left[\left(x-\frac{5}{2}\right)^2-\left(\frac{5}{2}\right)^2\right]+5=0$ oe	Correct use of formula or completing the square
		A1	cao	

Paper: 1MA1/1H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
19	$\frac{-11x+2}{x^2-4}$	M1	for writing at least one of the 3 terms with a denominator of $(x^2 - 4)$ or $(x - 2)(x + 2)$ eg. $\frac{3x(x-2)}{x^2-4}$ oe or $\frac{(x+2)(2x+1)}{x^2-4}$ oe or $\frac{x^2-4}{x^2-4}$	Students may work with a denominator of $(x - 2)(x + 2)$ for the first 3 marks
		M1	for $\frac{3x(x-2)}{x^2-4} - \frac{(x+2)(2x+1)}{x^2-4} - \frac{x^2-4}{x^2-4}$ oe or for $\frac{x^2-11x-2}{x^2-4}$ (– 1)	
			or for $\frac{[x^2-11x-2]}{x^2-4} - \frac{x^2-4}{x^2-4}$	$[x^2 - 11x - 2]$ denotes their expansion of $3x(x - 2) - (x + 2)(2x + 1)$
		M1	for a numerator of $3x^2 - 6x - 2x^2 - 5x - 2 - x^2 + 4$	May be simplified
		A1	for $\frac{-11x+2}{x^2-4}$	Accept $a = -11$ and $b = 2$

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
19	$-\frac{1}{2}\pm\frac{1}{2}\sqrt{2}$	P1	for using a common denominator, eg $\frac{x+1}{x(x+1)}-\frac{x}{x(x+1)}$ (= 4) or $\frac{x+1-x}{x(x+1)}$ (= 4) **or** $x+1-x=4x(x+1)$	
		P1	for expanding and rearranging to get $4x^2 + 4x - 1$ (= 0)	Note we don't need to see "= 0"; just the LHS is sufficient Accept other forms of the 3 term quadratic, eg $4x^2 + 4x = 1$
		P1	(dep P1) ft for a method to solve their 3 term quadratic equation, eg $\frac{-4\pm\sqrt{4^2-4\times4\times-1}}{2\times4}$ or $4\left[\left(x+\frac{1}{2}\right)^2-\left(\frac{1}{2}\right)^2\right]-1=0$ oe	Correct use of formula or completing the square
		A1	for values of x, eg $\frac{-4\pm\sqrt{32}}{8}$ or $\pm\sqrt{\frac{1}{2}}-\frac{1}{2}$ oe	
		A1	for $-\frac{1}{2}\pm\frac{1}{2}\sqrt{2}$ oe in the form $a\pm b\sqrt{2}$ where are a and b are fractions	Accept $a=-\frac{1}{2}$, $b=\frac{1}{2}$ or $a=-\frac{1}{2}$, $b=-\frac{1}{2}$

Paper: 1MA1/1H

22	$a = 4$ $b = 110$	M1 M1 A1	for writing at least one of the 3 terms with a denominator of $(x^2 - 25)$ or $(x - 5)(x + 5)$ eg. $\frac{(2x+3)(x+5)}{x^2-25}$ oe or $\frac{(x-4)(x-5)}{x^2-25}$ oe or $\frac{3(x^2-25)}{x^2-25}$ oe for $\frac{(2x+3)(x+5)}{x^2-25} + \frac{(x-4)(x-5)}{x^2-25} - \frac{3(x^2-25)}{x^2-25}$ oe or for $\frac{3x^2+4x+35}{x^2-25}$ (– 3) or for $\frac{[3x^2+4x+35]}{x^2-25} - \frac{3(x^2-25)}{x^2-25}$ oe for $a = 4$ and $b = 110$	Students may work with a denominator of $(x - 5)(x + 5)$ for the award of the first 2 marks.

14	$\frac{x + 2}{2x + 1}$	M1 M1 A1	for correctly factorising one expression, eg $(x - 3)(x + 2)$ or $(x - 3)(2x + 1)$ for factorising both expressions, eg $(x - 3)(x + 2)$ and $(x - 3)(2x + 1)$ oe or $a = 1, b = 2, c = 2, d = 1$	eg $\frac{2 + x}{1 + 2x}$, $\frac{-x - 2}{-2x - 1}$

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
24	$\frac{5x^2-23x+50}{9x^2-3x}$	P1	for using $y = 3x$ or $x = \frac{1}{3}y$ to obtain an expression for a probability in one variable	This may be awarded at any time
		P1	for a correct second probability eg $\frac{x-1}{y-1}$ or $\frac{x-1}{3x-1}$ or $\frac{4}{y-1}$ or $\frac{4}{3x-1}$ or $\frac{y-x-6}{y-1}$ or $\frac{2x-6}{3x-1}$	
		P1	for forming a correct product eg $\frac{x}{y} \times \frac{x-1}{y-1}$ or $\frac{x}{3x} \times \frac{x-1}{3x-1}$ or $\frac{5}{y} \times \frac{4}{y-1}$ or $\frac{5}{3x} \times \frac{4}{3x-1}$ or $\frac{y-x-5}{y} \times \frac{y-x-6}{y-1}$ or $\frac{2x-5}{3x} \times \frac{2x-6}{3x-1}$	
		P1	for adding the 3 correct probabilities eg $\frac{x}{y} \times \frac{x-1}{y-1} + \frac{5}{y} \times \frac{4}{y-1} + \frac{y-x-5}{y} \times \frac{y-x-6}{y-1}$ or $\frac{x}{3x} \times \frac{x-1}{3x-1} + \frac{5}{3x} \times \frac{4}{3x-1} + \frac{2x-5}{3x} \times \frac{2x-6}{3x-1}$	Can be seen after processing of algebra
		A1	$\frac{5x^2-23x+50}{9x^2-3x}$	

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

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: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
1	(b)	Letter 'x' changed to 'y'.	Standard mark scheme but note change of letter.
2	(a)	Letter 'g' at end of answer line changed to 'grams'	Standard mark scheme
3		Wording added 'Look at the diagram for Question 3 in the Diagram Booklet. It shows triangle AGF and two straight lines ACF and ADG.' Wording removed 'ACF and ADG are straight lines.' Wording added 'Angle CDG = 110°; Angle EFC = 125°' Diagram enlarged. Angles moved outside of angle arcs. Angle arcs made smaller.	Standard mark scheme
5	(b)	Wording added 'Remember: A = $2^2 \times 3^4 \times 7$ B = $3^2 \times 7^2$'	Standard mark scheme
7		Wording added 'Look at the diagram for Question 7 in the Diagram Booklet. It shows'. Wording 'Here is' removed. Diagram enlarged. Axes labels moved to above the vertical axes and right of the horizontal axes.	Standard mark scheme
8		Letter 'g' at end of answer line changed to 'grams'	Standard mark scheme

10		Wording added 'Look at the diagram for Question 10 in the Diagram Booklet. It shows a triangle ABD.' Wording removed 'ABD is a triangle.' Diagram enlarged. Angles moved out of angle arcs. Angle arcs made smaller. Right angles made more obvious. Wording added 'AB = 6.8 cm; Angle ABC = 41°; Angle ADC = 55° ' Wording added: Angle ACB and angle ACD are right angles.	Standard mark scheme
11		Wording added 'below'. Table enlarged and left aligned. Values changed in the table, so values can be plotted on the modified grid. 169 cm changed to 170 cm; 186 cm changed to 185 cm; 177 cm changed to 177.5 cm, 174 cm changed to 175 cm	
11	(a)	Wording added 'Look at the diagram for Question 11(a) in the Diagram Booklet. It shows a grid.' Diagram enlarged, no small squares. Open headed arrow. Axis label moved to the left of the horizontal axis.	Standard mark scheme but using the key values: 170, 175, 177.5, 180, 185
11	(b)	Wording added 'Look at the diagram for Question 11(b) in the Diagram Booklet. It is a box plot showing the distribution of the heights of a group of teenagers.' Wording removed 'below'. Diagram enlarged. Small squares removed. Open headed arrow. Axis label moved to the left of the horizontal axis. Box plot changed so values can be read on the modified grid: Key values now at 157.5, 165, 167.5, 172.5, 177.5	Standard mark scheme but using the new key values: Median Range IQR Adults 177.5 15 5 Teenagers 167.5 20 7.5
14		Wording added 'Look at the diagram for Question 14 in the Diagram Booklet.' Diagram enlarged. Angles moved out of angle arcs. Angle arcs made smaller. Wording added 'BA = 9 cm; AO = 6 cm; Angle BAO = 35°; Angle BOC = 80	Standard mark scheme
15	(a)	Letter 'a' changed to 'x'; Letter 'b' changed to 'y'.	Standard mark scheme but note change of letter.

16		Wording added 'Look at the diagram for Question 16 in the Diagram Booklet. It shows triangle T and triangle U on a grid.' Diagram enlarged. Open headed arrows. Axes labels moved to above the vertical axes and right of the horizontal axes. Triangle U added on the grid. Shapes labelled as 'triangle T' and 'triangle U'. Shading changed. Question changed. Wording removed 'On the grid, enlarge triangle T by scale factor -2 with centre of enlargement (-2,-2)' Wording added 'Describe fully the single transformation that maps triangle T onto triangle U.'	B2 for enlargement scale factor −2 centre (−2, −2) (B1 for two of these three aspects) Award no marks if more than one transformation is given.
17		Wording removed 'Here is'. Wording added 'Look at the diagram for Question 17 in the Diagram Booklet. It shows'. Diagram enlarged. Open headed arrows. Right axis labelled. Small squares removed.	Standard mark scheme
18		Wording added 'Look at Diagram 1, Diagram 2 and the formula for Question 18 in the Diagram Booklet. You may be provided with two models for this question and an additional formula model. They show a cone and a frustum.' Wording removed 'in the diagram.' Wording added 'by Diagram 1 and the models. Diagram 2 is a simplified 2D diagram of the frustum.' Formula diagram enlarged and a formula model provided. Wording added to the formula 'You may be provided with a model.' 3D frustum diagram enlarged. Dashed lines made longer and thicker. Open headed arrows. 2D diagram added. Model of frustum provided. Braille additional wording: Ask for the model for Question 18. The model is a large cone made from a small cone and a frustum. The small cone is detachable from the frustum. On the model: the slant height of the small cone is 6 cm; the slant height of the large cone is 10 cm the slant height of the frustum is 4 cm; the radius of the base of the large cone is 3 cm."	Standard mark scheme

19		Wording added 'Look at the diagram for Question 19 in the Diagram Booklet. It shows a graph.' '$0 \leq x \leq 4$' changed to '$0 \leq x \leq 2$' Wording added 'in the Diagram Booklet' Diagram enlarged but produced only in the range $0 \leq x \leq 2$.. Small squares removed. Right axis labelled. y axis cut at 10; x axis cut at 2. Axes labels moved to above the vertical axes and right of the horizontal axes.	Standard mark scheme
21		Letter 'x' changed to 'y'.	Standard mark scheme but note change of letter.

Question	Answer	Mark	Mark scheme	Additional guidance
20	$\frac{6x+37}{6x-42}$	P1	for factorising to get the numerator, eg $(x + 4)(2x – 14)$ or $2(x + 4)(x – 7)$ or $(2x + 8)(x – 7)$	P marks can be awarded in any order
		P1	For process to work with the division by $\frac{2x^2-6x-56}{2x+3}$ eg multiplies by $\frac{2x+3}{2x^2-6x-56}$	
		P1	for two correct fractions with a common denominator, eg $\frac{28}{6(x-7)}$ and $\frac{6x+9}{6(x-7)}$ oe **or** $\frac{28+6x+9}{6(x-7)}$ oe	
		A1	oe or $a = 6$, $b = 37$, $c = 6$, $d = -42$	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
15 (a)	$\frac{a-3}{5}$	B1	for $\frac{a-3}{5}$ oe	
(b)	$(3k-1)(k+4)$	M1	for $(3k \pm 1)(k \pm 4)$ oe or for brackets which when expanded give 2 out of 3 terms correct	Accept $3k(k+4)-(k+4)$ Accept $k(3k-1)+4(3k-1)$
		A1	cao	Accept $(1-3k)(-k-4)$
(c)	$\frac{2-x}{x}$	M1	for factorisation eg $(4-x^2=)\ (2-x)(2+x)$ **and** $(x^2+3x=)\ x(x+3)$ **or** for inversion and multiplication (condone incorrect factorising) eg $\frac{4-x^2}{x^2+3x}\times\frac{x+3}{x+2}$ oe	
		M1	for factorisation of both quadratics **and** inversion and multiplication, eg $\frac{(2-x)(2+x)}{x(x+3)}\times\frac{x+3}{x+2}$ allow sign errors in one bracket	
		A1	for $\frac{2-x}{x}$ or $\frac{2}{x}-1$	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
17	shown	M1	for use of a common denominator for 2 correct fractions, eg 2 of $\frac{6x-y}{10xy}$ **or** $\frac{5y}{10xy}$ **or** $\frac{2(2y-7x)}{10xy}$ oe	
		M1	for a correct method to write as single fraction, eg $\frac{6x-y}{10xy}+\frac{5y}{10xy}-\frac{4y-14x}{10xy}$ **or** $\frac{6x-y}{10xy}+\frac{5y}{10xy}-\frac{(4y-14x)}{10xy}$ **or** $\frac{6x-y+5y-4y+14x}{10xy}$ **or** $\frac{20x}{10xy}$ oe	If seen in steps all arithmetic must be correct
		C1	for correct working leading to $\frac{2}{y}$	

Paper: 1MA1/2H

GCSE

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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

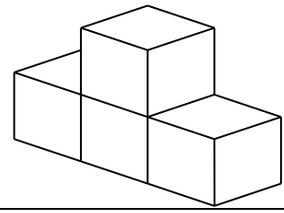
No	Working	Answer	Mark	Notes
4	286 × 43 = 858, 11440, 12298 43 × 286 = 258, 3440, 8600, 12298 286×40 = 1140 286×3 = 858 1140+858=12298 x | 40 | 3 | 200 | 8000 | 600 | 8600 80 | 3200 | 240 | 3440 6 | 240 | 18 | 258 | | | 12298 2 8 6 1 | 0 8 | 3 2 | 2 4 | 4 2 | 0 6 | 2 4 | 1 8 | 3 2 9 8	12298	3	M2 for complete correct method (condone one computational error) (M1 for complete correct method with two computational errors) A1 cao OR B2 inside of grid completed (condone missing zeros and one error) (B1 2 or 3 errors) B1 cao
5 (a) (b)(i) (ii) (c) (d)(i) (ii) (iii)		18, 69 18 or 36 16 or 36 factor 18 11 or 88 69	1 1 1 1 3	B1 B1 B1 B1 B1 cao B1 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 $\frac{2}{5}$ 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, 0.08×25, 0.80×2.5, 200 A1 cao
	(c)	$1 \div 0.8$ or $2.50 \div 2$	1.25	2	M1 for $1.00 \div 0.8$ or $2.50 \div 2$ or 125 or appropriate combination eg $1 + \frac{1}{2} \times 0.50$ A1 cao
10	(a)		hexagon	1	B1 Condone spelling error
	(b)		Sum of angles at a point is 360°	2	B1 for 360 seen B1 for "point", "complete turn" or "a circle" or similar unless accompanied by an incorrect angle 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)	$30 \times 4 + 8 \times 2$	136	2	M1 $30 \times 4 + 8 \times 2$ or attempt to sum 5 or 6 lengths 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 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 (B1 for $5.5 < \text{Area} \leq 7$) 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 A1 cao
(b)	$120\div10-3$	9	2	M1 for $\frac{120}{10}$ or 12 seen eg $12\times10=120$ A1 cao
(c)		$C=10(n+3)$	3	B3 for $C=10(n+3)$ oe such as $C=(n+3)\times10$ (B2 for correct RHS or $C=n+3\times10$, $C=10n+3$ oe B1 for C = some other linear expression in n or for $n+3\times10$, $10n+3$ etc) Note: $C = n$ scores no marks
15		11 13 16 8 21	2	B2 all correct (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) (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) (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 $\frac{180-"60"}{2} + 90$ A1 ft from (a)(i) if $x < 90$ SC B1 for "60" + 90 if $x < 90$
18			40	2	M1 for 60×2 or 120 or $60 \div 3$ or 20 or $\frac{120}{180}$ A1 cao
19			correct drawing	2	B2 Condone hidden detail shown with solid lines and missing lines on front face (B1 for a correct sketch with other incorrect sketch(es) or for prism with correct cross section >1 cube wide or for attempt to draw prism with correct cross section 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 A1 for $20\text{-}21\frac{1}{3}$ 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 A1 cao
	(b)	eg $400\times\frac{750}{500}$	600	2	M1 for $\frac{750}{500}$ or 1.5 seen or 400 + 200 A1 cao

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
23	(a)	$4\times3-2\times1$ $12-2$	10	3	M1 for 3×4 (=12) or 1×2 or attempt to divide diagram up into rectangles M1 "12"– "2" or sum of areas of rectangles A1 cao
	(b)(i)	$\frac{10}{100}\times680$ or $680\div10$ 680 + 68	748	5	M1 $\frac{10}{100}\times680$ or 680÷10 or 68 seen M1 (dep) 680 + "68" or M2 for 680×1.10 A1 cao
	(ii)	"748"÷50 or 14.96	15		M1 For "748"÷50 or 14.96 Accept "748" rounded up or down to next 50 followed by $\div50$ A1 ft from (b)(i) rounded up SC B1 for 680 (seen) leading to 14

Paper 5521/02					
No		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	Plain llll lll 8 Chicken lll 3 Bovril llll 5 S & Vin llll 4		3	M1 for attempt to tally A1 for 1 frequency correct or all tallies correct 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 (B1 for one line correct)
	(c)		12	2	B2 cao (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 A1 for 4.45 M1 £10 – "4.45" A1 cao
	(b)	£60 ÷ £2.80 = 21.42857	21	2	M1 for £60 ÷ 2.80 or sight of digits 214… A1 for 21
	(c)	$120 \times 25 \div 100$	30	2	M1 ¼ of £120 (oe) A1 cao 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)	$\times 2 - 1$		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 "228" × 32	72.96	4	M1 2658 – 2430 A1 228 M1 "228" × 32 or "228" × 0.32 or digits 7296 seen A1 cao **Or** M1 for 2430 × 32 (or digits 77760 seen) or 2658 × 32 (or digits 85056 seen) A1 if 1 correct M1 for "85056" – "77760" or 7296 seen A1 cao
	(b)	$\frac{2}{5} \times 145 = 58$ 145 – "58"	87	3	M1 $\frac{2}{5} \times 145$ (or M1 $\frac{3}{5}$ seen) A1 58 (or M1 $\frac{3}{5} \times 145$) A1 for 87 ft
	(c)(i) (ii)		80 125	2	B1 for 80 (± 1) B1 125 (± 3)

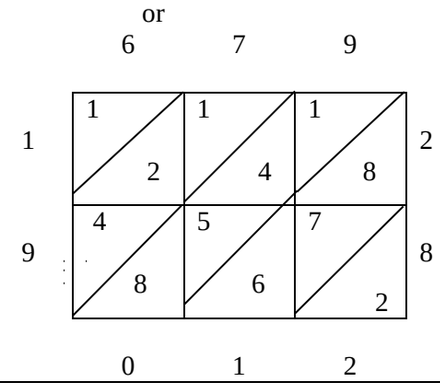
Paper 5521/02				
No	**Working**	**Answer**	**Mark**	**Notes**
10 (a)		1.5 – 2.0	1	B1 for height between 1.5m – 2.0m inclusive
(b)	Height of man × "2.5"	3 – 6	3	B3 for height between 3m – 6m inclusive (B2 for multiplying (a) by a number between 2 and 3 inclusive) (B1 for multiplying (a) by a number)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

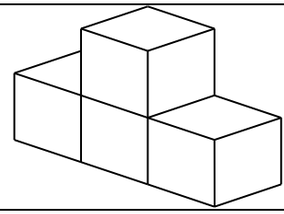
Paper 5521/02					
No		Working	Answer	Mark	Notes
19	(a)		Correct plane	2	B2 for a correct plane defined by showing at least 2 lines. (B1 for a line of symmetry on one face)
	(b)		Correct net	2	B2 cao (B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle joined appropriately to one of 3 rectangles)
	(c)		Correct drawing	2	B1 for two extra sides of length 6cm (± 2mm) 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) B1 line from (3, 20) to (5,0) or horizontal translation of it 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 $4x + a$ ($a > 0$) A1 for $4x + 8$ or $4(x + 2)$
	(b)	$4x + 8 = 54$ $4x = 46$ $x = 11.5$ Length = "11.5" + 4	15.5	3	M1 for "$4x + 8$" = 54 A1 cao for 11.5 seen B1 ft for "11.5" + 4
22		0.4 + 0.15 1 – "0.55"	0.45	2	M1 for 1 – sum A1 for 0.45 o.e. 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 π as 3.1 or better) A1 for 7.59 to 7.70

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

Paper 5523/03				
No	**Working**	**Answer**	**Mark**	**Notes**
1		Correct shape	2	B2 B1 for any 2 sides correct, or a correct enlargement scale factor ≠1 or 2.
2 (a)		11 13 16 8 21	2	B2 all correct (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) (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) (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 $\frac{(180-"60")}{2}+90$ A1 ft from (a)(i) if $x < 90°$ SC:B1 for answer from "60" + 90 if $x < 90°$

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
5	(a)	$4\times3-2\times1$ $12-2$	10	3	M1 for 3×4 (=12) or 1×2 or attempt to divide diagram up into rectangles M1 "12" – "2" A1 cao
	(b)(i)	$\frac{10}{100}\times680$ or $680\div10$ 680 + 68	748	5	M1 $\frac{10}{100}\times680$ or $680\div10$ or 68 seen M1 (dep) 680 +"68" (or M2 for 680×1.10) 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 $\div50$ A1 ft from (b)(i) rounded up SC B1 for 680 (seen) leading to 14
6	(a)	$2\times5+5\times-3=10-15=$	-5	2	M1 substitute e.g 2×5 and 5×-3 or 10 and -15 A1 cao
	(b)	5×4^2 - 7 5×16 - 7	73	3	M1 substitution e.g 5×4^2 -7; do not accept 54^2-7 M1 $5\times16-7$ or $5\times4\times4$-7 or 80 – 7 (NB 4^2 as 4×4) A1 cao

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
7		679 × 28 = 5432 + 13580 = 19012 or 28 × 679 = 252 + 1960 + 16800 = 19012 or  	190.12	3	M1 for an attempt to multiply the units and tens, or correct partitioning M1 complete correct method (condone one arithmetic error) A1 for 190.12 cao OR M1 for putting the numbers in a grid M1 for multiplying out and addition (condone one error) A1 answer shown with point OR M1 for correct partitioning M1 679×20 and 679×8 calculated oe (condone one error) 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 A1 cao
	(b)	eg $400 \times \frac{750}{500}$	600	2	M1 $750 \div 500$ or 1.5 seen or 400 + 200 A1 cao
10			$C = 10(n+3)$	3	B3 for $C = 10(n+3)$ oe such as $C = (n+3) \times 10$ (B2 for correct RHS or $C = n + 3 \times 10$, $C = 10n + 3$ etc B1 for C = some other linear expression in n or $n + 3 \times 10$, $10n + 3$ etc) NB: C=n scores no marks
11	(a)		$p(p+6)$	2	B2 for $p(p+6)$ or $p \times (p+6)$ (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 $x^2, -4x, 7x, -28$) A1 cao
12			correct drawing	2	B2. Condone hidden detail shown with solid lines, or missing lines on front face. (B1 for : one sketch correct with other sketches incorrect cross-section correct with depth > 1 cube, 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 A1 for 20 to 21 $\frac{1}{3}$ 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" (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 $x - y = 4$	$x = 7$ $y = 3$	3	M1 for either $x + y = 10$ or $x - y = 4$ A2 for both values correct [(A1 for one value correct) If M0, award B3 for both values correct or B2 for one value correct, otherwise B0] SC B2 for $x = 3$ and $y = 7$

Paper 5523/03				
No	**Working**	**Answer**	**Mark**	**Notes**
16 (a)	$5-3x=2x+2$ $5-2=2x+3x$	$\frac{3}{5}$	3	B1 for $2x+2$ seen OR $2.5-1.5x=x+1$ M1 for correct rearrangement of 4 terms 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. 2nd aspect: Response list (at least two), not overlapping.* 3rd aspect: Some mention of units (eg hours) in either question or responses Award B2 for all three aspects, or B1 for just two aspects. * 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 $\frac{2\times3}{3\times4}$ 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 A1 correct conversion : $\frac{8}{12}$ and $\frac{9}{12}$, or $\frac{20}{12}$ and $\frac{33}{12}$ seen (oe) A1 cao for $4\frac{5}{12}$ OR attempts to convert to decimals: must use at least 2dp M1 0.66+0.75 (or 1.66+2.75) or 0.67+0.75 etc A1 4.41, 4.417, 4.416 A1 4.416 (*recurring*)
19	$2\times\frac{1}{2}\times6\times8$ or 48 $8\times9+6\times9+10\times9$ or 72 +54 + 90	264 cm^2	4	M1 attempt to find the area of one face; $\frac{1}{2}\times6\times8$ or (8×9) or (6×9) or (10×9) or 72 or 54 or 90 or 24 M1 all five faces with an intention to add A1 cao numerical answer of 264 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) 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 $0.5\div 2$ A1 oe
	(b)	0.3×200	60	2	M1 0.3×200 A1 cao Accept 60 out of 200 (in words) 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 points joined with smooth curve	2	B1 ± 1 full (2mm) square ft table if at least B1 awarded (all 5 points plotted) B1 ft for any smooth curve if previous B1 gained NB: curve must pass within 1 full square of the points
23			$\frac{1}{4}$ on LH branch $\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches	2	B1 B1
24			m=3 n=5	2	B1 for 3 B1 for 5 (B2 for $2^3\times 5$ or $2\times 2\times 2\times 5$) SC: award B1 only if m=5, n=3 or for 8×5 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 A1 for -2 B2 ft for $y =$"-2"$x + 5$ oe (eg $y = \frac{-6}{3}x + 5$) (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)		30	3	B1 identifies angle between radius and tangent as $90°$ (may be in working or on diagram) M1 $360° - 90 - 90 -$"150" A1 ft from (a)(i) excluding a negative answer OR B1 for 90 M1 for $2 \times (180 - 90 -$"$\frac{150}{2}$"$)$ A1 ft from (a)(i) excluding a negative answer OR B3 for $180 -$(a)
		$360 - 90 - 90 -$"150"			

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 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 A1 cao
3	(a)	2.10 × 450	945	2	M1 for digits 210 × 450 or sight of digits 945 A1 cao
	(b)	63÷2.10	30	2	M1 for 63 ÷ digits 210 A1 cao
4		See diagram	$2(y + y)$ $2y + 2y$	2	B1 for $2(y + y)$ B1 for $2y + 2y$ (Deduct B1 for each additional tick (>2) to min 0)
5		360° ÷ 18 (=20) Sector angles: G= 60; S= 80; B=220; Correct sectors labelled correctly Use angle measurer	Angles drawn, labelled	4	B4 for fully correct and labelled pie chart (B3 for all angles correct or for a labelled pie chart with two angles correct) (B2 for labelled pie chart with one correct angle drawn) (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. (B1 for a line of symmetry on one face)
	(b)		Correct net	2	B2 cao (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) B1 for construction arcs 6cm from each of the ends of the given line
7		61 – 19 = 42 42 ÷ 3 = 14	14	2	M1 for –19 or 42 seen or $3x + 19$ A1 cao

Paper 5523/04					
No		Working	Answer	Mark	Notes
8	(a) (b) (c)		15 15	1 1 2	B1 cao for $15(\pm 1)$ B1 cao for $15(\pm 0.4)$ B1 horiz. line from (2,20) to (3,20) B1 line from (3,20) to (5,0) or horiz. translation of it 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 $4x+a$, $a>0$ A1 for $4x+8$ or $4(x+2)$
	(b)	$4x + 8 = 54$ $4x = 46$ $x = 11.5$ Length = "11.5" + 4	15.5	3	M1 for "$4x + 8$" = 54 A1 cao for 11.5 seen B1 ft for "11.5"+ 4
10		0.4 + 0.15 1 – 0.55	0.45	2	M1 for 1 – sum A1 for 0.45 oe SC: B1 for 0.81
11	(a) (b)	 $\pi \times 2.45$	3:1 7.7	1 2	B1 cao M1 for $\pi \times 2.45$ (accept π as 3.1 or better) A1 for 7.59 to 7.70
12		7×10000	70000	2	M1 for 7×10000 or $7 \times 100 \times 100$ A1 cao
13		$5.40 \div 3 \times 7$	12.60	3	M1 for $5.40 \div 3$ or sight of 1.8 M1 (dep) for "1.80" × 7 A1 for 12.6 or equivalent

Paper 5523/04				
No	**Working**	**Answer**	**Mark**	**Notes**
14	$7.60 \times \frac{17.5}{100} = 1.33$ 7.60 + 1.33 = 8.93 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) (Award M1 for 10%, 5% and 2½% correctly calculated) A1 for 8.93 or 893 M1 for 1650 × "8.93" or digits 147345 seen A1 cao Accept 14734.5 OR M1 for 1650×7.6 or 12540 seen M1 for "12540" $\times \frac{17.5}{100}$ or 2194.5 seen or "12540"×1.175 (oe) (Award M1 for 10%, 5%, and 2½% correctly calculated) M1 for "12540" + "2194.5" (dep on both previous M marks) or digits 147345 seen A1 cao accept 14734.5

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
15		$285 \times 1000/(60 \times 60) = 79.1\dot{6}$		3	M2 for $285 \times 1000 \div 60 \div 60$ or $80 \times 60 \times 60 \div 1000$ or for a correct method to obtain two comparable values e.g $80 \times 60 \times 60$ and 285×1000 (M1 for $285 \div 60 \div 60$ or 0.079(….) seen or $80 \times 60 \times 60$ or 288000 seen or for 285×1000 or 285000 seen or $80 \div 1000$ or 0.08 seen) A1 for 288 or 79.(….) or for two correctly calculated comparable values e.g 288000 and 285000
16	(a)	$4x + 12 = 6$ $4x = -6$	-1.5	3	B1 for $4x + 12$ or $x + 3 = \frac{6}{4}$ M1 for a correct re-arrangement of their 3 terms to isolate $4x$ or x 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 A1 oe

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
17		3→15 4→48 3.1→17.3(91) 3.2→19.9(68) 3.3→22.7(37) 3.4→25.7(04) 3.5→28.8(75) 3.4→25.7(04) 3.3→22.7(37) 3.35→24.1(95375)	3.3	4	B2 for trial between 3.3 and 3.4 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1 dp truncated or rounded
18	(a)	36 ÷ (7+3+2) "3" × 7	21	3	M1 for 36 ÷ (7+3+2) M1 (dep) for "3" × 7 or 3 or 2 A1 cao
	(b)	$51.5 \times \frac{8.5}{100} = 4.3775$ 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 M1 (dep) for 51.5 – "4.37(75)" A1 for 47 or better B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p OR M1 for $51.5 \times \frac{100-8.5}{100}$ M1 for $51.5 \times$"0.915" or 0.515 × "91.5" A1 for 47 or better B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		Angle in a semicircle	1	B1 oe
	(b)	$12^2 + 16^2 = 400$ $\sqrt{400} = 20$	20	3	M1 for $12^2 + 16^2$ M1 for $\sqrt{144+256}$ A1 cao
	(c)	$\pi \times 10^2$	314	3	M1 for $\pi \times \left(\frac{"20"}{2}\right)^2$ M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any r A1 for 314 – 315 inclusive

Paper 5523/04					
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) M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\frac{\sum fx}{\sum f}$ 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) 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. (SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)

Paper 5523/04				
No	**Working**	**Answer**	**Mark**	**Notes**
(d)		72–74	2	M1 (ft dep on graph being cf) for reading from graph at 7 A1 ft ±1 full (2 mm) square Or B2 for $72-74$
21 (a) (b) (c) (d)		a^7 $15x^3y^4$ $x-1$ $(x+3)(x-3)$	1 2 1 1	B1 accept a^{4+3} B2 cao (B1 for two of 15, x^3, y^4 in a product) B1 cao B1 cao
22	80% = 220 $220 \div 80 \times 100$	275	3	M1 for recognising that 80% is equivalent to 220 M1 for $220 \div 80 \times 100$ oe A1 cao

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
23			$x = 3$ $y = 0.5$	3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao SC: B1 for one correct answer only if M's not awarded
24			1.4×10^{10}	2	B2 for 1.4×10^{10} or 1.44×10^{10} (B1 for 14.4×10^{9} or 14400,000,000 or 14000,000,000 or 14×10^{9})
25	(a)	$\tan x = \frac{1.9}{3.2}$ $x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$	30.7	3	M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$ M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$ 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

Paper 5523/04				
No	**Working**	**Answer**	**Mark**	**Notes**
26	SF$=\frac{12}{9}$ $\frac{12}{9}\times 6=8$	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 A1 cao

Paper 5525/05					
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 $x^2,-4x,7x,-28$) A1 cao
	(b)		y^4+2y^2	2	B2 cao B1 for y^4 or $2y^2$
	(c)		$p(p+6)$	2	B2 for $p(p+6)$ or $p\times(p+6)$ (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. 2nd aspect: Response list (at least two), not overlapping.* 3rd aspect: Some mention of units (eg hours) in either question or responses Award B2 for all three aspects, or B1 for just two aspects. * 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" (B1 any statement including the word "reflection")
4	(a)	$5-3x=2x+2$ $5-2=2x+3x$	$\frac{3}{5}$	3	B1 for $2x+2$ seen OR $2.5-1.5x=x+1$ M1 for correct rearrangement of 4 terms 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)

Paper 5525/05					
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 $\frac{2\times3}{3\times4}$ 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 A1 correct conversion : $\frac{8}{12}$ and $\frac{9}{12}$, or $\frac{20}{12}$ and $\frac{33}{12}$ seen (oe) A1 cao for $4\frac{5}{12}$ OR attempts to convert to decimals: must use at least 2dp M1 0.66+0.75 (or 1.66+2.75) or 0.67+0.75 etc A1 4.41, 4.417, 4.416 or 0.41, 0.417, 0.416 or 0.42, 4.42 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 $x-y=4$	$x = 7$ $y = 3$	3	M1 for either $x + y = 10$ or $x-y=4$ A2 for both values correct [(A1 for one value correct) If M0, award B3 for both values correct or B2 for one value correct, otherwise B0] SC B2 for $x = 3$ or $y = 7$

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
7		$2\times\frac{1}{2}\times6\times8$ or 48 $8\times9+6\times9+10\times9$ or 72 +54 + 90	264 cm^2	4	M1 attempt to find the area of one face; $\frac{1}{2}\times6\times8$ or (8×9) or (6×9) or (10×9) or 72 or 54 or 90 or 24 or 48 M1 all five faces with an intention to add A1 cao numerical answer of 264 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) 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 A1 oe
	(b)	0.3×200	60	2	M1 0.3×200 A1 cao Accept 60 out of 200 (in words) 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 points joined with smooth curve	2	B1 ±1 full (2mm) square ft table if at least B1 awarded (all 5 points plotted) B1 ft for any smooth curve if previous B1 gained NB: curve must pass within 1 full square of the points
11			m=3 n=5	2	B1 for 3 B1 for 5 (B2 for $2^3\times5$ or $2\times2\times2\times5$) SC: award B1 only if m=3, n=3, for 8×5 seen

Paper 5525/05					
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 A1 for -2 cao B2 ft for $y=$"-2"$x+5$ oe (eg $y=\frac{-6}{3}x+5$) (B1 for $y=mx+5$ or , -2x+5 or $y=$"-2"$x+c$)
13	(a)		$\frac{1}{4}$ on LH branch $\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches	2	B1 cao 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 M1 for sum of two products A1 for $\frac{7}{12}$ oe
	(c)	$n=21\times4$ or $\frac{1}{6}:\frac{1}{4}$ oe $\frac{1}{6}\times84$ 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 M1 for 21×4 (=84) or $\frac{21}{3}\times2$ A1 for 14 cao SC: B2 for 63 seen in fraction or ratio

Paper 5525/05					
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) M1 $360° - 90 - 90 - "150"$ A1 ft from (a)(i) excluding a negative answer Or B1 for 90 M1 for $2 \times (180 - 90 - "\frac{150}{2}")$ A1 ft from (a)(i) excluding a negative answer Or B3 for $180 - (a)$ 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 $100x = 39.3939…$ $99x = 39$ so $x = \frac{39}{99} = \frac{13}{33}$		3	M1 for $100x = 39.39…$ M1 dep for subtraction of both sides A1 for $\frac{13}{33}$ from correct proof **Alternative method** M1 for $13.000 \div 33$ M1 for remainders 31 and 13 A1 for 0.39 recurring SC:B1 for $\frac{39}{99}$

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$d = kt^2$ $80 = k \times 4^2$	$d = 5t^2$	3	M1 for $d = kt^2$ or $d \propto t^2$ M1 sub d=80 and t=4 into their equation 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 A1 for 3 cao (condone inclusion of -3)
17	(a)(i) (ii)		(0, 9) (8, 25)	3	B1 cao B1 for $x = 8$ cao B1 for $y = 25$ cao SC: B1 for (25, 8)
	(b)	LHS = $\left(\frac{100-(x^2-16x+64)}{4}\right)$ = $\left(\frac{36+16x-x^2}{4}\right)$ 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 M1 for common denominator of 4 or multiplying through by 4 or reducing each numerator to a single term A1 for fully correct solution **Alternative method** M1 for $(5-\frac{(x-8)}{2})(5+\frac{(x-8)}{2})$ M1 for $(\frac{2\times5-(x-8)}{2})(\frac{2\times5+(x-8)}{2})$ A1 for $\frac{(18-x)(x+2)}{4}$

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
18	(a)	$\frac{810\pi}{90\pi}$ or 9 $\sqrt{9}$ or 3	12	3	M1 for $\frac{810\pi}{90\pi}$ or 9 or $\frac{1}{9}$ or 1:9 oe M1 for $\sqrt{\frac{810\pi}{90\pi}}$ or $\sqrt{9}$ or 3 or $\frac{1}{3}$ or $\sqrt{9}:\sqrt{1}$ oe A1 cao
	(b)	3^3 or 27 or 2700	2700π	2	SC:B1 for answer of 36 M1 for "3"^{3} or 27 or $\left(\sqrt{9}\right)^3 : (\sqrt{81})^3$ oe or 9^3 or 2700– 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 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 $\sqrt{27} = 3^{3/2}$ A1 for $\frac{5}{2}$ oe (cao) **Alternative method** M1 for $9\times27 = 3^{2n}$ A1 for $\frac{5}{2}$ oe (cao)

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
20	(a)(i) (ii) (b)(i) (ii)		(90, 1) (180, 0) (45, 0) (90, -3)	2 2 	B1 cao could be indicated on diagram B1 cao could be indicated on diagram B1 cao could be indicated on diagram B1 cao could be indicated on diagram
21		$\frac{1}{3}\pi x^2 h = \frac{4}{3}\pi(2x)^3$ $x^2 h = 4\times 8x^3$	$32x$	3	M1 for substitution in correct formulae M1 (dep.) for correct unsimplified expression eg $h = \frac{\frac{4}{3}\pi(2x)^3}{\frac{1}{3}\pi x^2}$ oe or $h = 8x$ oe A1 for $32x$ cao
22	(a)	$\left(\overline{OM} =\right)\ \boldsymbol{a} + 2\boldsymbol{b}$ $\left(\overline{ON} =\right) 3\boldsymbol{a}$ or $\frac{6}{2}\boldsymbol{a}$ $\left(\overline{MN} =\right)\ -\boldsymbol{a} - 2\boldsymbol{b} + 3\boldsymbol{a}$	$2\boldsymbol{a} - 2\boldsymbol{b}$	2	B2 (B1 for either $\overline{OM}$ or $\overline{ON}$ or $-\boldsymbol{a} - 2\boldsymbol{b} + 3\boldsymbol{a}$ SC: B1 for $2\boldsymbol{b} - 2\boldsymbol{a}$
	(b)	$\left(\overline{OX} =\right)\ 2\boldsymbol{a} + \boldsymbol{b}$ $\left(\overline{OY} =\right) \boldsymbol{b} + 4\boldsymbol{a}$ (½ $\overline{QR}$ =) $2\mathbf{a} - \boldsymbol{b}$ or (½ $\overline{RQ}$ =) $\boldsymbol{b} - 2\boldsymbol{a}$	$\overline{XY} = 2\boldsymbol{a}$ (hence parallel)	2	B1 for either $\overline{OX}$ or $\overline{OY}$ or (½ $\overline{QR}$) 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 A1 oe
	(b)	$x - 3 = 5x - 25$ $22 = 4x$	$5\frac{1}{2}$	3	M1 for $x - 3 = 5(x-5)$ or $\frac{x}{5} - \frac{3}{5} = x - 5$ M1 for isolating terms in x correctly from $ax + b = cx + d$ A1 cao accept $5\frac{1}{2}$, $\frac{11}{2}$, 5.5
2	(a)	$36 \div (7+3+2)$ "3" $\times 7$	21	3	M1 for $36 \div (7+3+2)$ M1 (dep) for "3" $\times 7$ or 3 or 2 A1 cao
	(b)	$51.5 \times \frac{8.5}{100} = 4.3775$ $51.5 - 4.3775 = 47.1225$	47 or 47.1 or 47.12	4	M1 for $51.5 \times \frac{8.5}{100}$ or 4.37(75) seen M1 (dep) for 51.5 – "4.37(75)" A1 for 47 or better B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p OR M1 for $51.5 \times \frac{100 - 8.5}{100}$ M1 for $51.5 \times$"0.915" or 0.515 ×"91.5" A1 for 47 or better 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 4→48 3.1→17.3(91) 3.2→19.9(68) 3.3→22.7(37) 3.4→25.7(04) 3.5→28.8(75) 3.4→25.7(04) 3.3→22.7(37) 3.35→24.1(95375)	3.3	4	B2 for trial between 3.3 and 3.4 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1 dp truncated or rounded
4	(a)		Angle in a semicircle	1	B1 oe
	(b)	$12^2 + 16^2 = 400$ $\sqrt{400} = 20$	20	3	M1 for $12^2 + 16^2$ M1 for $\sqrt{144+256}$ A1 cao
	(c)	$\pi \times 10^2$	314	3	M1 for $\pi \times \left(\frac{"20"}{2}\right)^2$ M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any r 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" $\div$ 120 = 6.08333	6.08	4	M1 for use of fx with x consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\frac{\sum fx}{\sum f}$ 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) 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. (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 A1 ft ±1 full (2 mm) square 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 (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 $(a + 3b)(a - 3b)$ (B1 for $(a \pm 3b)(a \pm 3b)$
7		80% = 220 $220 \div 80 \times 100$	275	3	M1 for recognising that 80% is equivalent to 220 M1 for $220 \div 80 \times 100$ oe A1 cao
8			$x = 3$ $y = 0.5$	3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao SC: B1 for one correct answer only if Ms not awarded
9			1.4×10^{10}	2	B2 for 1.4×10^{10} or 1.44×10^{10} (B1 for 14.4×10^9 or 14400,000,000 or 14000,000,000 or 14×10^9)

Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	$\tan x = \frac{1.9}{3.2}$ $x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$	30.7	3	M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$ M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$ 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)	$SF = \frac{12}{9}$ $\frac{12}{9} \times 6 = 8$	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 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 A1 cao

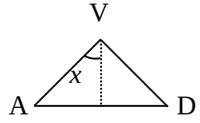
Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$84 = 6.7\pi + 2 \times 6.7 + 2a$ $2a + 13.4 = 62.95\ldots$ or $2a + 34.44 = 84$	24.8	3	M1 for substituting correctly, π may be left M1 for correct rearrangement as far as $\pm 2a$ A1 for $24.7 - 24.8$
	(b)	$P = \pi r + 2r + 2a$ $P - 2a = \pi r + 2r$ $P - 2a = (\pi + 2)r$	$\frac{P-2a}{\pi+2}$	3	M1 subtracting $2a$ from each side M1 for factorising to get $(\pi+2)r$ A1 for $\frac{P-2a}{\pi+2}$ oe 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 $\frac{1}{2} \times 14 \times 8 \times \sin 106$ M1 (dep) for $56 \times 0.961(26..)$ or $107.6\ldots$ A1 $53.8 - 53.9$ 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 500×1.045^{20} A1 for $1205.85 - 1206$ (SC:B1 for $705.85 - 706$ no working)

Paper 5525/06				
No	**Working**	**Answer**	**Mark**	**Notes**
15 (a)	$6x^2 + 11x - 10 + 6x - 4 = 25$ $6x^2 + 17x - 39 = 0$		3	M1 for an expression for the area involving either $(3x-2)(2x+5)+2(3x-2)$ or $3x(3x-2)+(3x-2)(7-x)$ or $3x(2x+5)-2(7-x)$ or $(3x-2)^2 + 2(3x-2) + (3x-2)(7-x)$ where in each case at least one of 2 or 3 product terms must be correct M1 (indep) for one correct expansion involving x^2 A1 for simplification to final answer

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

Paper 5525/06					
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) M1 for P(win) = " $\frac{2}{5}$ " $\times$ " $\frac{3}{5}$ " + " $\frac{2}{5}$ " $\times$ " $\frac{1}{5}$ " A1 for $\frac{8}{25}$, oe
	(b)	$\frac{8}{25}$ $\times$ 100 (=32) 100 $\times$ 20 – "32" $\times$ 50	£4	2	M1 for (" $\frac{8}{25}$ " $\times$100)$\times$50 or $\times$ 0.5 A1 cao

Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
17		Lower bound of 1200 is 1150 Upper bound of 60 is 65 $1150 \div 65$	17	4	B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (Lower bound of load) ÷ (Upper bound of weight) Where 1150 ≤ LB load < 1200 and 60 < UB Weight ≤ 65 A1 for 17 requires fully correct working OR B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (upper bound of load) ÷(lower bound of weight) Where 1200 ‹ UB load ≤ 1250 and 55 ≤ LB weight < 60 A1 for 22 requires fully correct working OR M2 $1200 \div 55$ A1 21.8 A1 21 requires fully correct working OR M2 $1200 \div 65$ A1 18.4(6) A1 18 requires fully correct working
18	(a)	$3^4 x^4 y^8$	$81x^4y^8$	2	B2 for $81x^4y^8$ (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 $x(x-3)$ B1 for $(x-5)(x-3)$ B1 cao

Paper 5525/06					
No		Working	Answer	Mark	Notes
19	(a)	$6^2 - 2^2 = 32$	5.66	2	M1 for $6^2 - 2^2$ (= 32) A1 5.65 – 5.66
	(b)	V  $DVA = 2 \times \sin^{-1}(\frac{2}{6})$ OR $\cos DVA = \frac{6^2 + 6^2 - 16}{2 \times 6 \times 6}$ $= \frac{56}{72}$ $DVA = \cos^{-1}\left(\frac{56}{72}\right) = 38.94$	38.9	3	M1 $\sin x = \frac{2}{6}$ oe M1 for $DVA = 2 \times \sin^{-1}(\frac{2}{6})$ A1 38.9 – 38.95 OR M1 for $(\cos DVA =) \frac{6^2 + 6^2 - 4^2}{2 \times 6 \times 6}$ M1 for $DVA = \cos^{-1}\left(\frac{56}{72}\right)$ A1 38.9 – 38.95

Paper 5525/06				
No	**Working**	**Answer**	**Mark**	**Notes**
19 (c)	$AC^2 = 2^2 + 2^2 - 2 \times 2 \times 2 \times \cos 120^o$ $AC = \sqrt{12}$ **OR** $AN = 2 \times \sin 60 = \sqrt{3}$ **OR** VN = $\sqrt{"32"+1} = \sqrt{33}$ $\cos AVC = \frac{6^2 + 6^2 - 12}{2 \times 6 \times 6}$ $\cos AVC = \frac{60}{72}$ **OR** $AVC = 2 \times \sin^{-1}\frac{\sqrt{3}}{6}$, using AN **OR** $AVC = 2 \times \cos^{-1}\frac{\sqrt{33}}{6}$, using VN	33.6	4	M1 for any valid method for AC or AN or VN where N is the midpoint of AC A1 for $AC^2 = 12$ or $AC = \sqrt{12}$ (= 3.46…) or $AN = \sqrt{3}$ (=1.73…)or $VN = \sqrt{33}$ (=5.74…) M1 (indep) for correct method to find angle AVC A1 33.55 – 33.6

Paper 5525/06					
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 $\begin{pmatrix}-1\\0\end{pmatrix}$ 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 A1 through all 3 points; $\pm\frac{1}{4}$ sq not on grid at $x = 2$

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Mark Scheme

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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.

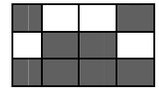
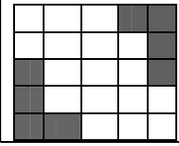
9 Parts of questions

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

Remember: if you are having difficulty making a decision on how you should mark a candidate response contact your Team Leader for advice, or send the item to review.

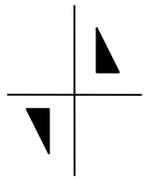
Paper 5521_01					
No		Working	Answer	Mark	Notes
1		Cat |||| /||| 8 Dog |||| | 6 Fish || 2 Hamster |||| 4	8, 6, 2, 4	3	M1 for attempt to tally or one frequency correct in either column A1 for 1 frequency correct or all tallies correct in correct column A1 for all frequencies correct (accept if /20)
2			27, 35, 42, 67, 118	1	B1 cao
3	(a)		Diameter drawn	1	B1 for a diameter
	(b)		Right angle marked	1	B1 *R* marked correctly
	(c)		Rectangle drawn	1	B1 for a rectangle
4	(a)		40	1	B1 cao
	(b)		50	1	B1 cao
	(c)		3 full loaves 4 full loaves + 1 half loaf	2	B1 for 3 full loaves B1 for 4 full loaves + 1 half loaf
5	(a)		7252	1	B1 cao
	(b)		Three thousand and eighty six	1	B1 accept 3 thousand and eighty six (condone 0 hundred)
	(c)		4600	1	B1 accept 4600
	(d)		200	1	B1 for 200 or 2 hundred or 100 or hundred
6	(i)		Cube	2	B1 for 'cube' (accept 'cuboid') ignore spelling
	(ii)		Cylinder		B1 for 'cylinder' ignore spelling
7		5×100	500	2	B2 for 490 or 500 or 510 (B1 for either 5 or 5.0 or 100 seen)

Paper 5521_01					
No		Working	Answer	Mark	Notes
8	(a)		8.4 cm or 84 mm	2	B2 allow ±2mm (B1 for 8.4 or 84, B1 for appropriate unit)
	(b)		37°	1	B1 allow ±2°
9	(a)		Carbon black	1	B1 accept 'black carbon' accept 26%
	(b)		0.1(0)	1	B1 cao
	(c)		0.04	1	B1 cao
	(d)	$\frac{26}{100}$	$\frac{13}{50}$	2	M1 for $\frac{26}{100}$ A1 cao
10	(a)		97	1	B1 cao
	(b)		London Reading	1	B1 cao
	(c)	41 + 57 + 58	156	3	M1 for two of 41, 57, 58 M1(dep) for '41' + '57' + '58' A1 cao
11	(a)		3	1	B1 cao allow ± 0.2
	(b)		–5	1	B1 cao allow ±0.2

Paper 5521_01					
No		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		Centimetres (cm) miles litres (*l*)	3	B3 (B1 for each correct answer) accept abbreviations
	(b)		300	1	B1 cao
	(c)	'1500>1400' or '1.5>1.4'	Reason	1	B1 for No and '1500>1400' or '1.5>1.4'
13	(a)	Height of bars 12, 8, 6 lines drawn between points	Bars drawn	2	B2 for 3 bars correctly drawn (B1 for 2 bars correct)
	(b)		July and August	1	B1 oe
	(c)	24 – 4	20	1	B1 (Accept '4 to 24' oe)
	(d)	The temperatures are rising	Temp's rising oe	1	B1 for reason
14	(a) (i)		$(-4, 3)$	2	B1 cao
	(ii)		$(2, -1)$		B1 cao
	(b) (i)	*D* marked at $(-4, -1)$	Point marked on grid	2	B1 for point marked at $(-4, -1)$ cao
	(ii)		$(-4, -1)$		B1 ft
15	(a)			1	B1 cao
	(b)			1	B1 cao

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
16 (a)		(Pat +) reason	1	B1 correct comment (Pat may be implied)
(b)	$21 \div 3$	7	1	B1 cao
17 (i)		S marked at 1	3	B1 for S within ½ cm of 1
(ii)		P marked at 0		B1 for P marked at 0 cao
(iii)		Q marked at "1/3"		B1 for Q marked at 1/3 ± 1 cm use overlay
18	$6 + 6 + 3$ or $2\frac{1}{2} \times 6$	15	3	M1 for realizing 6 glasses in one bottle M1 for realizing 3 glasses in ½ a bottle A1 cao (M2 for attempt to find $2\frac{1}{2} \times 6$) oe
19	15 and 16 parts shaded Alternative 1 $\frac{3}{4} = 0.75$, $\frac{4}{5} = 0.8$ Alternative 2 $\frac{3}{4} = \frac{15}{20}$, $\frac{4}{5} = \frac{16}{20}$	$\frac{4}{5}$ + reason	3	M1 for correctly shading 15 parts for 3/4 M1 for correctly shading 16 parts for 4/5 A1 (dependent on M2) for selection of 4/5 Alternative 1 M1 for $\frac{3}{4} = 0.75$ M1 for $\frac{4}{5} = 0.8$ A1 (dep on M2) for selection of 0.8 or $\frac{4}{5}$ or $\frac{16}{20}$ Alternative 2 M1 for $\frac{3}{4} = \frac{15}{20}$ M1 for $\frac{4}{5} = \frac{16}{20}$ A1(dep on M2) for selection of $\frac{4}{5}$ or $\frac{16}{20}$

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
20 (a)		−5 (−3) (−1) 1 3 5	2	B2 cao (B1 for any 2 or 3 correct)
(b)	Points plotted	Line	2	B2 for line from (−1, −5) to (4, 5) (B1 ft for plotting at least 5 "points")
21	Shapes shaded on grid	6 tessellating shapes	2	B2 for fully correct with 5 or more additional shapes, no gaps (B1 for 4 shapes tessellating with at least one shape inverted, with or without the given shape ignore extras)
22 (a)		$\frac{7}{20}$	1	B1 for $\frac{7}{20}$ oe
(b)	7 + 2 (or 20 – 11) are not lime flavour	$\frac{9}{20}$	1	B1 for $\frac{9}{20}$
(c)		0	1	B1 for 0, zero or nought ($\frac{0}{20}$ gets B0)
23 (a)		$4a$	1	B1 accept $4\times a$, $a \times 4$, $a4$
(b)		$12b$	1	B1 accept $12\times b$, $b \times 12$, $b12$
(c)		$2a + 6b$	2	B2 cao (B1 for $2a$ or $6b$ seen)
(d)		$x(x-6)$	2	B2 cao (B1 for $x(ax+b)$ where a, b are numbers not equal to 0 or $x - 6$ seen on its own, or as part of an expression)
24 (a)		40	1	B1 cao
(b)		45	1	B1 for 42 – 48 accept ¾ hour
(c)	40×2 or $\frac{40}{30}\times 60$ or $40\div\frac{1}{2}$	80	2	M1 for 40×2 or $\frac{40}{30}$ or $40\div\frac{1}{2}$ A1 cao NB $\frac{40}{45}\times 60$ gets M0 A0

Paper 5521_01					
No		**Working**	**Answer**	**Mark**	**Notes**
25	(a)		4560	1	B1 cao
	(b)		45.6	1	B1 cao
	(c)		2.4	1	B1 cao
26		$-7 - 3 = -10$ $2 \times -10 = -20$ $-20 \div 4$	-5	3	M1 for substitution of 2 and -7 into $p(q - 3)$ or sight of -20 or $-14 - 6$ M1dep for '-20' $\div 4$ A1 cao B1 SC for sight of -10 if M0 awarded
27	(a)		Reflection in y-axis	1	B1 cao
	(b)		Rotation by half turn about (0,0)	2	B2 cao (B1 for half turn not about (0,0).)
	(c)		Enlargement Scale factor 3 Centre (0,0)	3	B1 for 'enlargement' B1 for "scale factor 3" or 3 seen B1 for 'centre (0,0)
28	(a)		Reason	1	B1 for 'The frequencies are nearly equal' oe
	(b)	$1\times26+2\times26+3\times23+4\times25 = 247$ $247/100$	2.47	3	M1 for fx (attempting at least 2 relevant products) M1 for $\sum fx \div 100$ A1 2.47 cao

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
29	5 × 5 × 6	150	4	M1 for attempt at 1 division (e.g. 40 ÷ 8), may be implied by marks or number on one edge of diagram or by 5 or 6 seen M1 for attempt at 3 divisions (40÷8, 40÷8, 60÷10), may be implied by marks or numbers on diagram or by 5,5 and 6 seen. M1 (dep on 1st M1) for "5" × "5" × "6" A1 cao Alternatively M1 for 40 × 40 × 60 **or** 8 × 8 × 10 **or** 96000 or 640 seen M1 for 40 × 40 × 60 **and** 8 × 8 × 10 or 96000 **and** 640 seen M1 (dep on 1st M1) for "(40 × 40 × 60)" ÷ "(8 × 8 × 10)" A1 cao SC:B1 for dividing area of one carton face by area of corresponding box face if M0

Paper 5521_02					
No		Working	Answer	Mark	Notes
1	(a)	Draw diagram.	Diagram	1	B1 cao
	(b)		13,16	1	B1 cao
	(c)		31	1	B1 cao
2	(a)		8	1	B1 cao
	(b)		14	2	B2 for 14 (B1 for 13 or 15)
	(c)		16	2	B2 for 16 (B1 for 15, 17 or 8)
3	(a)		4,7 drawn	2	B2 for car height 4 and bus height 7, (B1 for one correct)
	(b)		6	1	B1 cao
	(c)		Walk	1	B1
	(d)		27	1	B1 cao
4	(a)		40	1	B1 for 40–41 inclusive
	(b)		12	1	B1 for 11.5 – 12.5 inclusive
5	(a)		Row complete	2	B2 for 1+..+11; 36 (B1 for one of the 2 cells complete)
	(b)		Square	1	B1 "square"
6		One line of symmetry		1	B1 within 2mm of centre of base / 2mm of vertex

Paper 5521_02				
No	**Working**	**Answer**	**Mark**	**Notes**
7 (a) (i)		09 06	2	B1 (accept 9 06 oe)
(ii)		39		B1 cao
(b)		06 55	1	B1 (accept 6 55 oe)
(c)		2h 6min	1	B1 cao
(d)		15 min	2	M1 for 0906 – 0645 – "(c)" or 0906 – 0645 − 2hr 6min or 2hr 21min − "(c)" or 2hr 21min − 2hr 6 min or 141 − 126 or 20 − 5 A1 cao SC: B1 for 55 or 75 or 93 seen
8 (i)		8,10,12,20 or 30	3	B1 at least one of 8, 10, 12, 20, 30 (no extras)
(ii)		8,12 or 20		B1 at least one of 8,12, 20 (no extras)
(iii)		3 or 5		B1 3 or 5 or both (no extras)
9 (a)		C or G	1	B1 at least one of C or G (no extras)
(b)		A and F	1	B1 cao
(c)		2	1	B1 (accept –2)
10 (a)		$\frac{7}{10}$	1	B1 7/10 oe
(b)(i)		4 squares	2	B1 4 squares shaded
(ii)		80%		B1 80% or ft from unshaded part (no ft from 0% or 100%)
(c)(i)		2.5	2	B1 2.4–2.6 inclusive
(ii)		1.7		B1 1.6–1.8 inclusive
11 (a)		2	1	B1 for 2 or –2
(b)		14	1	B1 for 14 or –14

Paper 5521_02					
No		**Working**	**Answer**	**Mark**	**Notes**
12		2 × 8.50 = 17.00 3 × 4.50 = 13.50 Total = 30.50 50.00 – 30.50	19.5(0)(*p*)	3	M1 for adding 5 correct values or 2 × 8.50 + 3 × 4.50 (ignore units) or 30.5(0) or 3050 seen M1 dep for 50 − "30.50" (ignore units) (OR M1for adding at least 1 adult ticket and at least 1 child ticket **and** subtracting from 50) A1 cao SC: B1 for 24 or 37 or 2400 or 3700 seen
13	(a)		Hexagon	1	B1
	(b)(i)		120	2	B1 cao
	(ii)		Str line		B1 reference to a (straight) line and 180°
	(c)		Obtuse	1	B1 Accept "interior"
14	(a)	2, 2, 3, 3, 3, 4, 4, 4, 5, 6	3.5	2	M1 ordering the numbers (condone 1 error or omission) A1 cao
	(b)	36 ÷ 10	3.6	2	M1 sum of numbers ÷ 10 A1 cao SC B1 for 3r 6
	(c)	6 – 2	4	1	B1 cao
15	(a)		Paul	1	B1 cao
	(b)	36 ÷ 2 oe	18	1	B1 cao
	(c)	60/360 =	1/6	2	M1 60/360 oe A1 cao

Paper 5521_02					
No		**Working**	**Answer**	**Mark**	**Notes**
16		4.7 ÷ 5.9 = 0.796610169	0.7966..	2	B2 for 0.7966 or better (B1 for 0.8, 0.80, 0.79, 0.796, 0.797 or digits 59 seen
17		$6x - 7 + 7 = 38 + 7$ $6x = 45$	7.5	2	M1 $6x = 45$ or +7 both sides A1 7.5 oe; accept 45/6 oe
18		**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	3	B3 all six entries correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
19	(a)	900 × 1.70 =	1530	2	M1 900 × 1.7(0) or digits 153(0) seen A1 cao
	(b)	160 ÷ 1.70 =	£94.12 or £94.11	2	M1 160 ÷ 1.7(0) or digits 941(....) seen A1 cao
20	(a)(i)	180 – 54 (=126) "126" ÷ 2	63	3	M1 for (180–54) ÷ 2 A1 cao
	(ii)		Reason		B1 (indep) angles in triangle add to 180 OR equal angles in isosceles triangle OR equal angles and 2 sides the same (B0 if any incorrect reasoning given eg parallel, equilateral triangle)
	(b)	180 – "x"	117	1	B1 117 or ft 180 – "x" if $x < 90$
21	(a)	3 × 35 + 50	155	2	M1 for 3 × 35 + 50 or digits 155 seen A1 cao
	(b)	260 – 50 = 210 210 ÷ 35 =	6	3	M1 for 260–50 or 210 seen. M1 for "260-50" ÷ 35 or 210÷35 A1 cao SC B1 for starting at a number between 100 and 170 and adding at least two 35's and showing a total between 230 and 290 OR For adding at least three 35's, perhaps with other numbers, and showing a total between 180 and 240 (or between 230 and 290 if 50 is included in the sum)

Paper 5521_02				
No	**Working**	**Answer**	**Mark**	**Notes**
(c)		P=35h + 50	3	B3 for P=35h+50 or P=35×h+50 oe (B2 for correct RHS or P=h + 50 ×35 or P=35h+k where k is numerical oe) (B1 for P = some other linear expression in h, OR h + 50 ×35 OR 35h seen) NB: P=h scores no marks; ignore £ signs. SC B2 for $h = \frac{P-50}{35}$
22 (a)		Elevation	2	B2 for 4 vertical squares. Accept 4 by 1 rectangle. (B1 for 4 vertical squares with one square added or one parallelogram added at the top, or 3 vertical squares, or 4 horizontal squares)
(b)		Plan	2	B2 for 2 adjacent squares, vertical or horizontal. Accept 2 by 1 rectangle. (B1 for 3 adjacent horizontal or vertical squares or a rectangle with sides in the ratio 2:1)
23 (i) (ii) (iii)		5 9 6	3	B1 cao B1 cao B1 cao
24	$45.00 + 45.00 \times \frac{15}{100} =$ $45.00 + 6.75 =$	51.75	3	M2 for $45.00 + 45.00 \times \frac{15}{100}$ oe or 45.00×1.15 oe OR $45.00 + 6.75$ OR complete method or 5175 seen. (M1 for $45.00 \times \frac{15}{100}$ oe OR 6.75 seen OR 675 seen OR correct method for calculating 15% of 45) A1 cao SC Award B2 for an answer of 38.25

Paper 5521_02				
No	**Working**	**Answer**	**Mark**	**Notes**
25 (a)		Points	1	B1 all three points ±1 full square
(b)		Negative	1	B1 Negative (ignore additional descriptors unless contradictory)
(c)		lobf	1	B1 A single straight line drawn to cross between (5,30), (5,40) and (40,0), (40,15); accept freehand if considered to be straight.
(d)(i)		18–25	2	B1 18g–25g inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient.
(ii)		30–40		B1 30–40 min inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient
26		300 3 75 150	3	B3 for 4 correct answers (B2 for 2 or 3 correct answers) (B1 for 1 correct answer)
27	π × 0.65	2.04–2.05	2	M1 for π × 0.65 or 3.14 x 0.65 or 3.142 x 0.65 A1 for 2.04–2.05 SC Award B1 for 2.0 seen (not 2)
28	5 miles = 8 km 70mph÷5×8 = 112 km/h OR 120km/h ÷ 8 × 5 = 75 mph Faster than 70 mph	70mph (Great Britain) (112 km)	3	M1 5 miles = 8 km; OR 70 mph is about 100 km/h OR 1km=0.6(25) miles OR 1mile=1.6km oe M1 70 ÷ 5 × 8 (=112) or 120 ÷ 8 × 5 (=75) A1 (dep on at least M1) GB or 70 mph Refer to both answer line and working. NB GB or 70 mph without working scores 0 marks

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
1		Cuboid drawn	2	B2 for correct isometric drawing in any orientation (ignore points 'behind', mark 7 vertices only); accept lines drawn near to dots as long as there is no ambiguity. (B1 for one of the three faces drawn correctly **or** for an isometric drawing of any cuboid)
2	Different makes of car Tally Frequency	Make of car Tally Frequency	3	B1 for make of car or list of at least 3 different makes B1 for tally or tally marks B1 for frequency or totals
3		6 tessellating shapes	2	B2 for fully correct with 5 or more additional shapes, no gaps (B1 for 4 or more shapes tessellating, with at least one shape inverted, with or without the given shape, ignore extras)
4	24.90 ÷ 3 or 8.30 24.90 – '8.30' or 2 × 8.30	16.6(0)	3	M1 for 24.90 ÷ 3 or 8.30 M1 (dep) for 24.90 – “8.30” or 2 × “8.30” A1 for 16.60 or 16.6

Paper 5523_03

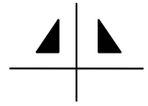
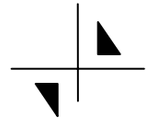
No	Working	Answer	Mark	Notes
5	315 × 24 24 × 315 1260 6300 7560 7200 7560 **3 1 5** 0 6 | 0 2 | 1 0 **2** 1 2 | 0 4 | 2 0 **4** 7 5 6 0 **300 10 5** 6000 | 200 | 100 **20** 1200 | 40 | 20 **4** 6000+200+100+1200+40+20 = 7560 **3 0.1 0.05** 60 | 2 | 1 **20** 12 | 0.4 | 0.2 **4** 60 + 2 + 1 + 12 + 0.4 + 0.2 = 75.6	75.6(0)	3	M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. **OR** M1 for a complete grid with not more than 1 multiplication error, addition not necessary. **OR** M1 for sight of a complete partitioning method, condone 1 multiplication error, final addition not necessary. A1 for 7560 or digits 756(0) A1 (dep on M1, but not previous A1) for correct placement of decimal point.

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
6	15 and 16 parts shaded Alternative 1 $\frac{3}{4} = 0.75$ or 75%, $\frac{4}{5} = 0.8$ or 80% Alternative 2 $\frac{3}{4} = \frac{15}{20}$, $\frac{4}{5} = \frac{16}{20}$	$\frac{4}{5}$ + reason	3	M1 for shading 15 parts for $\frac{3}{4}$ M1 for shading 16 parts for $\frac{4}{5}$ A1 (dep on M2) for selection of $\frac{4}{5}$ with correct shading Alternative 1 M1 for $\frac{3}{4} = 0.75$ or 75% M1 for $\frac{4}{5} = 0.8$ or 80% A1 (dep on M2) for selection of 0.8 or 80% or $\frac{4}{5}$ with correct decimals or percentages Alternative 2 M1 for $\frac{3}{4} = \frac{15}{20}$ oe M1 for $\frac{4}{5} = \frac{16}{20}$ oe A1 (dep on M2) for selection of $\frac{4}{5}$ or $\frac{16}{20}$ with equivalent fractions

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
7		$5 \times 5 \times 6$	150	4	M1 for attempt at 1 division (e.g. 40 ÷ 8), may be implied by marks or number on one edge of diagram or by 5 or 6 seen M1 for attempt at 3 divisions (40÷8, 40÷8, 60÷10), may be implied by marks or numbers on diagram or by 5,5 and 6 seen. M1 (dep on 1st M1) for "5" × "5" × "6" A1 cao Alternatively M1 for 40 × 40 × 60 **or** 8 × 8 × 10 **or** 96000 or 640 seen M1 for 40 × 40 × 60 **and** 8 × 8 × 10 or 96000 **and** 640 seen M1 (dep on 1st M1) for "(40 × 40 × 60)" ÷ "(8 × 8 × 10)" A1 cao SC:B1 for dividing area of one carton face by area of corresponding box face if M0
8	(a)		$\frac{7}{20}$	1	B1 for $\frac{7}{20}$ oe
	(b)	7 + 2 (or 20 – 11) are not lime flavour	$\frac{9}{20}$	1	B1 for $\frac{9}{20}$ oe
	(c)		0	1	B1 for 0, zero or nought ($\frac{0}{20}$ gets B0)
9	(a)		$80x$	1	B1 for $80x$ (accept $80 \times x$, $x80$, $x \times 80$) seen
	(b)		$95y$	1	B1 for $95y$ (accept $95 \times y$, $y95$, $y \times 95$) seen
	(c)		$80x + 95y$	2	M1ft for adding "$80x$" and "$95y$" (algebraic expressions only) A1 for $80x + 95y$

Paper 5523_03

No	Working	Answer	Mark	Notes
10 (a)		40	1	B1 cao
(b)		45	1	B1 for 42 to 48 (accept 3/4 hour)
(c)	40×2 or $\frac{40}{30}\times60$ or $40\div\frac{1}{2}$	80	2	M1 for 40×2 or $\frac{40}{30}$ or $40\div\frac{1}{2}$ A1 cao NB $\frac{40}{45}\times 60$ gets M0 A0
11 (a)	$3\times3-4\times2$ or $9-8$	1	2	M1 for substitution of 3 and 2 into expression or 9 and 8 seen A1 cao
(b)	$-7-3=-10$ $2\times-10=-20$ $-20\div4$	-5	3	M1 for substitution of 2 and -7 into $p(q-3)$ or sight of -20 or $-14-6$ M1 (dep) for "-20" $\div 4$ A1 cao SC: B1 for -10 seen if M0
12 (a)	6 | 8 9 7 7 | 8 5 9 6 3 8 | 1 3 1 7 1 9 | 0 1	6 | 7 8 9 7 | 3 5 6 8 9 8 | 1 1 1 3 7 9 | 0 1	3	M1 for unordered diagram (condone one error) A1 cao B1 for key (eg 6 | 7 = 67)
(b)(i)		Explanation	2	B1 for '(order numbers and) select middle value' oe
(ii)		79		B1 cao

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
13	(a)		Reflection in y-axis	1	B1 for triangle with vertices at (-1, 1) (-3, 1) and (-1,4)
	(b)		Rotation by half turn about (0, 0)	2	B2 for triangle with vertices (-1, -1) (-3, -1) and (-1, -4) (B1 for half turn not about (0,0))
	(c)		Enlargement Scale factor 3 Centre (0, 0)	3	B1 for 'enlargement' B1 for 'scale factor 3' or 3 seen B1 for 'centre (0,0)' B0 for any combination of transformations
14	(a)		4560	1	B1 cao
	(b)		45.6	1	B1 cao
	(c)		2.4	1	B1 cao
15	(a)	$4a-2a+5b+b$	$2a+6b$	2	B2 cao (B1 for $2a$ or $6b$ seen)
	(b)		$x(x-6)$	2	B2 cao (B1 for $x(ax+b)$ where a, b are numbers not equal to zero or $x-6$ seen on its own, or part of an expression)
	(c)		$3x-2x^3$	2	B2 cao (B1 for $3x$ or $2x^3$)
	(d)		$4x(3y+x)$	2	B2 cao (B1 for $2(6xy+2x^2)$ or $4(3xy+x^2)$ or $x(12y+4x)$ or $2x(6y+2x)$ or $4x(\quad)$)

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$1 - (0.2 + 0.3 + 0.1)$	0.4	2	M1 for $1 - (0.2 + 0.3 + 0.1)$ A1 for 0.4 oe, accept $\frac{0.4}{1}$
	(b)	0.2×200	40	2	M1 for 0.2×200 A1 cao NB $\frac{40}{200}$ is M1 A0, 40 out of 200 is M1 A1
17	(a) (i)	$180 - 2 \times 25$	130	3	M1 for $180 - 2 \times 25$ A1 cao
	(ii)		Reason		B1 for mentioning isosceles and equal (or base) angles or equal sides and equal (or base) angles
	(b)	$180 - 95$	85	1	B1 cao
18	(a) (i)		7^5	3	B1 cao
	(ii)		7^4		B2 cao (B1 for sight of 7^5 or 7^{2+3} or 7×7^3 or $7^1 \times 7^3$ or $7^2 \times 7^2$ or 7^{2+3-1})
	(b)		$\frac{1}{2}$	1	B1 for $\frac{1}{2}$ or 0.5 or 2^{-1}
19	(a)		3×10^7	1	B1 cao
	(b)		0.002	1	B1 cao

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
20		Box plot	2	3 aspects: 1st aspect – vertical line for median 2nd aspect – box using correct quartiles 3rd aspect – whiskers (could be single line) drawn with correct end points B2 for fully correct box plot (B1 for 1 aspect)
21 (a)	e.g. 2 | 126 3 | 63 3 | 21 7	$2\times3\times3\times7$	2	M1 for a systematic method of at least 2 correct divisions by a prime number oe factor trees; can be implied by digits 2, 3, 3, 7 on answer line. A1 for $2\times3^2\times7$ or $2\times3\times3\times7$
(b)	$2\times3\times7$	42	2	B2 cao (B1 for 6, 14, 21 or $2\times3\times7$)
22	$\frac{8}{3}\times\frac{5}{4}=\frac{8\times5}{3\times4}=\frac{40}{12}$	$3\frac{1}{3}$	3	B1 for $\frac{8}{3}$ oe improper fraction or $\frac{5}{4}$ oe improper fraction M1 (dep on B1) for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{5}{4}$" A1 for $3\frac{1}{3}$ oe mixed number or $\frac{10}{3}$ OR B1 for 1.25 and 2.67 or 2.66(…) M1 (dep on B1) for correct method of multiplication A1 for $3.\dot{3}$

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
23			2	M1 for a relevant pair of intersecting arcs A1 for line drawn within guidelines, at least 3cm in length, accept broken line [SC: B1 for line drawn within guidelines if M0]
24 (a)		$-1, 0, 1, 2, 3$	2	B2 cao (-1 each error or omission)
(b)(i)		$x \geq \frac{7}{2}$	3	M1 for $2x \geq 7$, condone use of = sign or wrong equality A1 for $x \geq \frac{7}{2}$ oe as final answer
(ii)		4		SC:B1 for 3.5 or $\frac{7}{2}$ seen if M0 B1 ft from $x \geq$ "$\frac{7}{2}$"
25	$4x + 2y = 8$ $4x - 10y = 20$ $12y = -12$ $y = -1$ $4x + 2(-1) = 8$ $x = 2.5$	$x = 2.5$ $y = -1$	3	M1 for correct process to eliminate either x or y (condone one arithmetical error) M1 (dep) for substituting found value into either equation A1 for $x = 2.5$, $y = -1$ [SC: B1 for $x = 2.5$ or $y = -1$ if M0]

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
26		Interior angle of hexagon = 180 – (360 ÷ 6) = 120 360 – (90 + 120)	150	4	Alternative 1 M1 for 360 ÷ 6 A1 for 60 M1 (dep on M1) for "60" + 90 A1 cao Alternative 2 M1 for 360 ÷ 6 A1 for 60 M1 (dep on M1) for 360 – (2 × "60" + 90) A1 cao Alternative 3 M1 for (6 – 2) × 180 ÷ 6 A1 for 120 M1 (dep on M1) for 360 – (90 + "120") A1 cao
27	(a)		(16), 50, 82, 96, 100	1	B1 cao
	(b)	Cumulative freq. diag. curve/ segments	Cum. freq graph	2	B1 for 4 or 5 points plotted correctly ± 1 full (2mm) square depending on sensible table (condone 1 addition error) 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. (SC:B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)
	(c)	100 – 42	58	2	M1 (ft dep on graph being cf) for reading from graph at 18 or 19, can be implied by answer in range 40 to 46 A1 for answer in range 56 to 60 or ft for 100 – '42' ±1 full (2mm) square

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	900 × 1.70 =	1530	2	M1 900 × 1.7(0) or digits 153(0) seen A1 cao
	(b)	160 ÷ 1.70 =	£94.12 or £94.11	2	M1 160 ÷ 1.7(0) or digits 941(....) seen A1 cao
2	(a)	4.7 ÷ 5.9 = 0.796610169	0.7966..	2	B2 for 0.7966 or better (B1 for 0.8, 0.80, 0.79, 0.796, 0.797 or digits 59 seen)
	(b)	0.82, 0.8, 0.85, 0.66, 0.875 0.66, 0.8, 0.82, 0.85, 0.875 2/3, 4/5, 0.82, 85%, 7/8	2/3, 4/5, 0.82, 85%, 7/8	2	B2 correct order (oe decimals in order) (B1 correct order reversed, or one error in ordered listing) with or without decimal equivalents. NB Accept 0.67 or 0.66
3		**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	3	B3 all 6 correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
4	(a)	–3 (–1) (1) 3 5 7	**–3**, 3, **5**, **7**	2	B2 all correct (B1 2,3 correct)
	(b)	(-2,-3),(-1,-1),(0,1),(1,3),(2,5),(3,7)	line	2	B2 cao for line from $x = -2$ to $x = 3$ (B1 plotting at least 5 points correctly or single line passing through (0, 1) or single line of gradient 2) The six possible points are: (-2,-3), (-1,-1), (0,1), (1,3), (2,5), (3,7)
	(c)(i)		–2	2	B1 $y = -2$ or ft from line segment
	(ii)		2.5		B1 $x = 2.5$ or ft from line segment

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
5	(a) (i)	180 – 54 (=126) "126" ÷ 2	63	3	M1 for (180–54) ÷ 2 A1 cao
	(ii)		Reason		B1 (indep) angles in triangle add to 180 OR equal angles in isosceles triangle OR equal angles and 2 sides the same (B0 if any incorrect reasoning given eg parallel, equilateral triangle)
	(b)	180 – "x"	117	1	B1 117 or ft 180 – "x" if $x < 90$
6		15/120×360 = 45 Plain 40/120×360 = 120 Cheese & Onion 55/120×360 = 165 Salt & Vinegar 10/120 × 360 = 30 Beef	45°, 120°, 165°, 30°	4	M1 evidence of method for at least one angle (could be implied by one correct angle of four on pie chart or in the table) A2 All four angles drawn ±2° tolerance, any order (A1 at least 2 angles correctly drawn ±2°, or all 4 angles in the table) B1 (dep on at least 1 angle drawn correctly, and exactly 4 sectors) for labels (flavour or frequency; initials will do) NB: Ignore the table if the pie chart provides the marks.
7	(a)	260 – 50 = 210 210 ÷ 35 =	6	3	M1 for 260–50 or 210 seen. M1 for "260-50" ÷ 35 or 210÷35 A1 cao
	(b)		P=35h + 50	3	B3 for P=35h+50 or P=35×h+50 oe (B2 for correct RHS or P=h + 50 ×35 or P=35h+k where k is numerical oe) (B1 for P = some other linear expression in h, OR h + 50 ×35 OR 35h seen) NB: P=h scores no marks; ignore £ signs. SC B2 for $h = \frac{P-50}{35}$
8	(a)		Elevation	2	B2 for 4 vertical squares. Accept 4 by 1 rectangle. (B1 for 4 vertical squares with one square added or one parallelogram added at the top, or 3 vertical squares, or 4 horizontal squares)

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
(b)		Plan	2	B2 for 2 adjacent squares, vertical or horizontal. Accept 2 by 1 rectangle. (B1 for 3 adjacent horizontal or vertical squares or a rectangle with sides in the ratio 2:1)
9 (a)		Points	1	B1 all three points ±1 full square.
(b)		Negative	1	B1 Negative. Ignore other descriptors unless contradictory.
(c)		lobf	1	B1 A single straight line drawn to cross between (5,30), (5,40) and (40,0), (40,15); accept freehand if considered to be straight.
(d)(i) (ii)		18–25 30–40	2	B1 18g–25g inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient. B1 30–40 min inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient.
10		300, 3, 75, 150	3	B3 for 4 correct (B2 for 2 or 3 correct) (B1 for 1 correct)
11 (a)	$6x - 7 + 7 = 38 + 7$ $6x = 45$	7.5	2	M1 $6x = 45$ or +7 both sides A1 7.5 oe; accept 45/6
(b)	$5y - 2 = 10$ or $20y - 8 = 40$ $5y = 12$ $20y = 48$	$2\frac{2}{5}$	3	M1 $20y–8(=40)$ or $\frac{4(5y-2)}{4} = \frac{40}{4}$ or $5y–2=10$ M1 (indep) for correct rearrangement into the form $ay=b+c$ or better (eg $20y=40+8$ or $5y=10+2$, using own terms) A1 for $2\frac{2}{5}$, 2.4 oe
12	5 miles = 8 km 70mph÷5×8 = 122 km/h OR 120km/h ÷ 8 × 8 = 75 mph Faster than 70 mph	70mph (Great Britain) (112 km)	3	M1 5 miles = 8 km; OR 70 mph is about 100 km/h OR 1km=0.6(25) miles OR 1mile=1.6km oe M1 70 ÷ 5 × 8 (=112) or 120 ÷ 8 × 5 (=75) oe A1 (dep on at least M1) GB or 70 mph Refer to both answer line and working. NB GB or 70 mph without working scores 0 marks.

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
13 (a)	$\pi \times 0.65$	2.04–2.05	2	M1 for $\pi \times 0.65$ or 3.14×0.65 or 3.142×0.65 oe A1 2.04–2.05 SC Award B1 for 2.0 seen (not 2)
(b)	1000 ÷ "(a)"	487–491	2	M1 for 1000 (or 100) ÷ "(a)" A1 for 487–491
14	$45.00 + 45.00 \times \frac{15}{100} =$ $45.00 + 6.75 =$	51.75	3	M2 for $45.00 + 45.00 \times \frac{15}{100}$ oe or 45.00×1.15 oe OR $45.00 + 6.75$ OR complete method or 5175 seen. (M1 for $45.00 \times \frac{15}{100}$ oe OR 6.75 seen OR 675 seen OR correct method for calculating 15% of 45) A1 cao SC Award B2 for an answer of 38.25
15		273	2	M1 for 728 ÷ 8 or 728 ÷ "3+5" or 91 A1 cao SC B1 for 455, or for 273:455
16	3 24 3.7 46.9(53) 4 60 3.8 51.0(72) 3.1 26.6(91) 3.9 55.4(19) 3.2 29.5(68) 3.21 29.8(66…) 3.3 32.6(37) 3.22 30.1(66…) 3.4 35.9(04) 3.23 30.4(68..) 3.5 39.3(75) 3.24 30.7(72...) 3.6 43.0(56) 3.25 31.0(78...) or 31	3.2	4	B2 for trial between 3.2 and 3.3 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.21 and 3.25 inclusive B1 (dep on at least one previous B1) cao for 3.2 as final answer. NB: embedded answers: –B1; award Bs for evaluations rounded or truncated to at least 1 dp or for 31

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
17	$45^2 + 34^2 =$ $2025 + 1156 = 3181$ $\sqrt{3181} = 56.4$	56	4	M1 for $45^2 + 34^2$ M1 (dep) for $\sqrt{(2025 + 1156)}$ A1 for 56.4 … B1 for rounding their diagonal to the nearest integer (dep on evidence from decimal) NB 56 as the final answer gets full marks. NB Scale drawings result in 0 marks.
18	$2000 \times (1.055)^3$ Interest = 2348.48 – 2000 =	348.48	3	M1 for 5.5/100 × 2000 (oe) or 330 or 2330 or 110 or 2110 M1 (dep) for 5.5/100 × (2000 + "110" + "116.05") or 122.4… seen A1 cao (accept only 348.48 or 348.49) **OR** M2 for $2000 \times (1.055)^3$ or 2348.48(…) or 2348.49 seen (M1 for $2000 \times (1.055)^n$, $n \neq 3$) A1 for 348.48 or 348.49 [SC: B2 for 2348.48 - 2348.49]
19		Line	2	B2 line fully within tramlines, crossing AB and CD (B1 a straight line which crosses AB within the tramline, and also crosses CD) NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight. SC B1 for a perpendicular bisector of AB that is at least half way from AB to CD within the tramlines
20 (a)		$90<t\leq100$	1	B1 for $90<t\leq100$; accept 90-100.
(b)	65×12=780 75×22=1650 85×23=1955 95×24=2280 105×19=1995 8660/100=	86.6	4	M1 for use of fx with x consistent within intervals (including end points). Allow one slip. M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$ A1 86.6

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
21	(a)	$8 \times \frac{10}{4}$	20	2	M1 $\frac{10}{4}$ or $\frac{4}{10}$ or 0.4 or 2.5 oe seen A1 cao NB ratios get M0 unless of the form 1:*n* OR M1 $\frac{8}{4}, \frac{4}{8}$ oe seen A1 cao
	(b)	$15 \times \frac{4}{10}$	6	2	M1 $15 \times \frac{4}{10}$ oe A1 cao
22	(a)	$x^2 - 4x + 3x - 12 = x^2 - x - 12$	$x^2 - x - 12$	2	M1 for exactly 4 terms correct ignoring signs (eg x^2, 4*x*, 3*x*, 12) or 3 correct terms out of 4 terms with correct signs (eg 3 out of 4 of x^2, –4*x*, +3*x*,–12) A1 cao
	(b)	$(x+2)(x+5)$	$(x+2)(x+5)$	2	B2 cao (B1 for exactly one of $(x+2)$, $(x+5)$)
	(c)	$6=15+4q-20$ $6-15=4(q-5)$ $p-3t=4q-4t$ $6-3\times5=4(q-5)$	2 ¾	3	M1 for correct substitution of *p* and *t*. M1 for correct expansion of $4(q-t)$ oe (eg $4q-20$, $4q-4t$) A1 11/4 or 2 ¾ or 2.75 OR M1 for correct substitution of *p* and *t*. M1 for $\frac{p-3t}{4} = q - t$ oe A1 11/4 or 2 ¾ or 2.75

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
23	(a)	$9.9\times10^8 - 6.0\times10^7$	9.3×10^8	2	M1 for $99\times10^7 - 6\times10^7$ or $9.9\times10^8 - 0.6\times10^8$ or conversion of either to an ordinary number, or 930000000 or 93×10^7 or 9.3×10^n where n is any positive integer A1 cao
	(b)	$\frac{6.0-4.5}{4.5}\times100 = \frac{1.5}{4.5}\times100 =$ or $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}\times100$	33.3%	3	M2 $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}\times100$ oe (M1 for $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}$ or $\frac{6.0\times10^7 - 4.5\times10^7}{6.0\times10^7}\times100$ oe A1 cao OR M2 $\frac{6.0\times10^7}{4.5\times10^7}\times100$ -100 = (M1 $\frac{6.0\times10^7}{4.5\times10^7}\times100$ or 133.33(%)) A1 cao NB Accept any of the above expressions without any reference to 10^7.
24		LCM (40,24) = 120 Bread buns 120÷40 Burgers 120÷24 OR Bread buns: 40 is $2\times2\times2$ (×5) Burgers: 24 is $2\times2\times2$ (×3)	Bread buns 3 Burgers 5	3	M1 attempt to find LCM by eg lists of multiples, or summing of 40 and 24. A1 identify 120 (as LCM) A1 cao (both) OR M1 expansion of either number into its prime factors in a factor tree or 8×5 or 8×3 A1 both expansions correct A1 cao (both) SC B2 if answers given the wrong way around

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
25	8 × 41 = 328 2 × 29 = 58 328 – 58 = 270 270 ÷ 6 = 45	45	3	M1 for either 8 × 41 (=328) or 2 × 29 (=58) M1 (dep) "328" – "58" (=270) A1 cao NB 328 and/or 58 on the answer line gets M1 (implied); 270 on the answer line gets M2 (implied)

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
1 (a)	$1 - (0.2 + 0.3 + 0.1)$	0.4	2	M1 for $1 - (0.2 + 0.3 + 0.1)$ A1 for 0.4 oe, accept $\frac{0.4}{1}$
(b)	0.2×200	40	2	M1 for 0.2×200 A1 cao NB $\frac{40}{200}$ is M1 A0, 40 out of 200 is M1 A1
2	$650 - 430 = 220$ 1 choc ice costs 110p $650 - 5 \times 110 = 100$p	50	3	M1 for $650 - 430$ or 220 or 110 oe seen M1 for $650 - 5 \times \frac{'220'}{2}$ or $430 - 3 \times \frac{'220'}{2}$ oe A1 for 50p or £0.50 or £0.5 *Alternative scheme* $2x + 5y = 650$ $2x + 3y = 430$ oe M1 for subtracting two simultaneous equations to eliminate x (lollies)(2 or 3 terms correct) M1 for $650 - 5 \times 'y'$ or $430 - 3 \times 'y'$ oe A1 for 50p or £0.50 or £0.5 *Alternative scheme* M1 for $3\times (2x + 5y = 650)$ evaluated and $5 \times (2x + 3y = 430)$ evaluated oe (5 or 6 terms correct) M1 for subtraction of equations to eliminate y (choc ices)(2 or 3 terms correct ft) A1 for 50p or £0.50 or £0.5

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
3		question + response boxes oe	2	1st aspect: One question (eg 'how long does it take you to travel to school?' or 'What time did you leave home to get to school?'); ignore other questions. 2nd aspect: Response list (at least two), not overlapping. 3rd aspect: Some mention of units (eg minutes) in either question or responses B2 for all three aspects, or B1 for just one aspects.
4	2 [(3×1) + (4×1)] + (3×6) + (1×6) + (2×6) + (4×6) + (1×6) + (5×6)	110 cm^2	4	M1 for attempt to find the area of one face M1 for at least 6 faces with intention to add A1 cao B1 (indep) for cm^2 (with or without numerical answer)
5	$\left(\frac{-6+4}{2}\right), \left(\frac{5+3}{2}\right)$	(–1, 4)	2	B2 cao [B1 for (–1,*a*) or (b,4) or (4,-1)]
6		Box plot	2	3 aspects: 1st aspect – vertical line for median 2nd aspect – box using correct quartiles 3rd aspect – whiskers (could be single line) drawn with correct end points B2 for fully correct box plot (B1 for 1 aspect)
7			2	M1 for a relevant pair of intersecting arcs A1 for line drawn within guidelines, at least 3cm in length, accept broken line [SC: B1 for line drawn within guidelines if M0]

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
8	(a)	e.g. 2 | 126 3 | 63 3 | 21 7	$2\times3\times3\times7$	2	M1 for a systematic method of at least 2 correct divisions by a prime number oe factor trees; can be implied by digits 2, 3, 3, 7 on answer line. A1 for $2\times3^2\times7$ or $2\times3\times3\times7$
	(b)	$2\times3\times7$	42	2	B2 cao (B1 for 6, 14, 21 or $2\times3\times7$)
9	(a)		$-1,0,1,2,3$	2	B2 cao (-1 each error or omission)
	(b)(i)		$x\geq\frac{7}{2}$	3	M1 for $2x\geq7$, condone use of = sign or wrong equality A1 for $x\geq\frac{7}{2}$ oe as final answer
	(ii)		4		SC:B1 for 3.5 or $\frac{7}{2}$ seen if M0 B1 ft from $x\geq$ "$\frac{7}{2}$" or $x>$"$\frac{7}{2}$"
10	(a)(i)		7^5	3	B1 cao
	(ii)		7^4		B2 cao (B1 for sight of 7^5 or 7^{2+3} or 7×7^3 or $7^1\times7^3$ or $7^2\times7^2$ or 7^{2+3-1})
	(b)		$\frac{1}{2}$	1	B1 for $\frac{1}{2}$ or 0.5 or 2^{-1}
11	(a)	$5n=m+21$	$n=\frac{m+21}{5}$	2	M1 for $5n=m+21$ or for attempt to divide three terms by 5 A1 $n=\frac{m+21}{5}$ oe

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
(b)	$4p-8q=3p+2$ $p-8q=2$ $p=8q+2$	$p=8q+2$	3	M1 for $4p-aq$ or $\frac{3}{4}p+b$ where a is an integer and b is a number M1 (dep) for taking one term correctly to LHS or RHS of expression A1 $p=8q+2$ oe
12		$y=\frac{1}{2}x+3$	2	B2 for $y = ½x + 3$ oe (B1 for $y = ½x + c$, $c \neq 7$ or $y = mx + 3$ oe or $½x + 3$ or $M = ½x + 3$)
13	$\frac{8}{3}\times\frac{5}{4}=\frac{8\times5}{3\times4}=\frac{40}{12}$	$3\frac{1}{3}$	3	B1 for $\frac{8}{3}$ oe or $\frac{5}{4}$ oe M1 (dep on B1) for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{5}{4}$" A1 for $3\frac{1}{3}$ oe mixed number or $\frac{10}{3}$ *OR* B1 for 1.25 and 2.67 or 2.66(…) M1(dep on B1) for correct method of multiplication A1 for $3.\dot{3}$
14	$4x+2y=8$ $4x-10y=20$ $12y=-12$ $y=-1$ $4x+2(-1)=8$ $x=2.5$	$x=2.5$ $y=-1$	3	M1 for correct process to eliminate either x or y (condone one arithmetical error) M1 (dep) for substituting found value into either equation A1 for $x = 2.5$, $y = -1$ [SC: B1 for $x = 2.5$ or $y = -1$ if M0]

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
15		Interior angle of hexagon = 180 – (360 ÷ 6) = 120 360 – (90 + 120)	150	4	Alternative 1 M1 for 360 ÷ 6 A1 for 60 M1 (dep on M1) for "60" + 90 A1 cao Alternative 2 M1 for 360 ÷ 6 A1 for 60 M1(dep on M1) for 360 – (2 × "60" + 90) A1 cao Alternative 3 M1 for (6 – 2) × 180 ÷ 6 A1 for 120 M1(dep on M1) for 360 – (90 + "120") A1 cao
16	(a)		(16), 50, 82, 96, 100	1	B1 cao
	(b)	Cumulative freq. diag. curve/ segments	Cum. freq graph	2	B1 ft for 4 or 5 points plotted correctly ± 1 full (2mm) square depending on sensible table (condone 1 addition error) 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. (SC:B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)

Paper 5525_05					
No		Working	Answer	Mark	Notes
	(c)	$100 - 42$	58	2	M1 (ft dep on graph being cf) for reading from graph at 18 or 19, can be implied by answer in range 40 to 46 A1 for answer in range 56 to 60 or ft for 100 –'42' ±1 full (2mm) square
17	(a)		0.6 and 0.7,0.3,0.7	2	B1 for 0.6 on LH branch B1 for 0.7, 0.3 and 0.7 on RH branches
	(b)	0.4×0.3	0.12	2	M1 for 0.4×0.3 A1 0.12 oe
	(c)	$0.4\times0.7+0.6\times0.3$	0.46	3	M1 for '0.4×0.7' or '0.6×0.3' M1 for addition of two products from correct branches A1 0.46 oe Alternative M2 for an attempt to evaluate 1-(0.3×0.4 +'0.6×0.7') A1 cao
18		$x = 0.4545...$ so $100x = 45.4545...$ $99x = 45$ $x = \frac{45}{99} = \frac{15}{33}$	proof	3	M1 for $100x = 45.45\ldots$ or $10000x = 4545.45\ldots$ M1 (dep) for subtraction of both sides A1 for $\frac{15}{33}$ from correct proof
19		$\left(\sqrt{3}\right)^2 + \sqrt{3}\sqrt{2} - \sqrt{3}\sqrt{2} - \left(\sqrt{2}\right)^2$ $= 3 - 2$	1	2	B2 cao (B1 for $\sqrt{3}\sqrt{3} + \sqrt{3}\sqrt{2} - \sqrt{3}\sqrt{2} - \sqrt{2}\sqrt{2}$ oe, $\sqrt{3}\sqrt{3} - \sqrt{2}\sqrt{2}$ oe, or for 2,3, $\sqrt{4}$ $\sqrt{6}$ $\sqrt{9}$ seen)
20	(a)	$\frac{96}{24}$ or 4 $\sqrt{4}$ or 2	8	3	M1 for $\frac{96}{24}$ or $\frac{24}{96}$ or 4 or $\frac{1}{4}$ oe M1 for $\sqrt{\frac{96}{24}}$ or $\sqrt{\frac{24}{96}}$ or $\sqrt{'4'}$ or $\frac{1}{\sqrt{'4'}}$ or 2 or $\frac{1}{2}$ oe A1 cao

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
	(b)	12×2^3	96	2	M1 for '2'^{3} or 8 A1 cao
21	(a)	$x\times3-x\times2x^2$	$3x-2x^3$	2	B2 cao (B1 for a two term expression with either $3x$ or $2x^3$)
	(b)		$4x(3y+x)$	2	M1 for taking out a factor of x, $2x$, 2, 4 or $4x$ A1 cao
	(c)	$\frac{5a}{b^2}$	$\frac{5a}{b^2}$	2	B2 for $\frac{5a}{b^2}$ or $5ab^{-2}$ (accept $\frac{5a}{1b^2}$) (B1 for either dealing with the numbers or dealing with the powers of a)
	(d)	$\frac{\cancel{x-3}}{\cancel{(x-3)}(x+3)}$	$\frac{1}{x+3}$	2	M1 for $(x-3)(x+3)$ A1 cao
22	(a)		$\mathbf{a}+\mathbf{b}$	1	B1 $\mathbf{a}+\mathbf{b}$ oe
	(b)	$ED=\mathbf{a}$ $DX=-2\mathbf{b}+2\ AC=2\mathbf{a}$ (So, $DX=2ED$)	$2\mathbf{a}$	3	M1 for $(DX=)\ DA+AX$ A1 for $(DX=)\ -2\boldsymbol{b}+2$ ("$\boldsymbol{a}+\boldsymbol{b}$") A1 $2\boldsymbol{a}$ from fully correct proof
23		$\pi(2x)^2h=\frac{4}{3}\pi(3x)^3$ $h=\frac{\frac{4}{3}\pi(3x)^3}{\pi(2x)^2}$	$9x$	3	M1 for $\pi(2x)^2h=\frac{4}{3}\pi(3x)^3$ (condone absence of brackets) M1 (dep) for valid algebra that gets to $h=ax$ (condone one error in powers of numerical constants) A1 cao

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
24	(i)	$n^2+(n+1)^2=2(n^2+n)+1$	$2n^2+2n+1$	4	M1 for at least 3 terms correct from $n^2+n+n+1$ A1 for $2n^2+2n+1$ oe
	(ii)		$2(n^2+n)$ is always even so $2(n^2+n)+1$ is always odd		M1 for recognizing $2n^2$ is always even A1ft complete proof for their quadratic *Alternative method* M1 for recognizing that if n^2 is odd then $(n+1)^2$ is even or vice versa A1 for complete proof
25			42 318	2	B1 for answer in range 36 – 48 B1 for answer in range 312 – 324
26	(a)	$(x-3)^2-3^2+15$	$p=3, q=6$	2	B2 for $p=3$ and $q=6$ (B1 for $p=3$ OR $q=6$) SC: award B2 for $(x-3)^2+6$ if p and q are not identified
	(b)		Sketch	2	B1 for U shaped curve B1 ft for TP in first quadrant (ft if TP not in first quadrant)
27	(a)	Graph translated 2 units upwards through points (–4, 2), (–2, 4), (0,2) and (3,5)	Sketch	2	M1 for a vertical translation A1 curve through points (–4, 2), (–2, 4), (0,2) and (3,5) ± ½ square
	(b)	Graph reflected in x-axis through points (–4,0), (–2, –2), (0, 0) and (3, -3)	Sketch	2	M1 for reflection in x-axis or y-axis A1 curve through points (–4,0), (–2, –2), (0, 0) and (3, -3) ± ½ square

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
1		273	2	M1 for 728 ÷ 8 or 728 ÷ "3+5" or 91 A1 cao SC B1 for 455 or 273:455
2		$3n - 1$	2	B2 for $3n - 1$ oe (B1 for $3n + k$ where $k \neq -1$ but k could be 0)
3	3 24 3.7 46.9(53) 4 60 3.8 51.0(72) 3.1 26.6(91) 3.9 55.4(19) 3.2 29.5(68) 3.21 29.8(66…) 3.3 32.6(37) 3.22 30.1(66…) 3.4 35.9(04) 3.23 30.4(68..) 3.5 39.3(75) 3.24 30.7(72...) 3.6 43.0(56) 3.25 31.0(78...) or 31	3.2	4	B2 for trial between 3.2 and 3.3 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.21 and 3.25 inclusive B1 (dep on at least one previous B1) cao for 3.2 NB: embedded answers: –B1; award Bs for evaluations rounded or truncated to at least 1 dp or for 31
4	2 is the only even prime number and the product of 2 odd numbers is odd	Yes	2	B2 for 'yes' and '2 is the only even prime number and the product of two odd numbers is odd' oe (B1 for 'yes' and either '2 is the only even prime number' oe **or** 'the product of two odd numbers is odd' oe)
5	$45^2 + 34^2 =$ $2025 + 1156 = 3181$ $\sqrt{3181} = 56.4$	56	4	M1 for $45^2 + 34^2$ M1 for $\sqrt{(2025 + 1156)}$ A1 for 56.4 … B1 for rounding their diagonal to the nearest integer (dep on evidence from decimal) NB 56 with no incorrect working as the final answer gets full marks. NB Scale drawings result in 0 marks.

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
6	$2000 \times (1.055)^3$ Interest = 2348.48 – 2000 =	£348.48	3	M1 for 5.5/100 × 2000 (oe) or 330 or 16.5/100×2000 or 2330 or 110 or 2110 M1 (dep) for 5.5/100 × (2000 + "110" + "116.05") or 122.4… seen A1 cao (accept only 348.48 or 348.49) **OR** M2 for $2000 \times (1.055)^3$ or 2348.48(…) or 2348.49 seen (M1 for $2000 \times (1.055)^n$, $n \neq 3$) A1 for 348.48 or 348.49 [SC: B2 for 2348.48 - 2348.49]
7 (a)		Line	2	B2 line fully within tramlines, crossing AB and CD (B1 a straight line which crosses AB within the tramline, and also crosses CD) NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight. SC B1 for the perpendicular bisector of *AB* reaching halfway or more from *AB*
(b)		Region		B2 correct arc ±2mm and shaded within. Allow dotty or continous arc. (B1 inaccurate arc and shaded or accurate arc unshaded)
8	65×12=780 75×22=1650 85×23=1955 95×24=2280 105×19=1995 8660/100=	86.6	4	M1 for use of fx with x consistent within intervals (including end points). Allow one slip even if outside interval M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$ A1 86.6

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
9		Distance ÷ time: 1400 ÷ 2 h 20 min 20 mins is $\frac{1}{3}$ hour 1400 × 3 ÷ 7 =	600 kph	3	B1 20 mins as $\frac{1}{3}$ hour or as 0.33……hour M1 for distance ÷ time eg 1400 ÷ "2h 20 min" A1 cao OR B1 2 hour 20min = 140 (min) M1 Speed = $\frac{1400}{140}$ = (10 km per minute) A1 cao
10	(a)	$(x+18)+2x+(2x+7)=180$	Equation	2	B2 for $(x+18)+2x+(2x+7)=180$ oe (B1 for $(x+18)+2x+(2x+7)$)
	(b)	$5x+25 = 180$ $5x = 155$	31	2	M1 for simplifying to at least $5x+25=180$ or 360 (may be earned in (a)) A1 for $x=31$
11	(a)	(–14) –4 (0) 4 14	–4, 4, 14	2	B2 for all 3 values correct (B1 for 1 or 2 values correct)
	(b)		curve	2	B1 for all 5 points plotted correctly ± ½ square (ft from table if at least B1 awarded in (a)) B1 (indep) ft for any smooth curve through their points

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$8 \times \frac{10}{4}$	20	2	M1 $\frac{10}{4}$ or $\frac{4}{10}$ or 0.4 or 2.5 oe seen A1 cao NB ratios get M0 unless of the form 1:*n* OR M1 $\frac{8}{4}, \frac{4}{8}$ oe seen A1 cao
	(b)	$15 \times \frac{4}{10}$	6	2	M1 $15 \times \frac{4}{10}$ oe A1 cao
13	(a)	$9.9\times10^8 - 6.0\times10^7$	$\pm 9.3\times10^8$	2	M1 for $99\times10^7 - 6.0\times10^7$ or $9.9\times10^8 - 0.60\times10^8$ or correct conversion of either to an ordinary number or 930000000 or 9.3×10^n where *n* is any positive integer A1 cao
	(b)	$\frac{6.0-4.5}{4.5} \times 100 = \frac{1.5}{4.5} \times 100 =$ or $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7} \times 100$	33.3%	3	M2 $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7} \times 100$ oe (M1 for $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}$ or $\frac{6.0\times10^7 - 4.5\times10^7}{6.0\times10^7} \times 100$ oe A1 33.3 – 33.4 OR M2 $\frac{6.0\times10^7}{4.5\times10^7} \times 100$ -100 or 33.3% (M1 $\frac{6.0\times10^7}{4.5\times10^7} \times 100$ or 133.3%) A1 33.3-33.4 NB Accept any of the above expressions without any reference to 10^7.

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
14	LCM (40,24) = 120 Bread buns 120÷40 Burgers 120÷24 OR Bread buns: 40 is 2 × 2 × 2 (×5) Burgers: 24 is 2 × 2 × 2 (×3)	Bread Buns 3 Burgers 5	3	M1 attempt to find LCM by eg lists of multiples, or summing of 40s and summing of 24s, with at least 3 numbers in each list A1 identify 120 as LCM A1 cao (both) **OR** M1 expansion of either number into its prime factors in a factor tree or 8×5 or 8×3 A1 both expansions correct A1 cao (both) SC B2 if answers given the wrong way around
15	$\sin 32 = \frac{AB}{12}$ $AB = 12 \times \sin 32$ $AB = 6.35903\ldots$	6.36	3	M1 $\sin 32 = \frac{AB}{12}$ (accept $\text{Sin}\ \frac{AB}{12}$) M1 $12 \times \sin 32$ or $12 \times 0.5299..$ A1 accept 6.359 – 6.360 SC Gradians 5.78(1…) Radians 6.62 Get M1M1A0 **OR** Use of Sine Rule $\frac{\sin 32}{AB} = \frac{\sin 90}{12}$ or $\frac{AB}{\sin 32} = \frac{12}{\sin 90}$ M1 $AB = \frac{12 \times \sin 32}{\sin 90}$ M1 AB = 6.359 – 6.36 A1 SC Gradians 5.85(…) Radians 7. 40(…) M1M1A0

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
16		$8 \times 41 = 328$ $2 \times 29 = 58$ $328 - 58 = 270$ $270 \div 6 = 45$	45	3	M1 for either 8×41 (=328) or 2×29 (=58) M1 (dep) "328" – "58" (=270) A1 cao NB 328 and /or 58 on the answer line gets M1 (implied); 270 on the answer line gets M2 (implied)
17	(a)	$x^2 - 4x + 3x - 12 = x^2 - x - 12$	$x^2 - x - 12$	2	M1 for exactly 4 terms correct ignoring signs (x^2, $4x$, $3x$, 12) or 3 out of 4 terms with correct signs (x^2, $-4x$, $+3x$, -12) A1 cao
	(b)	$6x^2 - 8x + 15x - 20 = 6x^2 + 7x - 20$	$6x^2 + 7x - 20$	2	M1 for exactly 4 terms correct ignoring signs ($6x^2$, $8x$, $15x$, 20) or 3 out of 4 terms with correct signs ($6x^2$, $-8x$, $+15x$, -20) A1 cao
	(c)	$(x+2)(x+5)$	$(x+2)(x+5)$	2	B2 cao (B1 for exactly one of $(x + 2)$, $(x + 5)$)
	(d)		$12p^8q^3$	2	B2 cao (B1 for any 2 out of 3 terms correct in a product or 3 terms correct in a sum or part product)
	(e)	$6 = 15 + 4(q - 5)$ $6 = 15 + 4q - 20$ $11 = 4q$	$2\frac{3}{4}$	3	M1 for correct substitution of p and t. M1 for correct expansion of $4(q-t)$ oe (eg $4q-20$, $4q-4t$) A1 11/4 or 2 ¾ or 2.75 OR M1 for correct substitution of p and t. M1 for $\frac{p-3t}{4} = q - t$ oe A1 11/4 or 2 ¾ or 2.75
18	(a)	$T=kx$; $150=6k$; $k=25$	$T=25x$	3	M1 for $T=kx$, k algebraic M1 subs $T=150$ and $x=6$ into $T = kx^n$ $(n \neq 0)$ A1 for $T=25x$ oe SC B1 $T \propto 25x$ oe

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
	(b)	$T = 25 \times 15 =$	375	1	B1 ft on k , $k \neq 1$
	(c)	$600 = 25x$; $x = 600 \div 25 =$	24	1	B1 ft on k , $k \neq 1$
19		$\frac{120}{570} \times 50 = 10.5263$ $\frac{250}{570} \times 50 = 21.9298$ $\frac{200}{570} \times 50 = 17.5438$	10 22 18	3	M1 method shown eg $\frac{120}{120+250+200} \times 50$ or one of 10.5(263) 21.9(298), 17.5(438) **OR** 570 ÷ 50 = 11.4 and one of 120 ÷ 11.4 =10.526…) , 270 ÷ 11.4 (=21.9298…) , 200 ÷ 11.4 (=17.5438…) A1 for 10.5(263), 21.9(298), 17.5(438) or 11, 22, 18 B1 correction to add to 50: 10, 22, 18 or 11, 22, 17
20		$x(x+1) + 4(2x–3) = (2x–3)(x+1)$ $x^2 + x + 8x – 12 = 2x^2 + 2x – 3x – 3$ $x^2 – 10x + 9 = 0$ $(x – 9)(x – 1) = 0$	$x = 1,9$	5	M1 for multiplying through by common denominator $(2x–3)(x+1)$ M1 (dep)for either $x^2 + x + 8x – 12$ or $2x^2 + 2x – 3x – 3$ oe A1 for correct quadratic (= 0) M1 for a correct method to solve 3 term quadratic A1 cao for both solutions
21		$AB^2 = 8^2 + 9^2 – 2\times8\times9\times\cos40$ $AB^2 = 64 + 81 – 144\times\cos40$ $AB^2 = 145 – 144 \times 0.766$ $AB^2 = 145 – 110.31… = 34.6896$ $AB = \sqrt{34.6796} = 5.8897877$	5.89	3	M1 Subs in Cos Rule: $8^2 + 9^2 – 2\times8\times9\times\cos40$ M1 correct order of evaluation of $8^2 + 9^2 – 2\times8\times9\times\cos40$ A1 cao 5.88 – 5.89 SC: Award B2 for one of $AB^2 = 241.03…$ or $AB = 15.525…$ (radians) $AB^2 = 28.50…$ or $AB = 5.33…$ (gradians)
22	(a)		24 30	2	B1 24 cao B1 30 cao
	(b)	Column $60 \leq w < 75$ at 10 Column $75 \leq w < 95$ at 4	10 4	2	B1 10 and correct width (tol $\pm\frac{1}{2}$ small square) B1 4 and correct width (tol $\pm\frac{1}{2}$ small square)

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
23 (a)		100.5	1	B1 cao
(b)		10.515	1	B1 cao
(c)	$\frac{100.5}{10.515}$	9.5577746	2	M1 for greatest distance divided by least time Where 100 < greatest distance ≤ 100.5, 10.51 ≤ least time < 10.52 A1 for 9.555 – 9.56
(d)	$\frac{99.5}{10.525}$	9.45368..	2	M1 for least distance divided by greatest time Where 99.5 ≤ least distance < 100, 10.52 < greatest time ≤10.53 A1 for 9.45 – 9.455
24	$\frac{4}{7}\times\frac{4}{7}\times\frac{3}{7} + \frac{3}{7}\times\frac{3}{7}\times\frac{4}{7} =$ $\frac{48+36}{343} = \frac{84}{343}$ But there are three ways this can be achieved: BBG, BGB, GBB So the probability is $\frac{84}{343}\times 3$ OR $1-\frac{64}{343}-\frac{27}{343}$ NB: 84/343 = 0.244897; 252/343 = 0.73469 $\frac{4}{7} = 0.57(142...)$, $\frac{3}{7} = 0.42(857...)$	$\frac{252}{343}$	3	M1 for $\frac{4}{7}\times\frac{4}{7}\times\frac{3}{7}$ or $\frac{3}{7}\times\frac{3}{7}\times\frac{4}{7}$ oe or $\left(\frac{4}{7}\right)^3$ oe or $\left(\frac{3}{7}\right)^3$ oe or $\frac{91}{343}$ or 0.10(49…) or 0.13(99….) M1 (indep) for identification of all 6 outcomes (M2 for $1-\left[\left(\frac{4}{7}\right)^3+\left(\frac{3}{7}\right)^3\right]$) oe A1 $\frac{252}{343}$, $\frac{36}{49}$, 0.73(469…) oe

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
25	(a)	$\frac{1}{3} \times \pi \times 5^2 \times 8 = \pi \times 25 \times 8 \div 3 =$ 209.4395	209–210	2	M1 for $\frac{1}{3} \times \pi \times 5^2 \times 8$ A1 for 209–210
	(b)	Base radius = $\frac{216}{360} \times 15 = 9$ Height = $\sqrt{(15^2 - 9^2)} =$	12	4	M1 for 216 ÷ 360 A1 for 9 M1 for $\sqrt{(15^2 - \text{“9”}^2)}$, where “9” < 15 A1 cao

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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 A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

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5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$5 \times 6 \div 2$	15cm^2	3	M1 $5 \times 6 \div 2$ oe seen A1 15 B1 cm^2
2	(a)		$3y + 7x + 3$	1	B1 cao
	(b)		$2x(x - 2)$	2	B2 for $2x(x - 2)$. Accept $2x(x + -2)$. (B1 for $x(2x - 4)$ or $2(x^2 - 2x)$ or $2x$(linear expression in x) or $(x - 2)$(linear expression in x)
	(c)	$11-3x - 6$	$5-3x$	2	M1 for expansion of $-3(x + 2)$ 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) **OR** $x(3x+7)-6(3x+7)$ or $3x(x - 6) + 7(x - 6)$ A1 cao

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5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
3 (a)	48=2 × 24 = 2 × 2 × 12 = 2 × 2 × 2 × 6 =2 × 2 × 2× 2 × 3 **OR** Use of factor trees	2 × 2 × 2 × 2 × 3	2	M1 for a systematic method that isolates 2 correct prime numbers correct divisions by a prime number **OR** an equivalent factor tree A1 for 2 × 2 × 2 × 2 × 3 or $2^4 \times 3$
(b)	Exeter coach after 20, 40, 60, 80, 100… Plymouth coach after 16, 32, 48, 64, 80, 96, … **OR** Timetable schedule for the coaches Exeter coach at 8.00, 8.20, 8.40, 9.00, 9.20… Plymouth coach at 8.00, 8.16, 8.32, 8.48, 9.04, 9.20… **OR** 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) M1(dep) for identifying their LCM A1 9:20 am (accept 9:20) **OR** 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) M1(dep) for identifying the first time common to both timetables A1 9:20 oe (do not accept 9:20pm) **OR** M1 attempt to find the LCM M1 for 2 × 2 × 2 × 2 × 5 oe seen A1 9:20 oe (do not accept 9:20pm)
4	10% = 6 6 × 4 = 24	24	2	M1 40 ÷ 100 × 60 oe or any complete method, eg 10% = 6, 6 × 4 A1 cao SC B1 for 36 or 84

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5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
5 (a)	Table of values x = -1 0 1 2 3 y = 2 2 6 10 14 OR Using $y = mx + c$, gradient = 4, y intercept = 2	Line from (1, 2) to (3,14)	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct) A1 for correct line between 1 and 3 **(No table of values)** 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) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between -1 and 3 **(Use of $y = mx + c$)** 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) (M1 for line drawn with gradient 4 OR line drawn with a y intercept of 2) 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. Note – 0.25 could be written as $-\frac{1}{4}$ oe

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5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
6	$6 \times 2 + 3 \times 2 = 12 + 6 = 18$ or $2 \times 5 + 4 \times 2 = 18$ $18 \div 2.5 = 7.2$ or $2.5 \times 7 = 17.5$ or $2.5 \times 8 = 20$ OR $6 \times 5 - 4 \times 3 = 18$ $18 \div 2.5 = 7.2$ or $2.5 \times 7 = 17.5$ or $2.5 \times 8 = 20$	8 packs	4	M2 for a complete method for finding the total area (can be implied by 18) (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)) M1 for their area $\div 2.5$ or repeated addition of 2.5 to within 2.5 of their area 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 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 Al for $(5, 6\frac{1}{2})$ oe
8 (a) (b) (c)		p^8 h^5 x^6	3	B1 for p^8 B1 for h^5 B1 for x^6

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5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
9	24 × 2 = 48 56 ÷ 8 × 5 = 35 or 24 × 2 = 48 48 ÷ 5 × 8 = 76.8	Monday	4	M1 for a correct method to obtain two comparable time periods or speeds. eg 24 × 2 (= 48 miles), 56 ÷ 2 (= 28 km) M1 for a correct method to convert between miles and km or mph and km/h eg –, – – – A1 for two correct values (using same units) for comparison C1 for day identified from a clear attempt to use comparable time periods and speeds/distances Note: day alone scores zero
10 (a)		$4n + 2$	2	B2 for oe (B1 for $4n+k$ where $k \neq 2$)
(b)	$2 \times 3^2 - 4$ 18 - 4	14	2	M1 for $2 \times 3^2 - 4$ A1 cao
11	360 ÷ 10 36 ÷ 2	18°	4	M1 for correct method to find the size of an exterior angle eg 360 ÷ 10 A1 for 36 M1 for '36' ÷ 2 or (180 – (180 – 36)) ÷ 2 A1 cao OR M1 for correct method to find the size of an interior angle eg(180 × 8) ÷ 10 A1 144 M1 (180 '144') ÷ 2 A1 cao

5MB2H_01				
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 A1 for $3n^2 + 2$ from correct working
13	$42 \div 2 = 21$ $180 - 90 - 21 = 69$ $69 \times 2 = 138$	138°	3	M1 for 90 seen. A1 for 138 (accept 222) C1 for The tangent to a circle is perpendicular (90°) to the radius (diameter) and Angles in a triangle add up to 180° **OR** The tangent to a circle is perpendicular (90°) to the radius (diameter) and 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 $3\sqrt{3}$ A1 for $15\sqrt{3}$ (accept $n = 15$)
(b)		$7\sqrt{3}$	2	M1 for $\frac{21\sqrt{3}}{\sqrt{3}\sqrt{3}}$ A1 for $7\sqrt{3}$ (accept $\frac{21\sqrt{3}}{3}$)

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5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
15 (a)		3	1	B1 cao
(b)		$\frac{1}{5}$	2	M1 $\frac{1}{25^{\frac{1}{2}}}$ or $\sqrt{25} = 5$ 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 $2(y-6)$ M1 $(y-6)(y-2)$ 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 $(x-4)(x+5)$ A1 for $\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$ oe

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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.

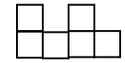
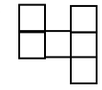
12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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 A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent 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 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.) A1 for all 5 bars correctly labelled and vertical axis correctly scaled A1 for fully correct **or** ft frequencies in (a) **OR** M1 for pictogram with at least 3 correct rows (can f.t.) A1 for correct labels on all 5 rows and correctly key A1 for fully correct **or** ft frequencies in (a) **OR** M1 for pie chart with at least 3 correct sectors ± 2° (can f.t.) A1 for all 5 sectors correctly labelled A1 for fully correct **or** ft frequencies in (a)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		£1.18 + 94p = £2.12 £5 – £2.12 – 30p = £2.58 £2.58 ÷ 2 =	1.29	3	M2 for (5 – 1.18 – 0.94 – 0.30) ÷ 2 oe **or** digits 129 (M1 for 1.18 + 0.94 **or** 2.12 seen **or** 1.18 + 0.94 + 0.30 oe **or** 2.42 seen **or** 5 – 1.18 – 0.94 oe **or** 2.88 seen **or** (5 – 1.18 – 0.94) ÷ 2 **or** 1.44 seen **or** 5 – 1.18 – 0.94 – 0.30 oe **or** 2.58 seen) A1 cao **NOTE**: Accept working in £ or pence
5	(a)(i) (ii) (b)		(2, 3) (–3, 1) Point plotted at (3, –4)	2 1	B1 cao B1 cao B1 cao
6	(a) (b) (c)		– 5 6 3	1 1 1	B1 cao B1 for 6 or – 6 B1 cao
7			(P, B), (P, S), (P, L) (M, B), (M, S), (M, L) (H, B), (H, S), (H, L)	2	M1 for any 3 combinations with no incorrect combinations A1 for all 9 combinations with no duplicates or extras
8	(a) (b)	 24 ÷ 4 =	Walk 6	1 2	B1 cao M1 for 24 ÷ 4 oe or ¼ oe seen 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 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 **or** 2 × 2 × 2 **or** 8 seen in the working A1 cao
12	(a)		20	2	M1 3 × 3 × 3 oe seen or drawn or 27 seen or use of 3 layers A1 cao
	(b)			2	B2 for correct view (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

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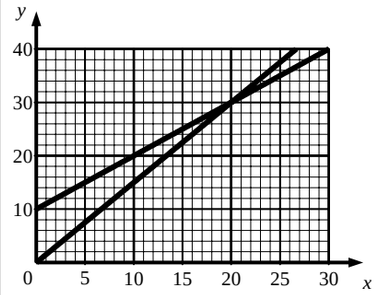
1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		2 + 8 + 2 + 8 = 20 20 ÷ 4 =	5	4	M2 for 2 + 8 + 2 + 8 oe **or** 20 seen **or** (2 + 8) ÷ 2 oe (M1 for the sum of 3 sides of the rectangle) M1 (dep) for the sum of 3 or 4 sides of the rectangle ÷ 4 **or** an attempt to evaluate (2 + 8) ÷ 2 oe to get the length of one side A1 cao **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 = **OR** 9.5 ÷ 2 =	4.75	2	M1 for 9.5 – 4.75 **or** 9.5 ÷ 2 **or** 4.75 – 9.5 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 A1 cao
16	(a)		trapezium	1	B1 for trapezium or isosceles trapezium
	(b)			2	B2 for correct tessellation (at least 5 more shapes) (B1 for at least 4 shapes (including initial shape) correctly tessellating)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
17*		S: 35 ÷ 100 × 40 = 14 W: 40 ÷ 8 × 3 = 15 **OR** D: 16 ÷ 40 (× 100) = 0.4 (40%) W: 3 ÷ 8 (× 100) = 0.375 (37.5%) **OR** D: $\frac{16}{40} = \frac{80}{200}$ S: $\frac{35}{100} = \frac{70}{200}$ W: $\frac{3}{8} = \frac{75}{200}$	Debbie and correct calculations	4	**Compares Marks out of 40 or fractions with denominator of 40** M1 for 35 ÷ 100 × 40 oe **or** 14 seen (or 14/40 seen) M1 for 40 ÷ 8 × 3 **or** 15 seen (or 15/40 seen) A1 for 14 and 15 **or** $\frac{14}{40}$ and $\frac{15}{40}$ C1 (dep on M1) for correct conclusion for their working QWC with 3 comparable marks: Decision and justification should be clear with working clearly presented and attributable. **OR Decimals (or Percentages)** M1 for 16 ÷ 40 (× 100) oe **or** 0.4 (or 40) seen M1 for 3 ÷ 8 (× 100) oe **or** 0.375 (or 37.5) seen A1 for 0.4 and 0.375 (**or** 40 and 37.5) C1 (dep on M1) for correct conclusion for their working QWC: with 3 comparable decimals (or percentages: Decision and justification should be clear with working clearly presented and attributable. **OR Compares Fractions with denominator other than 40** M1 for attempt to convert all to fractions with a common denominator other than 40 M1 for at least 1 correct A1 for $\frac{80}{200}$ and $\frac{70}{200}$ and $\frac{75}{200}$ oe C1 (dep on M1) for correct conclusion for their working QWC with 3 comparable fractions: 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)	 **Miles** 0 10 20 30 40 50 **Ed** 0 15 30 45 60 75 **Bill** 10 20 30 40 50 60	Ed is cheaper up to 20 miles, 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 C2 (dep on M1) for a correct full statement ft from graph eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles (C1 (dep on M1) for a correct conclusion ft from graph eg. cheaper at 10 miles with Ed ; eg. cheaper at 50 miles with Bill eg. same cost at 20 miles; eg for £5 go further with Bill **or** A general statement covering short **and** long distances eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances) **OR** (continued on next page)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
18 (contd)					**OR** M1 for correct method to work out Ed's delivery cost for at least 2 values of n miles where $0 < n \leq 50$ **or** for correct method to work out Ed and Bill's delivery cost for n miles where $0 < n \leq 50$ C2 (dep on M1) for 20 miles linked with £30 for Ed and Bill with correct full statement eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles (C1 (dep on M1) for a correct conclusion eg. cheaper at 10 miles with Ed; eg. cheaper at 50 miles with Bill eg. same cost at 20 miles; eg for £5 go further with Bill **or** A general statement covering short **and** long distances eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances) SC: B1 for correct full statement seen with no working eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles 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 **OR** 4.23 ÷ 9 = 0.47 1.96 ÷ 4 = 0.49 **OR** 4.23 × 4 = 16.92 1.96 × 9 = 17.64 **OR** 4.23 ÷ 9 = 0.47 0.47 × 4 = 1.88 **OR** 1.96 ÷ 4 = 0.49 0.49 × 9 = 4.41 **OR** 9 ÷ 4.23 = 2.12 4 ÷ 1.96 = 2.04	Pack of 9	3	M2 for a fully correct method to enable a conclusion eg 1.96 × 2¼ **OR** M1 for 4.23 ÷ 9 or 423 ÷ 9 **or** 0.47 seen **or** 47 seen M1 for 1.96 ÷ 4 or 196 ÷ 4 or 0.49 seen or 49 seen **OR** M1 for 4.23 × 4 **or** 423 × 4 **or** 16.92 seen **or** 1692 seen M1 for 1.96 × 9 **or** 196 × 9 **or** 17.64 seen **or** 1764 seen **OR** M1 for 4.23 ÷ 9 **or** 423 ÷ 9 **or** 0.47 seen **or** 47 seen M1 for 0.47 × 4 **or** 47 × 4 **or** 1.88 seen **or** 188 seen **OR** M1 for 1.96 ÷ 4 **or** 196 ÷ 4 **or** 0.49 seen **or** 49 seen M1 for 0.49 × 9 **or** 49 × 9 **or** 4.41 seen **or** 441 seen **OR** M1 for 9 ÷ 4.23 **or** 2.12(...) seen **or** 2.13 seen M1 for 4 ÷ 1.96 **or** 2.04(...) seen A1 for Pack of 9 and fully correct calculations **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 **or** 29 – 60 **or** any correct method that is attempting to find the difference between 29 and 60 (allow 1 arithmetic error) A1 cao

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
21*		Angle *DBC* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal Angle *ABD* = 180 – 65 Angles on a straight line add up to 180 *x* = 180 – 20 – 115 Angles in a triangle add up to 180 **OR** Angle *DBC* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal *x* = 65 – 20 Exterior angle of triangle is equal to sum of interior opposite angles **OR** Angle *DCB* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal *x* = 180 – 50 – 20 – 65 Angles in a triangle add up to 180	45 with reasons	4	M1 for (180 – 50) ÷ 2 oe **or** 65 seen M1 for 180 – 20 – (180 – "65") **or** "65" – 20 or 180 – 50 – 20 –'65' oe C2 for *x* identified as 45 with full reasons QWC: Reasons clearly laid out with correct geometrical language used (C1 (dep on M1) for one reason QWC: Reasons clearly laid out with correct geometrical language used) 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 = 6 300 ÷ 60 = 5 6 × 5 =	Yes and 30	3	M1 for dividing side of patio by side of paving slab 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 M1 for correct method to find number of paving slabs eg (360 ÷ 60) × (300 ÷ 60) oe **or** 6 × 5 **or** 30 squares seen on diagram (units may not be consistent) A1 for Yes **and** 30 (or 2 extra) with correct calculations **OR** 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 M1 for dividing area of patio by area of a paving slab eg. (3.6 × 3) ÷ (0.6 × 0.6) oe (units may not be consistent) A1 for Yes **and** 30 (or 2 extra) with correct calculations **OR** M1 for method to find area of patio and area of 32 slabs eg. 60 × 60 × 32 **or** 360 × 300 M1 for method to find both areas eg. 60 × 60 × 32 **and** 360 × 300 (units may not be consistent) A1 for Yes **and** 115200 **and** 108000 **OR** Yes **and** 11.52 **and** 10.8 **NB :** Throughout the question, candidates could be working in metres or centimetres

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(b)	1726 25890 27616 **8 6 3** **2** 2 4 1 8 9 **3** **7** 1 6 1 2 6 **2** 6 1 6 800 60 3 30 24000 1800 90 2 1600 120 6 24000 + 1800 + 90 + 1600 + 120 + 6 = 27616	276.16	3	M1 for complete correct method with relative place value correct. Condone 1 multiplication error, addition not necessary. **OR** M1 for a complete grid. Condone 1 multiplication error, addition not necessary. **OR** M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary. A1 for digits 27616 A1 ft (dep on M1) for correct placement of decimal point after addition (of appropriate values) (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 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 A1 cao

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
24		Acton after 24, 48, 72, 96, .. Barton after 20, 40, 60, 80, .. LCM of 20 and 24 is 120 9:00 am + 120 minutes **OR** Acton after 24, 48, 1h 12 min... Barton after 20, 40, 1 h LCM is 2 hours 9:00 am + 2 hours **OR** Times from 9:00 am when each service leaves the bus station Acton at 9:24, 9:48, 10:12.. Barton at 9:20, 9:40, 10:00.. **OR** 20 = 2 × 2 × 5 24 = 2 × 2 × 2 × 3 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 (condone one addition error in total in first 3 numbers in lists) A1 identify 120 (mins) **or** 2 (hours) as LCM A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock **OR** M1 for listing times after 9am when each bus leaves the bus station, with at least 3 times in each list (condone one addition error in total in first 3 times after 9am in lists) A1 for correct times in each list up to and including 11:00 A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock **OR** M1 for correct method to write 20 and 24 in terms of their prime factors 2, 2, 5 and 2, 2, 2, 3 (condone one error) A1 identify 120 as LCM 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 (B1 for $x(8x + 4y)$ **or** $2x(4x + 2y)$ **or** $4(2x^2 + xy)$ **or** $4x(ax + by)$ where a, b are positive integers **or** $ax(2x + y)$ where a is a positive integer **or** $4x(2x \quad y)$)
	(c)	$10t = gh$ $h = \frac{10t}{g}$	$\frac{10t}{g}$	2	M1 for clear intention to multiply both sides of the equation by 10 (eg. ×10 seen on both sides of equation) **or** clear intention to divide both sides of the equation by g (eg. ÷ g seen on both sides of equation) **or** $10t = gh$ **or** $\frac{t}{g} = \frac{h}{10}$ **or** fully correct reverse flow diagram eg. ← ×10 ← ÷g ← A1 for $\frac{10t}{g}$ oe

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

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Mark Scheme (Results)

June 2012

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

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

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*1		Angle *BED* = 68° 180 – (68 + 68) OR Angle *BEF* = 180 – 68 = 112 Angle *BED* = 180= 112 = 68 180 – (68 + 68)	*x* = 44°	4	M1 for Angle *BED* = 68° seen in the diagram or correctly used in the working space M1 for 180 – 2 × "68" A1 for *x* = 44° (accept angle *BDE* = 44°) [Note: 44° only seen in the body of the script without the "*x* =" gets M1M1A0] 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 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, …) or *n*th = 4*n* + 2 (B1 for a linear expression in 4*n* e.g. 4*n* + a ($a \neq 2$) or *n* = 4*n* + 2) (B0 for *n* = 4*n* and *n* + 4)

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

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5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		$\frac{15}{100} \times 400 = 60$ $400 - 60 =$ OR $\frac{85}{100} \times 400$	340	3	M1 for $\frac{15}{100} \times 400$ (= 60) oe or 40 + 20 or 400 × 0.15 M1 (dep) for 400 – "60" A1 for 340 cao OR M1 for 100–15 (=85) M1 (dep) for $\frac{'85'}{100} \times 400$ or '0.85' × 400 A1 for 340 [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 A1 for $8x + 29$
	(c)		$3ab(a + 2b)$	2	B2 for $3ab(a + 2b)$ (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 $ab(3a + 6b)$ OR $3ab(ma + 2b)$ or $3ab(a + nb)$ where $m \neq 1$, $n \neq 2$) [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 2575 15450 18025 10 × 515 = 5150 10 × 515 = 5150 10 × 515 = 5150 5 × 515 = 2575 18025 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 M1 for a complete method with relative place value correct. Condone one multiplication error, addition not necessary Or for a complete grid, condone one multiplication error, addition not necessary Or for sight of a complete partitioning method. Condone one multiplication error final addition not necessary M1 (dep on the previous M1) for addition of appropriate elements of the calculation 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

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

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5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		**Triangular ends** $\frac{1}{2} \times 5 \times 12 = 30$ $\frac{1}{2} \times 5 \times 12 = 30$ **Base** $20 \times 5 = 100$ **Vertical face** $20 \times 12 = 240$ **Slant face** $20 \times 13 = 260$ **Total area** $= 30 + 30 + 100 + 240 + 260$ OR $(5 + 12 + 13) \times 20 + 2 \times \frac{1}{2} \times 5 \times 12$	660	3	M1 for $\frac{1}{2} \times 5 \times 12$ (= 30) or 20×5 (= 100) or 20×12 (= 240) or 20×13 (= 260) M1 (dep) for adding at least 3 areas found from correct methods (of no more than 5 faces) A1 cao OR M1 for $(5 + 12 + 13) \times 20$ or $\frac{1}{2} \times 5 \times 12$ (= 30) M1 (dep) for adding "$(5 + 12 + 13) \times 20$" to at least "$1 \times \frac{1}{2} \times 5 \times 12$" A1 cao 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 x : –2, –1, 0, 1, 2 y : –7, –5, –3, –1, 1 OR Using $y = mx + c$ Gradient 2 intercept –3	Single line drawn from (–2, –7) to (2, 1)	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 (dep) ft for correctly plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for the correct line from (-2, -7) to (2, 1) OR **(No table of values)** M2 for at least 2 correct points (and no incorrect points) correctly plotted or for a line segment of the graph of $y = 2x – 3$ drawn (ignore any additional incorrect line segments) [M1 for at least 3 correct points plotted with no more than 2 incorrect points] A1 for the correct line from (-2, -7) to (2, 1) OR **(Use of $y = mx + c$)** M2 for a single straight line of gradient 2, passing through (0, -3) [M1 for a single straight line of gradient 2 or for a single straight line passing through (0, -3)] A1 for the correct line from (-2, -7) to (2, 1)

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

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5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		10 000 × 0.8 8000 × 0.9 = 7200 OR 10 000 – $\frac{20}{100}$ × 10 000 = 8000 8000 – $\frac{10}{100}$ × 8 000 OR 10 000 × 0.8 × 0.9	7200	3	M1 for 10 000 × 0.8 (= 8000) M1 (dep) for "8000" × 0.9 (= 7200) A1 for £7200 cao OR M1 for 10 000 – $\frac{20}{100}$ × 10 000 oe M1 (dep) for "8000" – $\frac{10}{100}$ × "8 000" oe A1 7200 cao OR M1 for 0.8 × 0.9 (=0.72) M1 (dep)for 10 000 × "0.72" A1 for 7200 cao [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) A1 for $x^2 - 3x - 40$ [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 A1 for (3, 2, 4) cao

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5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	$x = 0.25555\ldots$ $10x = 2.555\ldots$ $100x = 25.5555\ldots$ $90x = 25 - 2 = 23$ OR $x = 0.25555\ldots$ $10x = 2.555\ldots$ $100x = 25.5555\ldots$ $9x = 2.3$ OR $0.2 + (x = 0.0555\ldots.)$ $10x = 0.555\ldots$ $100x = 5.5555\ldots$ $0.2 + 5/90$	$\frac{23}{90}$	3	M1 for $0.255(5\ldots.)$ or $0.2 + 0.055(5\ldots)$ This can be implied in subsequent working M1 for 2 correct recurring decimals which when subtracted will leave an integer or a terminating decimal number A1 for $\frac{23}{90}$ [Note: $\frac{2.3}{9}$ gets A0] [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 $\sqrt{6}$ A1 for $2\sqrt{6}$ (accept $\frac{2\sqrt{6}}{1}$)

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

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

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

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In Mathematics B (2MB01)
Higher (Non-Calculator) Unit 2

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

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5MB2H_01 November 2015					
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1.			6 525 900 450	3	M1 for × 6 ÷ 4 oe or $\frac{6}{4}$ or 1.5 or 1 correct answer A2 for all correct (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 M1 for $8n \pm k$ or $8(n \pm m)$ where $k \neq 24$, $m \neq 3$ A1 for $8n + 24$ or $8(n + 3)$ oe
3.			105 cm^3	4	M1 for writing factor pairs of 35, 21 or 15 M1 for "3" × "5" × "7" using their lengths dep on one at least one correct factor pair A1 ft for 105 (dep on one correct factor pair) B1 for cm^3

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

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.			68	5	B1 for correct conversion of units M1 for 250 ÷ 25 (= 10) or 300 ÷ 20 (= 15) M1 for "10" × "15" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68 OR B1 for correct conversion of units M1 for 250 ÷ 20 (= 12.5) or 300 ÷ 25 (= 12) M1 for "12.5" × "12" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68 OR B1 for correct conversion of units M1 for 3 × 2.5 (= 7 .5) or 20 × 25 (= 500) M1 for "3 × 2.5" ÷ "0.2 × 0.25" or "300 × 250" ÷ "20 × 25" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68
*6		1, 4, 7, 10, 13 8, 6, 4, 2, 0	Explanation	2	M1 for listing at least 3 terms of both sequences C1 for Yes and explanation from fully correct working 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 M1 for identifying 36 as LCM A1 cao OR M1 for listing times 6.54, 7.03, 7.12, 7.21 or for listing times 6.57, 7.09, 7.21 (condone one arithmetic error) M1 for listing times 6.54, 7.03, 7.12, 7.21 **and** 6.57, 7.09, 7.21 (condone one arithmetic error) A1 cao
8	(a)		$4(3e+1)$	1	B1 cao
	(b)		$15c - 10d$	1	B1 cao
	(c)		$28a^4b^3$	2	B2 for $28a^4b^3$ (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 A1 cao

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

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		7.8×10^{-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 A1 for fully correct list from correct working, accept original numbers or evaluated. (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 M1 for $600 - 480$ or $\frac{480}{80} \times 20$ oe A1 cao
14.			$A = 9x^2 + 19x - 6$	4	B1 for one of $5x - 2$ or x found M1 for correct method to find area of one relevant rectangle. M1 for complete method to find whole area or simplified expression $9x^2 + 19x - 6$ or correct but not simplified formula 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 M1 (dep) for attempt to find gradient of perpendicular line eg use of $-\frac{1}{m}$ M1 for substituting $x = 3, y = 2$ into $y =$ "m" $x + c$ A1 for complete correct equation $y = \frac{3}{2}x - \frac{5}{2}$ oe
16.			$2\sqrt{7}$	3	M1 for multiplying numerator and denominator by $\sqrt{7}$ 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 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 M1 for correct factorisation of denominator A1 for $\frac{x-5}{2x+1}$

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Mark Scheme (Results)

November 2016

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 A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1	3 | 1 3 7 4 | 1 4 4 7 8 8 5 | 1 2 3 5 6 6 6 6 | 0 1 3 4	Diagram and key	3	B2 for fully correct diagram (accept a stem of 30, 40, 50, 60, the order of the numbers in the stem may be reversed) (B1 for one error or omission or unordered diagram with no errors) B1 for a correct key (units may be omitted but must be correct if stated) eg 3 | 1 = 31 (mm)
2 (a)		225 : 475	2	M1 for 700 ÷ 2 + 125 (= 475) **or** 700 ÷ 2 – 125 (= 225) A1 for 225 : 475 oe, eg 9:19
(b)		175, 455	3	M1 for 630 ÷ (5 + 13) (= 35) M1 for "35" × 5 (= 175) **or** "35" × 13 (= 455) A1 cao
3		26	3	M1 for (360 − 90) ÷ 2 (= 135) M1 for $4x + 31$ = "135" or $6x - 21$ = "135" A1 cao OR M1 for forming an appropriate equation eg $4x + 31 = 6x - 21$ or $6x - 21 + 4x + 31 + 90 = 360$ oe M1 (dep) for isolating terms in x and number terms A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
4 (a)		0.3	2	M1 for 1 − (0.25 + 0.10 + 0.20 + 0.15) oe A1 for 0.3 oe
(b)		21	3	M1 for 0.25 + 0.10 (= 0.35) or 0.25 × 60 (= 15) or 0.10 × 60 (= 6) M1(dep) for 60 × "0.35" or "15" + "6" A1 cao
5		1.4091(…)	2	B2 for 1.4091(…) (B1 for 2.1025 or 1.492 or 2.397…or 2.398)
6		180	3	M1 for a correct start to the process, eg 300 ÷ 5 (= 60) or 300 ÷ (5 × 1.5) (= 40) or 8 ÷ 5 (= 1.6) or 5 ÷ 8 (= 0.625) M1 for a complete method that will lead to the number of bricks needed to build the wall (= 480) or for a complete method that will lead to the number of extra bricks needed to build the wall, eg 300 ÷ 5 × 3 A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
7	x -1 0 1 2 3 4 y 10 8 6 4 2 0	$y = 8 - 2x$ drawn	3	B3 for a correct line between $x = -1$ and $x = 4$ OR B2 for a correct straight line segment through at least 3 of $(-1, 10)$, $(0, 8)$, $(1, 6)$, $(2, 4)$, $(3, 2)$, $(4, 0)$ **or** for all of these points plotted but not joined **or** for a line drawn with a negative gradient through $(0, 8)$ **and** clear intention to use of a gradient of -2, eg line through (0,8) and (0.5, 6) OR B1 for at least 2 correct points stated or plotted **or** for a line drawn with a negative gradient through $(0, 8)$ **or** a line with gradient -2
*8		Comparison	3	M1 for 23.50×1.34 A1 for 31.49 C1 (dep M1) for 'euros' stated and a comparison ft their "31.49" OR M1 for $31 \div 1.34$ A1 for 23.13(43...) C1 (dep M1) for '£' stated and a comparison ft their "23.13" OR M1 for $31 \div 23.50$ A1 for 1.31(91...) C1 (dep M1) for comparison ft their "1.31(91...)" and explanation linked to conversion rate.

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
9		6.56	4	M1 for $200^2 + 60^2$ (= 43600) M1 for $\sqrt{40000 + 3600}$ or $\sqrt{43600}$ (= 208.8…) M1 for a complete method eg ("208.8" + 2 × 200 + 2 × 60) ÷ 100 × 0.9 oe A1 for 6.55 – 6.561
*10		large carton with correct calculations	3	M1 for 1.60 ÷ 125 (= 0.0128) or 2.8 ÷ 225 (= 0.0124(4…)) or 125 ÷ 1.60 (= 78(.125(g)) or 225 ÷ 2.80 (= 80(.35…g)) or any other calculation that could lead to a comparative figure M1 for 1.60 ÷ 125 (= 0.0128) **and** 2.8 ÷ 225 (= 0.0124(4…)) or for 125 ÷ 1.60 (= 78(.125(g)) **and** 225 ÷ 2.80 (= 80(.35…g)) or for calculations that could lead to comparative figures for the cartons 2 C1 for correct comparative figures for both cartons leading to a correctly stated comparison. Accept any other method considered equivalent. Figures may be truncated or rounded as long as their method is clear.

PAPER: 1MA0/2H				
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..)); $\pi \times 6^2 \div 2 = 56.5(4..)$; $\pi \times 6^2 \div 4 = 28.2(7\ldots)$) M1 for method to work out the area of the square (=72) oe or a triangle eg ½×6×6 (=18) M1 for complete method to find shaded area. A1 for value in the range 41.04 - 41.112
12 (a)		n^4	2	M1 for $\frac{n^{10}}{n^6}$ oe or $\frac{n^7}{n^3}$ oe or $n \times n^3$ oe A1 cao
(b)		$3x^2 + 4x$	2	B2 for $3x^2 + 4x$ or $x(3x + 4)$ (B1 for $x^2 - 2x$ or $2x^2 + 6x$ or $3x^2 + nx$ or $px^2 + 4x$)
(c)		$5(y - 3)$	1	B1 cao
(d)		$9ab(2 + 3b)$	2	B2 for $9ab(2 + 3b)$ (B1 for $9a(2b + 3b^2)$ or $9b(2a + 3ab)$ or $ab(18 + 27b)$ or $3ab(6 + 9b)$ or $3a(6b + 9b^2)$ or $3b(6a + 9ab)$ or $9ab$(a two term algebraic expression))

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
13 (a)		5, 30, 60, 75, 80	1	B1 for correct cumulative frequencies (may be implied by correct heights on the grid)
(b)		cf graph	2	M1 for at least 4 of the 5 points plotted correctly at the ends of the intervals or 4 of the 5 points plotted not at the ends but consistently within each interval and joined (dep on a cf table with no more than one arithmetic error) A1 for a fully correct cf graph (points may be joined by a curve or straight line segments)
(c)	IQR = UQ – LQ	26-28	2	M1 for reading values from their cf graph at cf = 20 or 20.25 **and** cf = 60 or 60.75 A1ft provided M1 is awarded in (b)
(d)		55-59	3	M1 for reading a value from their cf graph at weight 150 grams M1 for $\frac{"45"}{"80"} \times 100$ A1ft provided M1 is awarded in (b)
14		126	3	M1 for 180 – (360 ÷ 5) (= 108) or (5 – 2) × 180 ÷ 5 (= 108) M1 for a complete method eg $\frac{360-"108"}{2}$ or $180-\frac{"108"}{2}$ A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
15		28.9	5	M1 for $\sin 62 = \frac{BD}{15}$ **or** $\frac{BD}{\sin 62} = \frac{15}{\sin 90}$ oe M1 for $(BD =)\ 15 \times \sin 62$ **or** $\frac{15}{\sin 90} \times \sin 62$ oe (= 13.24...) M1 for $\tan BCD = \frac{"13.24"}{24}$ oe **or** $\tan BDC = \frac{24}{"13.24"}$ with *BDC* clearly identified M1 for $BCD = \tan^{-1}\frac{"13.24"}{24}$ oe **or** $BDC = \tan^{-1}\frac{24}{"13.24"}$ with *BDC* clearly identified A1 for 28.8 – 28.9 **OR** M1 for $\cos(90 - 62) = \frac{BD}{15}$ M1 for $(BD =)\ 15 \times \cos(90 - 62)$ (= 13.24...) M1 for $\tan BCD = \frac{"13.24"}{24}$ oe **or** $\tan BDC = \frac{24}{"13.24"}$ with *BDC* clearly identified M1 for $BCD = \tan^{-1}\frac{"13.24"}{24}$ oe **or** $BDC = \tan^{-1}\frac{24}{"13.24"}$ with *BDC* clearly identified A1 for 28.8 – 28.9

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
16		$\frac{8}{17}$	5	M1 for $5x + 4$ or $10 - x$ M1 (dep) for "$5x + 4$" = $\frac{2}{3}$ "$(10 - x)$" M1 for expanding the bracket or multiplying both sides by 3 in an equation of the form $(ax + b) = \frac{2}{3}(cx + d)$ A1 for correct equation with terms in x and number terms isolated, eg $15x + 2x = 20 - 12$ or $5x + \frac{2x}{3} = \frac{20}{3} - 4$ A1 for $\frac{8}{17}$ oe accept 0.47(0588...)
17 (a)		Question and responses	2	B1 for a suitable question which includes a time frame (the time frame could appear with the response boxes) B1 for at least 3 non-overlapping response boxes which are exhaustive for their question NB Do not accept inequality signs
(b)		53 or 54	2	M1 for $\frac{460}{1709} \times 200$ (= 53.8...) oe A1 for 53 or 54

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*18		28°	4	M1 for angle $ABD = 62°$ M1 for angle $BAD = 90°$ C2 for angle $ADB = 28^{\circ}$ with full, appropriate reasons given angles in the same segment are equal; angles in a semicircle are 90°; angles in a triangle add up to 180° (C1 (dep on relevant M1) for one correct and appropriate reason relating to a circle theorem) OR M1 for angle $AOD = 62° \times 2$ (= 124°) M1 for $(180° - 124°) \div 2$ C2 for angle $ADB = 28°$ with full, appropriate reasons given the angle at the centre of a circle is twice the angle at the circumference; base angles of an isosceles triangle are equal; angles in a triangle add up to 180° (C1 (dep on relevant M1) for one correct and appropriate reason relating to a circle theorem)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 (a)		$y^2 + 7y + 10$	2	M1 for all 4 terms (and no additional terms) correct ignoring signs **or** 3 terms correct A1 for $y^2 + 7y + 10$
(b)		$(e - 3)(e + 4)$	2	M1 for $(e \pm 3)(e \pm 4)$ A1 for $(e - 3)(e + 4)$
(c)		0.77, –0.43	3	M1 for $\frac{--1 \pm \sqrt{(-1)^2 - 4 \times 3 \times -1}}{2 \times 3}$ (condone one sign error) M1 for $\frac{1 \pm \sqrt{13}}{6}$ A1 for one answer in the range 0.767 to 0.77 and one answer in the range –0.43 to –0.4343
20		17.7(014…)	3	B1 for 7.75 or7.85 or 5.15 or 5.25 or 62.5 or 63.5 M1 for $\frac{1}{2} \times 7.75 \times 5.15 \times \sin 62.5$ A1 for 17.7(0140994…)

PAPER: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*21			No with explanation and supportive working	4	M1 for method to find the volume of compost needed to fill one or more baskets eg $\frac{2}{3} \times \pi \times 20^3$ (= 16755(.16…)) Or $\frac{4}{3} \times \pi \times 20^3$ (= 33510(.32…)) M1 for appropriate use of 1 litre = 1000 cm^3, eg $4 \times 50 \times 1000$ (= 200000) or "16755" ÷ 1000 M1 for complete method to find values needed to make decision C1 for conclusion supported by correct values, eg 200000 and 201061(.92...) (accept 201000 to 201120) or 16666(.66...) and 16755(.16…) or 11.9(36...) NB Calculations can be in litres or cm^3
22	(a)	$2 = k^{-1}$	½	2	M1 for reading off and substituting a pair of values from the graph (excluding 0, 1) into the equation, eg $x = -1$, $y = 2$ A1 for ½ oe
	(b)		correct graph	2	B2 cao (B1 for correct general shape, eg $y = -\sin x°$)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
23		Correct conclusion from correct working	4	B1 for $\overrightarrow{AB} = -5\mathbf{a} + 2\mathbf{b}$ or $\overrightarrow{BA} = 5\mathbf{a} - 2\mathbf{b}$ M1 for a correct vector statement for $\overrightarrow{OT}$ eg $\overrightarrow{OA} + \overrightarrow{AT}$ or $\overrightarrow{OB} + \overrightarrow{BT}$ or $\overrightarrow{OA} + \frac{5}{6}\overrightarrow{AB}$ or $\overrightarrow{OB} + \frac{1}{6}\overrightarrow{BA}$, may be written partially or fully in terms of **a** and **b** M1 for $5\mathbf{a} + \frac{5}{6}(-5\mathbf{a} + 2\mathbf{b})$ oe or $2\mathbf{b} + \frac{1}{6}(5\mathbf{a} - 2\mathbf{b})$ oe A1 for $\frac{5}{6}(\mathbf{a} + 2\mathbf{b})$ is parallel to $\mathbf{a} + 2\mathbf{b}$

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*24	$(n^2 + 4n + 4) - (n^2 + 2n + 1)$ $\frac{2n+3}{2n^2+3n}$ $\frac{2n+3}{n(2n+3)}$	Proof	4	M1 for correct method to expand $(n + 2)^2$ or $(n + 1)^2$ M1 for correct simplification of numerator M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof OR M1 for $\{(n+2)-(n+1)\}\{(n+2)+(n+1)\}$ M1 for $1 \times (2n+3)$ M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof OR M1 for $n\{(n+2)^2-(n+1)^2\} = (2n^2 + 3n) \times 1$ M1 for $n(n+2)^2 - n(n+1)^2$ or for correct expansion of $(n+2)^2-(n+1)^2$ M1 for correct expansion of $n\{(n+2)^2-(n+1)^2\}$ C1 for complete and correct proof (must include statement recognising the equality of LHS and RHS)

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**
1		Diagram enlarged. 4th horizontal line added to the bottom of the stem and leaf diagram. Key moved above and to the left of the diagram. Wording added 'It shows the basis of a stem and leaf diagram.	Standard mark scheme
3		Diagram enlarged. Wording added 'Angle $BOC = 4x + 31$'. Wording added 'Angle $AOC = 6x - 21$'.	Standard mark scheme
4		Diagram enlarged. Spike removed from the spinner and the spinner has been straightened.	Standard mark scheme
7		Grid enlarged.	Standard mark scheme
9		Diagram enlarged. Wording added '$CB = 200$ cm'. Wording added '$DC = 60$ cm'.	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
10		Pictures have been removed.	Standard mark scheme
11		Diagram enlarged.	Standard mark scheme
12	(b)	MLP only: x changed to y.	B2 for $3y^2 + 4y$ or $y(3y + 4)$ (B1 for $y^2 - 2y$ or $2y^2 + 6y$ or $3y^2 + ny$ or $py^2 + 4y$)
	(d)	'a' changed to 's' and 'b' changed to 't' for all candidates.	B2 for $9st(2 + 3t)$ (B1 for $9s\,(2t + 3t^2)$ or $9t(2s + 3st)$ or $st(18 + 27t)$ or $3st(6 + 9t)$ or $3s(6t + 9t^2)$ or $3t(6s + 9st)$ or $9st$(a two term algebraic expression))
13	(a)	Wording added 'There are five spaces to fill.'	Standard mark scheme
	(b) to (d)	Diagram enlarged. Axes labels have been moved to the top of the vertical axis and to the left of the horizontal axis. Right axis has been labelled.	Standard mark scheme
14		Diagram enlarged.	Standard mark scheme
15		Diagram enlarged. Wording 'AB = 15 m' changed to 'BA = 15 metres'. Wording 'BC = 24 m' changed to 'CB = 24 metres'. Wording added 'Angle CBD = angle BDA = 90°.'	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
18		Diagram enlarged.	Standard mark scheme
19	(b)	Braille only: e changed to m.	M1 for $(m \pm 3)(m \pm 4)$ A1 for $(m - 3)(m + 4)$
21		Simplified diagram provided for MLP candidates.	Standard mark scheme
22	(a) (b)	Grid enlarged. Grid enlarged.	Standard mark scheme Standard mark scheme
23		Diagram enlarged. Cross at T changed to a solid dot.	Standard mark scheme

PMT

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Question 13

This algebraic fraction problem was answered quite well, with the majority of students attempting it, and most gaining at least some credit. The question had three steps of method and each was awarded a method mark. Students needed to factorise the given quadratic expression. This could be done at any stage. The second step was the need for a method to divide fractions, for example by multiplying by the reciprocal of the second fraction. The final step was to be able to add a fraction to an integer by using a common denominator. The first two steps were very commonly seen and for most, at least one mark was awarded. The division mark was often lost by failing to deal with the reciprocal of $(x+5)\times\frac{(x-1)}{"(x+5)(x-2)"}$ having cancelled the $(x + 5)$. The third mark was the hardest to achieve, with students regularly losing the addition sign and then multiplying in the last step. It was disappointing to see a number of those who, having gained the first three marks, then lose the final one by either failing to correctly simplify the numerator, or for adding denominators.

Question 13

Any marks gained in this question were usually in part (a), only a very small number of students gained the mark in part (b).

In part (a), many students correctly found the common denominator of $3x(x + 1)$ or equivalent. Unfortunately, numerators of 5 and 2 were often retained gaining no credit. A numerator $5 \times 3x + 2(x + 1)$ was often not or incorrectly simplified resulting expressions of $15x + 2x + 2$(or 1). It was also disappointing to see so many students having found the correct simplified expression then try to simply further. In algebraic questions, such subsequent incorrect working can never be ignored, and the final accuracy mark is lost.

In part (b), the modal approach was to expand the brackets rendering the resulting expression near impossible to factorise.

Question 22

Most students attempted this question and often gained one mark from multiplying by the reciprocal. Students could often factorise the numerator or the denominator of the first fraction, but they could not fully factorise the second fraction, often factorising $x^3 - 36x$ incorrectly or failing to notice the difference of two squares. Only a small minority managed to simplify to 7x, some went on to give their final answer as $a = 7$, this was not penalised.

Many students did not realise that they needed to factorise and cancel terms, a significant number of students spent a lot of time expanding the brackets for no gain and could not then simplify the complex expression generated.

Question 12

Students usually scored well in this question requiring the addition of two algebraic fractions in part (a) and the expansion of a product of three linear expressions in part (b). The question was a good discriminator at the level set and tested skills and confidence in the area of algebraic manipulation and simplification.

About a half of students taking this paper scored at least two of the three marks available in part (a). They were able to decide on a common denominator and combine the fractions with accuracy. However, a large number of students then went on to make errors in simplifying their expressions. It was common to see a correct answer of $\frac{3x^2}{x^2-2x-8}$ spoiled by incorrect cancelling leading to an incorrect final answer. Examples of incorrect final answers seen quite frequently are $\frac{2x^2}{-2x-8}$, $\frac{3}{-2x-8}$ and $\frac{x}{-5}$. Another commonly seen error occurred when students obtained a correct result of the form $\frac{3x^2}{(x+2)(x-4)}$ only to make the decision to multiply out the brackets but then to do this incorrectly. Students should be advised that it is generally acceptable to leave the denominator in factorized form.

More students scored full marks in part (b) than in part (a) of this question. Errors in part (b) were usually restricted to incorrect terms rather than a flawed strategy although some students omitted terms from their expansion. Most students earned at least two of the available marks. Less able students sometimes either stopped after multiplying two linear expressions together or lacked a clear strategy and tried to multiply all three brackets together at once.

Question 15

Most of the students who used $10x$ as a common denominator went on to score full marks. Exceptions to this were those who made errors in expanding brackets, for example $5(4x + 3) = 20x + 3$, and those who wrote $\frac{3}{5}$ as $\frac{6}{10x}$. Some students wrote only one of the fractions with a suitable denominator, often this was $(\frac{20x+15}{10x})$ and gained the first mark only. Many students did not know how to tackle this question.

Question 22

There were some excellent clear and concise answers to this question leading to the correct answer $\frac{1}{x(x+4)}$. Many students were able to show that to divide the algebraic fractions, inverting the second fraction and multiplying it by the first fraction was needed. Fewer students realised the need to factorise the denominator of the first fraction and much fruitless algebra was seen with students frequently multiplying out expressions.

Question 19

Relatively few students could demonstrate the necessary skills of algebraic manipulation to solve the equation and give the answer in the required form. Many students were able to correctly write the two fractions with a common denominator and gain the first mark but a significant number were then unable to carry the algebraic solution any further. Those that did reduce the equation to a 3 term quadratic often made errors when rearranging and did not get the second mark. Substitution into the quadratic equation formula was generally done well but some students attempted to use completing the square and this was done less well due to not dealing with the coefficient of 2 correctly. Some students who did not get a correct quadratic equation were still able to gain the third mark for dealing correctly with their 3 term quadratic equation. The final step to write $\frac{10 \pm \sqrt{60}}{4}$ in the required form proved difficult with $\frac{5 \pm \sqrt{30}}{2}$ a common incorrect answer.

Question 19

Fully correct answers to this question were seen infrequently. However, a significant proportion of students taking this paper were able to score at least one mark for using a correct common denominator and writing at least one of the three terms with that common denominator, usually the first fraction as $\frac{3x(x-2)}{x^2-4}$. Only the best students were able to work accurately in order to gain more credit for their responses. The question discriminated well between high ability students aiming to get one of the two top grades. For many students, this question proved to be the most challenging question on the paper. In particular mistakes were often made with signs when the fraction $\frac{(x+2)(2x+1)}{x^2-4}$ was subtracted from the fraction $\frac{3x(x-2)}{x^2-4}$ or in writing $-(x^2-4)$ as $-x^2-4$.

Question 19

Some students correctly wrote the two fractions with a common denominator and gained the first mark but many were then unable to carry the algebraic solution any further. Those that did reduce the equation to a 3-term quadratic sometimes made errors when rearranging and did not get the second mark. Substitution into the quadratic equation formula was generally done well. Some students who did not get a correct quadratic equation were still able to gain the third mark for dealing correctly with their 3-term quadratic equation. The first of the two accuracy marks was awarded for two correct values of x, e.g. $\frac{-4 \pm \sqrt{32}}{8}$. Some students gave this as the final answer and others made errors when attempting to write it in the required form. Only a few students could demonstrate the necessary skills of algebraic manipulation to solve the equation and give the answer in the required form.

Question 22

Fully correct answers to this question were rarely seen. However, a good number of candidates were able to score at least one mark for using a correct common denominator. Only the higher attaining candidates were able to work accurately and/or gain more than one mark for their responses. In particular mistakes were often made with signs when $-3(x^2 - 25)$ or equivalent was written as $-3x^2 - 75$. Much of the work seen showed little understanding of the method required to combine the 3 fractions concerned. For example, a significant number of candidates produced work involving expressions which were not fractions and could not be awarded any credit. $(2x + 3)(x + 5) + (x - 4)(x - 5)$ is an example of such an expression.

Question 14

A straightforward algebra question that allowed many to score some credit. Even some of the weaker candidates were able to gain one mark for correctly factorising the numerator of the fraction, the coefficient of x^2 being more than 1 caused more issues but still a significant number went on to gain all 3 marks. Unfortunately, quite a few candidates got their signs wrong on the numerator, eg $(x+3)(x-2)$ which often then led to an incorrectly factorised denominator as they were looking for a common factor.

Question 24

This question also discriminated well between high attaining students. Most students who made a good attempt at the question recognised the non-replacement nature of the problem and were able to make a start by forming expressions for probabilities in terms of x and/or y. A good proportion of these students were also able to use the ratio given in the question to make a substitution in order to get their expressions in terms of x only or y only. However, a significant number of students used "$y = 4x$" instead of the correct "$y = 3x$". Invariably and sensibly, the overwhelming majority of students opted for getting their expressions in terms of x only. Those students who attempted substituting $3x$ for y into their probabilities before combining their products had more success than those who substituted later as the algebra became more complex. A significant number of students obtained correct expressions for the probability of Freda taking two pink counters and the probability of her taking two blue counters but gave the probability of her taking two green counters as $\frac{2x-5}{3x} \times \frac{2x-4}{3x-1}$ instead of $\frac{2x-5}{3x} \times \frac{2x-6}{3x-1}$. This had clearly arisen from an error with signs earlier on in a student's working. It was encouraging to see a good number of fully correct solutions from students working at the highest level.

Summary

Based on their performance on this paper, students are offered the following advice:

- carry out a check to make sure you have not miscopied any numbers given in a question before you complete the question.
- check that you have not miscopied algebraic expressions from a previous line in your working.
- practise solving equations involving algebraic fractions.
- compare the medians and either the ranges or the interquartile ranges in context when asked to compare two distributions represented by box plots.
- ensure you can write and manipulate algebraic expressions accurately particularly with regard to the use of brackets and the signs of terms.
- practise solving real life problems involving inverse proportionality.
- carry out common sense checks where possible.

Question 20

This hard algebra question required students to deal with 3 different aspects. There was division by a fraction, factorisation of a harder quadratic, and then the addition of fractions with different denominators. A reasonable number of students were able to gain one or two marks, normally for the first two steps. However, many struggled with the factorising, and

often lost a factor of 2. This appears to come from their method for solving quadratics, they can divide through by a common factor, and they attempted to do the same here. Those who made a mistake in the factorisation step, then were not able to gain further credit as any fractions they had, would not be correct.

Question 15

Part (a) was well answered with a high proportion of students gaining the mark. When the mark was not awarded it was usually as the student had expanded the brackets or for incorrectly simplifying the $\frac{a-3}{5}$. In part (b) most students were able to gain at least one of the available marks. Some were awarded one mark for making an error with the signs or for

giving two pairs of brackets which when expanded gave two out of three terms correct. Students should be encouraged to multiply out their brackets as a final check - there was little evidence of this taking place. A popular error that resulted in no marks being awarded was to factorise the first two terms and give $k(3k + 11) - 4$ as the answer. Some students went on to equate the expression to zero and solve the equation, which on this occasion was condoned and didn't result in loss of marks. It was surprising how many students used the quadratic formula to find the solutions when the expression was equal to zero, this often resulted in no marks being awarded as the students either thought that this was the requirement of the question or didn't know how to use these solutions to help them factorise. A surprising number gave a solution of 3(k-1/3)(k+4) which also scored 1 mark. Students should be aware that factors within brackets should be integer values. Part (c) was a good discriminator and many students were able to show that to divide the algebraic fractions, they needed to multiply the first fraction by the reciprocal of the second fraction. Fewer students realised the need to factorise the numerator and denominator of the first fraction and many spent time expanding the brackets for no gain and could not then simplify the complex expression generated. Of those that realised the need to factorise many struggled to factorise the $4-x^2$ often factorising this to $(x+2)(x-2)$ instead of $(2+x)(2-x)$ as sign errors were condoned in one bracket, these students were able to gain 2 of the 3 marks. Almost all of those who correctly factorised went on to simplify the fraction correctly and gain full marks.

Question 17

This was the stage of the paper where the level of demand poses a challenge to many learners. That said, most did at least make a good attempt at question 17, and we saw plenty achieving the first mark for writing at least two of the fractions correctly with a common denominator. The second mark proved more challenging as they had to have all fractions with a common denominator and numerators expanded. There was normally an error here, often due to the two negatives in the final fraction. We saw very few examples of learners being able to complete the algebra to the required result of $\frac{2}{y}$.