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GCSE MATHS

Geometry and measures

Edexcel 1MA1 | Subtopic collection Topic 37

Angles, parallel lines and polygons

Higher tier

Answers and examiner comments

84	2003-2025	Higher
question groups	available papers	tier

Using this booklet

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

Name _____ **Date** _____

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

Original question 23

The full source mark scheme begins on page 141. Use the original paper code, tier and question number shown above.

Original question 9

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

Original question 8

The full source mark scheme begins on page 195. Use the original paper code, tier and question number shown above.

Original question 19

The full source mark scheme begins on page 246. Use the original paper code, tier and question number shown above.

Original question 15

The full source mark scheme begins on page 307. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
6	(i)		45	1	B1 cao
	(ii)			1	B1 (dep) for corresponding angles (accept F angles) or any other complete reason that includes properties of parallel lines e.g. alternate angles (accept Z angles) with 45 marked on diagram (or angles on a straight line = 180) or allied angles with 135 marked on diagram

Question		Working	Answer	Mark	Notes
12		$360 \div 5$ or $180 - (3 \times 180 \div 5)$	72	2	M1 for $360 \div 5$ or $180 - (3 \times 180 \div 5)$ A1 cao

Question	Working	Answer	Mark	Notes
5 (i)	180 – 68	112	3	B1 cao B1 for ‘alternate angles’ or Z angles or ‘corresponding angles’ or F angles **or** B1 for ‘(angles on a straight) line $=180'$ Alternative: B1 for ‘allied angles’ or ‘co-interior angles’ or B1 for ‘(vertically) opposite angles’
(ii)				

Question	Working	Answer	Mark	Notes
9 (a)	180° - 60° or 60° + 60°	120°	2	M1 for 180 ÷ 3 **or** 60 as angle of triangle **or** 180 – 60 **or** 60 + 60 A1 cao
(b)		Reason	1	B1 for at least one correct reason and no incorrect reasons (ignore irrelevant reasons) 'angles on a straight line add to 180°' **or** 'angles in a triangle add up to 180°' **or** 'angles in an equilateral triangle are equal' **or** 'exterior angle of a triangle is equal to the sum of the interior angles at the two other vertices'

Question	Working	Answer	Mark	Notes
4	$BFD = 42°$ *HFB* = 110° $110 - 42$	68	3	M1 for $EDC = 42$ or $DHF = 180 - 110$ M1 for $180 - 42 - 70$ A1 cao **or** M1 for $BFD = 42°$ or $HFB = 110°$ M1 for $110 - 42$ A1 cao **or** M1 for $AFH = 180 - 110 = 70$ M1 for $180 - 70 - 42 = 68$ A1 cao

6	$180-140(=40)$ $360\div"40"$	9	3	M1 for $180-140(=40)$ M1 (dep) for $360\div"40"$ A1 cao

5MB2H_01

5MB2H_01

6	(i)	180° – 160° =	20	3	B1 cao
	(ii)	Exterior angles sum to 360° So 360 ÷ '20' =	18		M1 for 360 ÷ "20" A1 cao

3	(i)		55	1	B1 cao
	(ii)		Corresponding angles	1	B1 for corresponding (angles), accept F angles

1380_3H

6		360 ÷ 30	12	2	M1 for 360 ÷ 30 A1 cao

17		$PBC = 90 - PAC$ $BCP = 90 - (90 - PAC)$	Proof	3	M1 for $PBC = 90 - PAC$ or $PAC = 90 - PBC$ or $ACP = 90 - PCB$ M1 for $BCP = 90 - (90 - PAC)$ or $PAC = 90 - (90 - BCP)$ oe A1 for $PAC = PCB$ and $PCA = PBC$ and $APC = CPB$ B1 SC if M0 awarded for $APC = BPC = 90°$ or statement matching the 3 equal sets of angles $PAC = PCB$ and $PCA = PBC$ and $APC = CPB$

1380_3H

Original question 11

The full source mark scheme begins on page 359. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
3		Exterior angle = $\frac{360}{6}$ = 60 Interior angle = 180 – 60 = 120 120 + 90 = 210 360 – 210 = OR Sum of interior angles = 4 × 180 = 720 Interior angle = 720 ÷ 6 = 120 120 + 90 = 210 360 – 210 = OR Exterior angle = $\frac{360}{6}$ = 60 Exterior angle = 90 90 + 60 =	150	4	M1 $\frac{360}{6}$ (= 60) M1 (Interior angle =) 180 – '60' M1 (dep on at least M1) 360 – ('120' + 90) A1 cao [SC: B2 answer of 210] OR M1 4 × 180 or 720 seen M1 '720' ÷ 6 M1 (dep on at least M1) 360 – ('120' + 90) A1 cao OR M1 $\frac{360}{6}$ (= 60) M1 (Exterior angle =) $\frac{360}{4}$ or 180 – 90 or 90 seen as exterior angle on diagram M1(dep on at least M1) '90' + '60' A1 cao

10		$CBE = 180 - 2 \times 48 = 180 - 96 = 84$ $DCB = 84$ OR $CBE = 180 - 2 \times 48 = 180 - 96 = 84$ $CBA = 180 - 84 = 96$ $ACB = 42$	42	3	M1 correct method to find < CBE or 84 seen at CBE on the diagram M1 correct method to find an angle in triangle ABC or to find angle DCB (these angles may be seen on the diagram) A1 cao

1380_3H

Question		Working	Answer	Mark	Notes
6	(a)	$2x - 10 + x + 50$ (ext angle of a triangle = sum of interior opp angles) OR $180 - (2x - 10 + x + 50) = 140 - 3x$ (sum of the angles in a triangle = 180) $180 - (140 - 3x)$ (sum of the angles on a straight line = 180)	Show result, with reasons	3	M1 for $2x - 10 + x + 50$ **or** $2x + x$ and $50 - 10$ A1 for completing the algebra to complete the proof and showing $y = 3x + 40$ B1 for '**ext angle** of a **triangle** = **sum** of interior **opp** angles' OR M1 for $180 - (2x - 10 + x + 50)$ or $140 - 3x$ seen A1 for completing the algebra to complete the proof and showing $y = 3x + 40$ B1 for 'sum of the **angles** in a **triangle** = **180**' oe **and** 'sum of the **angles** on a straight **line** = **180**' oe
	(b)(i)	$3x = 145 - 40 = 105$ $105 \div 3$ $35 + 50 = 85$	35	4	M1 for clear attempt to subtract 40 from both sides of the equation **or** divide all 3 terms by 3 **or** ($3x =$) $145 - 40$ or 105 seen A1 cao
	(ii)	$2 \times 35 - 10 = 60$ $180 - 145 = 35$	85		M1 ft for $2\times$'35' $- 10$ **or** '35' $+ 50$ **or** $180 - 145$ **or** can be implied by sight of 85 or 60 **or** for substituting '35' in order to find at least one angle implied by sight of 85 or 60 A1 for 85 or ft for '35' provided 'x' < 47

1380_4H

16	(a)		55	1	B1 cao
	(b)		23	2	M1 for $k - 47$ **or** $47 - k$ **or** $70 - k$ **or** $k - 70$ where k can be any value A1 cao
	(c)		Box plot	2	B2 for a fully correct box plot ± ½ square (B1 for 3 correctly plotted points with box or whiskers drawn in)
	(d)		Eg: Adults greater spread, greater iqr, higher median, etc	2	B1 for a correct comparison of a specific value (lowest, highest, median, UQ, LQ) B1 for a correct comparison of spread (iqr, range)

1380_4H

Original question 10

The full source mark scheme begins on page 372. Use the original paper code, tier and question number shown above.

Original question 13

The full source mark scheme begins on page 390. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
1		180 – 47	133	3	M1 for 180 – 47 A1 for 133 C1(dep on M1) for full reasons e.g. angles on a straight line add up to 180° **and** alternate angles are equal **OR** corresponding angles are equal **and** angles on a straight line add up to 180° **OR** vertically opposite angles (or vertically opposite angles) are equal **and** allied angles (or co-interior angles) add up to 180°

Original question 1

The full source mark scheme begins on page 410. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
18			12	4	B1 for 60 seen M1 for (360 – 60) ÷ 2 (=150) M1 for 360 ÷ (180 – 150) or 150×n=180(n-2) oe A1 cao **OR** B1 for 60 seen M1 for 60 ÷ 2 (=30) M1 for 360 ÷ (60÷2) A1 cao **OR** M2 for 30 seen M1 for 360 ÷ 30 A1 cao

Question		Working	Answer	Mark	Notes
6		Angle *DEC* = 180 – 41 =139 Angles on a straight line sum to 180° Angle *EDC* = 60 – 38 **or** Angle *ABD* = 180 – 120 – 38 (=22) Co-interior/allied angles of parallel lines sum to 180° **or** Angles in a triangle sum to 180° **and** Alternate angles *x* =)180 – '139' – '22' (=19) Angles in a triangle sum to 180° **OR** Angle *ADC* = $180^o – 120^o = 60^o$ Co-interior/allied angles of parallel lines sum to 180° Angle *EDC* = 22° Angle *ECD* = $41^o – 22^o = 19^o$ Exterior angle of triangle equals sum of the two opposite interior angles **OR** Angle *DBC* = 38° Alternate angles Angle *BCE* = 101° Angle sum of a triangle is 180° Angle *BCD* = 120° Opposite angles of a parallelogram are equal Angle *ECD* = $120^o – 101^o = 19^o$	*x* = 19° and reasons	4	M1 for *DBC* = 38° **or** *ADC* = 60^o(can be implied by *BDC* = 22°) **or** *ABC* = 60° **or** *DCB* = 120° **or** (*ABD* =) 180 – 120 –38 (=22) M1 for (*BDC* =) 60 − 38 (=22) **or** *BDC* = '22' **or** (*DEC* =) 180 − 41 (=139) **or** (*BCE* =) 180 −41 − 38 (=101) M1 (dep on both previous M1) for complete correct method to find *x* **or** (*x* =) 19 C1 for *x* = 19° **AND** Co-interior/allied angles of parallel lines sum to 180° **or** Opposite angles of a parallelogram are equal **or** Alternate angles **AND** Angles on a straight line sum to 180° **or** Angles in a triangle sum to 180° **or** Exterior angle of triangle equals sum of the two opposite interior angles **or** Angles in a quadrilateral sum to 360°

1MA0_2H

Question		Working	Answer	Mark	Notes
23	(b)	Angle $ABO = 45^o$ Angle $DAB = 180 - 45 - 45$ **OR** In ΔBAD, $\cos A = \frac{10^2 + 10^2 - '\sqrt{200}'^2}{2 \times 10 \times 10} = 0$ **OR** In ΔBOA, $\cos B = \frac{'\sqrt{50}'}{10}$ Angle $BAD = 180 - $ '45' – '45' **OR** $\sin A = \frac{'\sqrt{50}'}{10}$ $A = 45$ Angle $BAD = 2 \times$ '45'	90	2	M1 Angle $DAB = 180 - 2 \times$ '45' A1 89.98 - 90 **OR** M1 $\cos BAD = \frac{10^2 + 10^2 - '\sqrt{200}'^2}{2 \times 10 \times 10}$ A1 89.98 - 90 **OR** M1 $\sin A = \frac{'\sqrt{50}'}{10}$ A1 89.98 - 90

1MA0_2H

Question		Working	Answer	Mark	Notes
9			$112\frac{1}{2}$	4	M1 for exterior angle = 360 ÷ 8 (=45) M1 for interior angle = 180 − "45" (=135) M1 (dep on at least M1) for $\frac{1}{2}$(360 – "135") or 180 - $\frac{1}{2}$("135") A1 for $112\frac{1}{2}$ oe OR M1 for 360 ÷ 8 (=45) M1 for 180 + "45" (=225) or 180 – "45" M1 (dep on at least M1) for "225" ÷ 2 or for $\frac{1}{2}$(360 – "135") or 180 - $\frac{1}{2}$("135") A1 for $112\frac{1}{2}$ oe OR M1 for Sum of interior angles = 180×(8-2) (=1080) M1 for interior angle = "1080" ÷8 (=135) M1 (dep on at least M1) for $\frac{1}{2}$(360 – "135") or 180 - $\frac{1}{2}$("135") A1 for 112.5 oe NB do not award marks for angles that are stated in working but contradicted by their position on the diagram.

5MB2H_01

Original question 10

The full source mark scheme begins on page 429. Use the original paper code, tier and question number shown above.

13			54	3	M1 for 180 – 360 ÷ 5 **or** 108 seen as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao **OR** M1 for 180 × (5 – 2) (= 540) ÷ 5 or 108 given as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao

1MA0_1H

8			48	4	M1 for 360 ÷ 5 (=72) M1 for 180 – '72' (= 108) M1 (dep M2) for '108' – 60 A1 cao OR M1 for (5 – 2) × 180 (=540) M1 for '540' ÷ 5 (= 108) M1 (dep M2) for '108' - 60 A1 cao

9			55	4	M1 for a correct method to find a different angle using 35° M1 for setting up a complete process to calculate angle *x* A1 cao B1 states one of the following reasons relating to their chosen method: Alternate angles are equal; Corresponding angles are equal; Allied angles / Co-interior angles add up to 180; the exterior angle of a triangle is equal to the sum of the interior opposite angles.

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
10			4.7	4	B2 for a trial $4.6 \leq x \leq 4.7$ evaluated correctly (B1 for a trial evaluated correctly for $4 \leq x \leq 5$) B1 for a different trial evaluated correctly for $4.65 \leq x < 4.7$ B1 (dep on at least one previous B1) for 4.7 [Note: Trials should be evaluated to at least accuracy shown in table, truncated or rounded] No working scores 0 marks

x	$x^3 + 2x$
4	72
4.1	77.(121)
4.2	82.(488)
4.3	88.(107)
4.4	93.(984)
4.5	100.(125)
4.6	106.(536)
4.7	113.(223)
4.8	120.(192)
4.9	127.(449)
5	135
4.65	109.8(44625)
4.66	110.5(14696)
4.67	111.1(87563)
4.68	111.8(63232)
4.69	112.5(41709)

Question		Working	Answer	Mark	Notes
10			36	4	M1 for 360 ÷ 5 (=72) or (2×5 – 4)×90 (=540) or (5−2)×180 (=540) M1(dep) for 180 – "72" (=108) or 540 ÷ 5 (=108) (could be marked on the diagram) M1 for complete method to find angle *HAB* (360 – 2 × "108") ÷ 2 oe or angle *EAH* + angle *HCD* 540 – ("108" + "108" + (360 – "108")) oe or angle *EAF* 720 – ("108" × 4) ÷ 2 oe A1 cao

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

PAPER: 1MA0_1H

9		115	4	M1 for 360 − 4 × 25 (=260) M1 (dep) for '260'÷4 (=65) M1 for 180 − '65' **or** (360 −2× '65') ÷ 2 A1 for 115 with working **OR** M1 for 360÷4 (=90) M1 (dep) for '90' − 25 (=65) M1 for 180 − '65' **or** (360 − 2×'65') ÷ 2 A1 for 115 with working

4	(i) (ii)		126 Reason	2	B1 cao B1 for reason relating to geometrical property & parallel lines which is not contradicted by method shown elsewhere eg alternate angles are equal, corresponding angles are equal, allied angles / co-interior angles add up to 180°

PAPER: 5MB2H_01

Question		Working	Answer	Mark	Notes
10			126	3	M1 for (angle BCD =) $\frac{180\times(10-2)}{10}$ (= 144) M1 (dep) for (angle DCX =) 360 – '144' – 90 oe A1 cao OR M1 for (exterior angle =) $\frac{360}{10}$ (= 36) M1 (dep) for (angle DCX =) 90 + '36' oe, eg 180 – (90 – 36) A1 cao

11			36	3	M1 for a correct method to find either an interior or an exterior angle; eg. (180 × 3) ÷ 5 or 540 ÷ 5 (=108) or 360 ÷ 5 (=72) M1 (dep) for a complete method to find angle *CFD*. A1 cao

PAPER: 1MA0_1H

Original question 7

The full source mark scheme begins on page 456. Use the original paper code, tier and question number shown above.

Original question 8

The full source mark scheme begins on page 470. Use the original paper code, tier and question number shown above.

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
17			25	4	M1 for complete method to work out interior angle of a regular octagon **or** 135° identified as an interior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg "135" − "110" or (8×"135" − 4×"135" − 4×"110") ÷ 4 or (3×180 − 2×"135" − 2×"110") ÷ 2 A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg 180 − "45" − "110" A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *JKF* or angle *JKF* identified as 70° M1 (dep on M2) for complete method to work out angle *KFE*, eg "70" − "45" A1 for 25 with supporting working

PAPER: 1MA0_1H

21	(a)		$\frac{3}{2}\mathbf{a}$	3	M1 for (eg $\overrightarrow{EO}$ or $\overrightarrow{CB}$ =) $\mathbf{a} - \mathbf{b}$ M1 for correct vector expression for $\overrightarrow{MN}$, eg $\overrightarrow{MO} + \mathbf{a} + \frac{1}{2}\mathbf{b}$ or $\overrightarrow{ME} + 2\mathbf{a} - \frac{1}{2}\mathbf{b}$ A1 for $\frac{3}{2}\mathbf{a}$ oe
	(b)		*MN* is parallel to *OA* and $\frac{3}{2}\times$ length of *OA*	2	B1 for *MN* is parallel to *OA* B1 for $MN = \frac{3}{2} \times$ length *OA* oe or ft part (a)

Original question 12

The full source mark scheme begins on page 491. Use the original paper code, tier and question number shown above.

17			18	4	M1 for a method to find the exterior angle of a pentagon eg. 360 ÷ 5 (=72) or the interior angle of a pentagon, eg. 180 – 360 ÷ 5 (= 108) A1 for 72 or 108 M1 (dep M1) for a fully complete method to find the required angle, *DCF* A1 for 18 or ft their interior or exterior angle

PAPER: 1MA0_1H

Original question 10

The full source mark scheme begins on page 515. Use the original paper code, tier and question number shown above.

17		85.6	4	M1 for 360 ÷ 5 (=72) M1 (dep) for $\frac{1}{2} \times 6^2 \times \sin 72$ (=17.12) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6 OR M1 for 360 ÷ 10 (=36) or $\frac{1}{2}(180 - 360 \div 5)$ (=54) M1(dep) for eg $6 \times \sin 36 \times 6 \times \cos 36$ (=17.12) or $\frac{1}{2}$ $6 \times \sin 54 \times 6 \times \cos 54$ (=8.55) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6

5MB3H/01 June 2015

6			40°	4	M1 for angle FBC=70 or CFG = *x* or ABF = 110 may be seen in diagram M1 for angle CBF = BFC =70 or 90 – ½ *x* A1 for 40 supported by working C1 (dep on M2) for all reasons and linked to appropriate working, e.g. Alternate angles are equal; Allied angles / Co-interior angles add up to 180°; Base angles of an isosceles triangle are equal; angles in a triangle add to 180°, angles on a straight line equals 180°

14			126	4	M1 for method to find exterior or interior angle of octagon M1 for method to find exterior or interior angle of pentagon M1 for complete method A1 cao

1MA0 1H November 2015

Original question 9

The full source mark scheme begins on page 531. Use the original paper code, tier and question number shown above.

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
9			124° with reasons	4	M1 for a method to find any angle, eg. angle *DEF* = 180 – 70 – 54 (= 56) or angle *AEB* = 70 or angle *EAB* = 54 or angle *GEB* = 180 – 70 (= 110) A1 for $x = 124$ NB: angles may be just shown on the diagram C2 for full reasons, appropriate to their given method, with no additional reasons (C1 for one appropriate reason relating to parallel lines) Possible reasons: corresponding angles are equal; alternate angles are equal; co-interior angles (allied) add up to 180 angles on a straight line add up to 180 ; angles in a triangle add up to 180; vertically opposite angles are equal ; the exterior angle of a triangle is equal to the sum of the interior opposite angles; angles at a point add up to 360;

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
12			144	4	M1 for method to find the interior angle of a regular pentagon, eg. 180 × (5 – 2) ÷ 5 (= 108) oe M1 (indep) for using a line of symmetry to find an angle, eg. " interior angle " ÷ 2 (half an interior angle) or 90 between line and side M1 (dep on M2) for complete method to find angle *x*, eg. 90 + "54" or "108"×5 – "108"×2 – 90×2 A1 for 144 supported by working OR M1 for considering all 5 lines of symmetry or angle vertically opposite *x* with angle bisector drawn M1 for 360 ÷ 10 (= 36) or 360 ÷ 5 (= 72) M1 for (360 ÷ 10) × 4 or (360 ÷ 5) × 2 A1 for 144 supported by working OR M1 for method to find the exterior angle of a regular pentagon (72°), eg. 360 ÷ 5 (= 72) oe M1 (indep) for using a line of symmetry to find an angle, eg. "interior angle" ÷ 2 (half an interior angle) or 90 between line and side M1 (dep on M2) for complete method to find angle *x*, eg. 180 – 2(180 – 90 – 72) A1 for 144 supported by working

PAPER: 1MA0_2H

8			88	4	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

PAPER: 5MB2H/01

Original question 9

The full source mark scheme begins on page 544. Use the original paper code, tier and question number shown above.

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

Original question 5

The full source mark scheme begins on page 564. Use the original paper code, tier and question number shown above.

5		42	3	M1 for a method to find angle *ABD* eg *ABD* = 360 −130 −130 −40 (= 60) or angle *DBC* eg *DBC* = 180 − 2 × 72 (= 36) (may be on the diagram) M1 for a complete method eg (180 – "60" − "36") ÷ 2 A1 cao OR M1 for a method to find angle *ABC* eg *ABC* = 540 −130 − 40 −130 −72 −72 (= 96) M1 for a complete method eg (180 − "96") ÷ 2 A1 cao

Paper: 1MA0/1H

Original question 5

The full source mark scheme begins on page 575. Use the original paper code, tier and question number shown above.

Question	Working	Answer	Mark	Notes
15		100	4	M1 for 360 ÷ 9 (= 40) or (9 – 2) × 180 (= 1260) M1 (dep) for 180 – "40" or "1260" ÷ 9 (= 140) oe M1 (dep M2) for a complete method to find the required angle, eg "140" – (360 – "140" – "140") ÷ 2 or ("140" ÷ 7) × 5 A1 for 100 supported by working
*16		No with correct calculations	5	M1 for splitting the cross section into separate areas and a method to find the area of one part OR for splitting up the pool into smaller prisms and a method to find the volume of one prism, e.g. a cuboid M1 (dep) for a complete method to find the cross-sectional area OR for a method to find the volume of more than on prism M1 (dep) for a complete method to find the vol of the pool (= 70 (m^3) OR for a complete method to find the depth of 60000L of water M1 for method to find figure for comparison, eg distance between surface and top of pool ("70" – "60") ÷ (5 × 10) C1 No, with correct calculations, eg water level is 20cm below top of pool

Paper: 1MA0/2H

5		Shows polygon is a hexagon	M1 M1 A1 C1	for a complete method to find the interior or exterior angle of the dodecagon eg $180 - \frac{360}{12}$, $\frac{180}{12}(12-2)$ oe (= 150), 360 ÷ 12 (=30) for a complete method to find the interior angle of polygon **P** eg at *B* or *C*: 360 – "150" – 90 (= 120) or "30" + 90 (= 120) **or** for a complete method to find the interior or exterior angle of the hexagon eg $180 - \frac{360}{6}$, $\frac{180}{6}(6-2)$ oe (= 120), 360 ÷ 6 (= 60) for 30 and 120 **or** 30 and 60 **or** 120 and 150 **or** 60 and 150 complete solution, fully supported by accurate figures

Paper 1MA1: 3H

3	*CB* extended to form *CG*	Reasoning	B1 M1 C2 (C1	for 35 **or** 75 **or** 145 **or** 105 **or** *DEF* = 70, marked on the diagram or 3 letter description for 180-70-35 **or** 180-75-35 **or** a correct pair of angles that would lead to 75 or 70, eg *AFB* = 35 and *FAB* = 75 **or** *AFB* = 35 and *ABG* = 75 **or** *FBC* = 35 and *ABG* = 75 **or** *EDF* = 75 and *DEF* = 70 **or** *FDC* = 105 and *FBC* = 35 **or** *ABC* = 105 and *FBC* = 35 (dep on B1M1) All figures correct with all appropriate reasons stated. Angles must be clearly labelled or on the diagram. Full solution must be seen (dep on B1 or M1) for one reason clearly used and stated.) Corresponding angles are equal, alternate angles are equal, opposite angles in a parallelogram are equal, angles in a triangle sum to 180, angles on a straight line sum to 180, vertically opposite angles are equal, vertically opposite angles are equal, angles in a quadrilateral sum to 360, co-interior angles sum to 180, allied angles sum to 180, angles around a point sum to 360

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
12		15	P1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10\times180}{12}$ (= 150) or $\frac{360}{12}$ (= 30), must be no contradictions
			P1	for process to find angle *STR*, eg $\frac{180-"150"}{2}$ or $\frac{"30"}{2}$
			A1	cao

18	39.5	P1	for a start to a process eg, for a correct trigonometric statement, eg $\sin 48 = \frac{7.3}{AC}$ **or** $\cos 42 = \frac{7.3}{AC}$ **or** $\frac{AC}{\sin 90} = \frac{7.3}{\sin 48}$ **OR** angle *CAH* unambiguously identified on a diagram	Must include correct values
		P1	for a complete correct process to find *AC*, eg $(AC =) \frac{7.3}{\sin(48)}$ (=9.8..) **or** $(AC =) \frac{7.3}{\cos(42)}$ (=9.8..) **or** $(AC =) \sin 90 \times \frac{7.3}{\sin 48}$ (=9.8..)	
		P1	for a correct statement using angle *CAH*, eg $\tan(CAH) = \frac{8.1}{\text{"9.8..."}}$ **OR** $\sqrt{8.1^2 + \text{"9.8"}^2}$ (=12.7…) **and** $\frac{\sin CAH}{8.1} = \frac{\sin 90}{\text{"12.7"}}$	
		A1	for answer in the range 39.5 – 39.51	If an answer is given in the range but then incorrectly rounded award full marks.

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
8	140	P1	for complete process to find sum of the interior angles of a pentagon eg $(5 – 2) \times 180$ or exterior $360 \div 5 = 72$, interior $180 – 72 = 108$, 108×5 **OR** for complete process to find sum of the exterior angles of the pentagon eg $(180 – x) + (180 – 2x) + (180 – 125) + (180 – 115) + (180 – 90)$	Must be a complete process that could lead to a figure of 540 if that process is evaluated incorrectly
		A1	for sum of interior angles is 540 **OR** for sum of exterior angles is 360	360 must be identified as the sum of the exterior angles
		P1	for start to process to find angle *ABC* eg [angles in a pentagon] – 115 – 125 – 90 (= 210) or $115 + 125 + 90 + x + 2x =$ [angles in a pentagon] **OR** $(180 – x) + (180 – 2x) + (180 – 125) + (180 – 115) + (180 – 90) = 360$	Award provided [angles in a pentagon] is greater than 400 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified
		P1	for process to find angle *ABC* eg "210" ÷ 3 (= 70), "210" divided in the ratio 2 : 1 **or** for process to find angle *BCD* eg $\frac{2}{3} \times$ "210" **or** for $3x =$ "210" or $–3x = –$"210"	Award if 70 is given for either *ABC* or *BCD* on the diagram
		A1	cao	Award marks for 140 on the diagram with working and not contradicted by the answer line. Award 0 marks for 140 without working.

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
9 (a)	4.52×10^3	M1	for $2.04.... \times 10^7$ oe eg $2.04....\times 10^{-5} \div 10^{-12}$ or $20.4... \times 10^6$ or 204(08163.27) **or** for correct value of T, 4517.(53....), not written in standard form, eg 4520	May be given correct to 3 sig figs or more
		A1	for answer in the range 4.51×10^3 to 4.52×10^3 (SC B1 for $6.32\ldots\times 10^{-1}$)	
(b)	Explanation	M1	for method to find the scale factor or decreased value in T, eg $\sqrt{\frac{1.1}{1.05^3}}$ (= 0.97.....) oe or $\sqrt{\frac{5.6 \times 10^{-5} \times 1.1}{(1.4\times10^{-4}\times1.05)^3}}$ (= $4.40\ldots\times 10^3$) oe	Award mark for a correct method to calculate the scale factor or the percentage increases in w and d^3 or the decreased value of T
		C1	(dep M1) for explanation eg value of scale factor less than 1, so a decrease in T **OR** compares $4.40\ldots\times 10^3$ with their value of T from (a) provided answer to (a) is greater	This mark may only be awarded if supported by numerical evidence

Question	Answer	Mark	Mark scheme	Additional guidance
3	60	M1	use of parallel lines to find an angle eg *ABE*=70 **or** *EBG*=75 **or** *EBC* = 110 **or** shows parts of *x* as 35 or 25	Parts of *x* should be identified on the diagram by the insertion of a dividing line through angle *x* (need not be identified or drawn parallel).
		M1	for a complete method to find angle *x*; could be in working or on the diagram	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for *x* = 60	
		C1	(dep on M1) for one reason linked to parallel lines and one other reason, supported by working taken from: alternate angles are equal, allied angles / co-interior angles add up to 180, angles on a straight line add up to 180, angles in a triangle add up to 180°	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. There should be no incorrect reasons given.

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
19	31.0	P1	for tan 35 = $BE \div 15$ or $BE = 10.5(0...)$ **OR** finding the length DM = $\frac{2}{5}\times 15 (=6)$ **or** MA = $\frac{3}{5}\times 15 (=9)$ **or** 6:9 **OR** showing the required angle on a diagram eg with an arc	$MB = \sqrt{9^2 + 15^2} = \sqrt{306}$ (=17.4(9…) or 17.5) $BE = 15\times\tan 35$ (=10.5(0…)) $AE = 15\div\cos 35$ (=18.3(1…)) $ME = \sqrt{9^2 + 18.31...^2} = \sqrt{416.(3...)}$ (=20.4(0…))
		P1	for $MB = \sqrt{15^2 + "9"^2}$ or $\sqrt{306}$ or 17.4(9....) **OR** $ME = \sqrt{"9"^2 + "18.3(1...)"^2}$ or $\sqrt{416.(3...)}$ or 20.4(0…)	Check diagram for working
		P1	for using appropriate trigonometry ratio to set up an equation in angle *EMB* eg tan θ = "10.5(0...)" ÷ "17.4(9...)" **or** cos θ = "17.4(9…)" ÷ "20.4(0…)" **or** sin θ = "10.5(0…)" ÷ "20.4(0…)"	
		A1	for answer in the range 30.9 to 31	If an answer is shown in the range in working and then incorrectly rounded award full marks.

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
5	162 supported	M1	for method to find sum of the interior angles of a hexagon eg $(6 – 2) \times 180$ (= 720) oe **OR** for method to find sum of the interior angles of a pentagon, eg $(5 – 2) \times 180$ (= 540) **OR** for method to find angle *AFC* or *BCF*, eg $(360 – 2 \times 117) \div 2$ (= 63) **OR** for dropping a perpendicular from *A* or *B* to *ED* with 90° marked on *ED* and 27° at the top	Must be a complete process that would lead to a figure of 720 if evaluated correctly. For a pentagon there must be an indication that they have divided the hexagon into two halves. 63 may be shown on the diagram for angle *AFC* or angle *BCF*
		M1	for method to use ratio 2 : 1 eg marks as $2x$ and x or as x and $\frac{1}{2}x$ on diagram **OR** for ([angle sum of hexagon] $– 2 \times 117) \div 6$ (= 81) oe or ([angle sum of hexagon] $\div 2 – 117) \div 3$ (= 81) oe **or** $117 + 117 + 2x + 2x + x + x =$ [angle sum of hexagon] oe **OR** eg ([angle sum of pentagon] $– 117 – 180) \div 3$ (= 81) oe **or** $117 + 180 + 2x + x =$ [angle sum of pentagon] oe	Ratio must be used correctly if awarded for diagram Award provided [angle sum of hexagon] is greater than 700 or [angle sum of pentagon] is greater than 500 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified.
		M1	for finding angle *FED* = 81 or for finding angle *CDE* = 81 **OR** for complete process to find angle *AFE* eg ([angle sum of hexagon] $– 2 \times 117) \div 6 \times 2$ oe **OR** ([angle sum of pentagon] $– 117 – 180) \div 3 \times 2$ oe	This may be shown by solving a correct equation to find the value of x.
		C1	for accurate working leading to angle *AFE* = 162	Award marks for 162 on the diagram with working and not contradicted by the answer line. Award 0 marks for 162 without working.

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
5	93	M1	for method to find angle *ACB*, eg. 180 – 75 – 51 (= 54)	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54° shown in the wrong place
		M1	(dep M1) for method to use the ratio, eg. "54" ÷ (2 + 1) (= 18)	
		M1	for complete method, eg. 180 – 51 – "18" × 2 or 75 + "18" oe	
		A1	cao	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
8	45	P1	for 180 – 117 (=63) **or** states, or uses, exterior angle + x =117	Angles may be shown on the diagram. Any angle labelled correctly as 63 and not contradicted scores this mark
		P1	for process to find the exterior or the interior angle of the pentagon, eg 360 ÷ 5(=72) **or** 180 – (360 ÷ 5) (=108) **or** ((5–2) × 180) ÷ 5 (=108)	Exterior = 108 or interior =72 does not score the mark
		P1	for a complete process to find x, eg 180 – "72" – "63" **or** "108" – "63" **or** 117 – "72"	
		A1	cao	An answer of 45 with no supporting working scores 0

6	85 with working and reasons	M1	for correct use of corresponding angles eg *AEB* = 63 **or** co-interior angles eg *BCD* = 180 – 148 (= 32) or *DEB* = 180 – 63 (= 117)	Angles must be clearly labelled on the diagram or otherwise identified. Full solution must be seen.
		M1	(dep) for a complete method to find angle *EAB* eg. 180 – "63" – (180 – 148) **or** 148 – "63" **or** "117" – (180 – 148)	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for *EAB* = 85 (identified)	
		C2	(dep on M2) all working correct with all appropriate reasons stated. Corresponding angles are equal Allied angles / Co-interior angles add up to 180 Angles on a straight line add up to 180 Angles in a triangle add up to 180 The exterior angle of a triangle is equal to the sum of the interior opposite angles.	When reasons are given the key words underlined must be present. Reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
		(C1	for **one** reason relating to parallel lines clearly used and stated **or** for any **two** reasons clearly stated for their fully correct method)	

Paper: 1MA1/1H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
5	132	M1	for finding an exterior angle eg 360 ÷ 6 (= 60) **or** 360 ÷ 5 (= 72) **or** an interior angle eg 180 × 4 ÷ 6 (= 120) or 180 × 3 ÷ 5 (= 108)	Angles may be shown on the diagram. Only award this mark for an angle that is not contradicted
		M1	for a complete method eg 360 – "120" – "108" or "60" + "72"	
		A1	cao	Answer only award no marks

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
20	56	P1	for a correct process to find AF, eg $\sqrt{13^2 - 9^2}$ (= 9.38…) **or** $2\sqrt{22}$ **or** $\sqrt{88}$	Decimal values truncated or rounded to 3 sf or more
		P1	for a correct process to find FH, eg $\frac{9}{\cos(49)}$ (= 13.7…)	
		P1	for a correct trig statement involving FAH, eg $\tan(FAH) = \frac{"13.7..."}{"9.38..."}$	
		A1	answer in the range 55.6 to 56	If a correct answer within the range is shown in working but incorrectly rounded award full marks

Question	Answer	Mark	Mark scheme	Additional guidance
26	15.8	P1	starts process by finding an angle, eg exterior angle = 360 ÷ 7 (= 51.42...) or interior angle = $\frac{900}{7}$ or 180 – (360 ÷ 7) (= 128.57…) oe	Accept values to 3 figures rounded or truncated
		P1	start of process to find length of side by using area, eg $\frac{1}{2} \times AB \times AG \times \sin GAB = 30$ oe or $\frac{1}{2} \times a \times b \times \sin [128.5 \ldots] = 30$ oe or $\frac{1}{2} \times x \times x \times \sin [128.5 \ldots] = 30$ oe **or** $\frac{1}{2} \times AG \times \frac{1}{2}GB \times \sin AGB = 15$ oe **or** for a relationship linking GB and h, $\frac{1}{2} \times GB \times h = 30$ oe	Any symbols used in formulae must be consistent with any labels on the diagram. For this mark, [128.5...] does not have to come from a correct process but is the value that the student believes is the interior angle.
		P1	for process to find the length of a side of the polygon eg $\sqrt{\frac{2\times30}{\sin "128.5..."}}$ oe (= 8.76…) **or** for process to get a second relationship linking AG and $\frac{1}{2}GB$, eg $AG \times \cos$ "25.7..." $= \frac{1}{2}GB$ oe **or** for process to get a second relationship linking GB and h, eg tan"25.7..." $= \frac{h}{\frac{1}{2}GB}$ oe	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
		P1	for complete process to find *GB* eg $\frac{\text{“8.76...”}\times\sin\text{“128.5...”}}{\sin\text{“25.7...”}}$ oe or $\sqrt{\text{“8.76”}^2 + \text{“8.76”}^2 - 2 \times \text{“8.76”}^2 \times \cos\text{“128.5…”}}$ oe or 2 × “8.76...” × sin “64.2...” or 2 × “8.76...” × cos “25.7...” oe or $\sqrt{\frac{2\times60}{\tan\text{“25.7...”}}}$ oe	
		A1	for answer in the range 15.7 to 15.8	

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: ±5°
Measurements of length: ±5 mm

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
1		Value changed: a to n	Standard mark scheme but note change of letter.
2		Equations stacked vertically and moved left with equals symbols aligned.	Standard mark scheme
4		Wording added 'Look at the diagram for Question 4 in the Diagram Booklet. You may be provided with a model. It is not accurate.' Diagram enlarged. Model provided. '160cm' label moved to left side.	Standard mark scheme
5		Wording added 'Look at the diagram for Question 5 in the DB.' Diagrams stack vertically and enlarged. Angle arcs made smaller. Arcs at C and F separated more. Wording added: AC = 5 cm; BC = 4 cm; DE = 22 cm; DF = 20 cm; 'Angle ABC = Angle DEF' ; 'Angle ACB = Angle DFE'	Standard mark scheme
6		Wording added 'Look at the diagram for Question 6 in the DB.' Diagram enlarged.	Standard mark scheme
11		Left align information. Values changed: x to p, y to q	Standard mark scheme but note change of letters
13		Wording added 'Look at the diagram for Question 13 in the Diagram Booklet.' The word 'this' removed and replaced with 'the'. Wording added 'in the table below'. Table and diagram enlarged. Open headed arrows. Crosses changed to dots. Small squares removed. The word 'this' removed and replaced with 'the'. Wording added 'in the Diagram Booklet'.	Standard mark scheme
14	(b)	Value changed: x to y	Standard mark scheme but note change of letter
15		Wording added 'Look at the information for Q15 in the Diagram Booklet. It shows details about the fish in a pet shop.' Information moved to the Diagram Booklet and left aligned	Standard mark scheme
16		Wording added 'Look at the diagram for Question 16 in the Diagram Booklet.' Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller. Ratio left aligned.	Standard mark scheme
20		Wording added 'Look at the diagram for Question 20 in the Diagram Booklet.' The wording 'The diagram' removed and replaced with 'It'. Diagram enlarged	Standard mark scheme

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
23	(a)	Wording added 'Look at the diagram for Question 23(a) in the Diagram Booklet. It shows'. The wording 'is shown on the grid below' removed. Diagram enlarged. Open headed arrows. Axes labels moved above the vertical axis and right on the horizontal axis. Wording added 'in the Diagram Booklet'.	Standard mark scheme
23	(b)	Wording added 'Look at the diagram for Question 23(b) in the Diagram Booklet.' The word 'this' removed and replaced with 'the'. Wording added 'in the Diagram Booklet'. Diagram enlarged. Open headed arrows. Axes labels moved above the vertical axis and right on the horizontal axis. Graph B line made dashed. Key added to show graph line A and graph B. Odd numbers removed from X axis.	Standard mark scheme
24		Wording added 'Look at the diagram for Question 24 in the Diagram Booklet. It shows'. Diagram enlarged. Open headed arrows.	Standard mark scheme
25		Wording added 'Look at Diagram 1 and Diagram 2 for Question 25 in the Diagram Booklet. You may be provided with a model. It is not accurate.' Diagram enlarged. Diagram added to show side view. Labels moved to left side. Dashed lines longer and thicker. Model provided.	Standard mark scheme
26		Wording added 'Look at the diagram for Question 26 in the Diagram Booklet.' Wording added 'Points G and B are joined to form triangle ABG.' Diagram enlarged.	Standard mark scheme

10	140	P1	for process to find sum of the interior angles of a pentagon eg $180 \times (5 - 2)$ (= 540) oe	Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		P1	(dep P1) for process to use ratio 4 : 1, eg labels as $4x$ and x or as x and $\frac{1}{4}x$ or $110 + 135 + 120 + 4x + x =$ "540" **or** for "540" – 110 – 135 – 120 (= 175)	Ratio must be used correctly if awarded for diagram
		P1	for process to find angle ABC or angle AED eg "175" ÷ (4 + 1) (= 35) **or** "175" ÷ (4 + 1) × 4	
		A1	cao	A correct answer with no supportive working gets 0 marks

Paper: 1MA1/1H

22	30	P1 A1	for a correct trig statement using angle ACF, eg $\sin x = \frac{6.8}{13.6}$ **or** $x = \sin^{-1}\left(\frac{6.8}{13.6}\right)$ **or** $\sin x = 0.5$ **or** $\frac{6.8}{\sin x} = \frac{13.6}{\sin 90}$ oe cao	Check diagram for working

Paper: 1MA1/1H

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

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

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

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

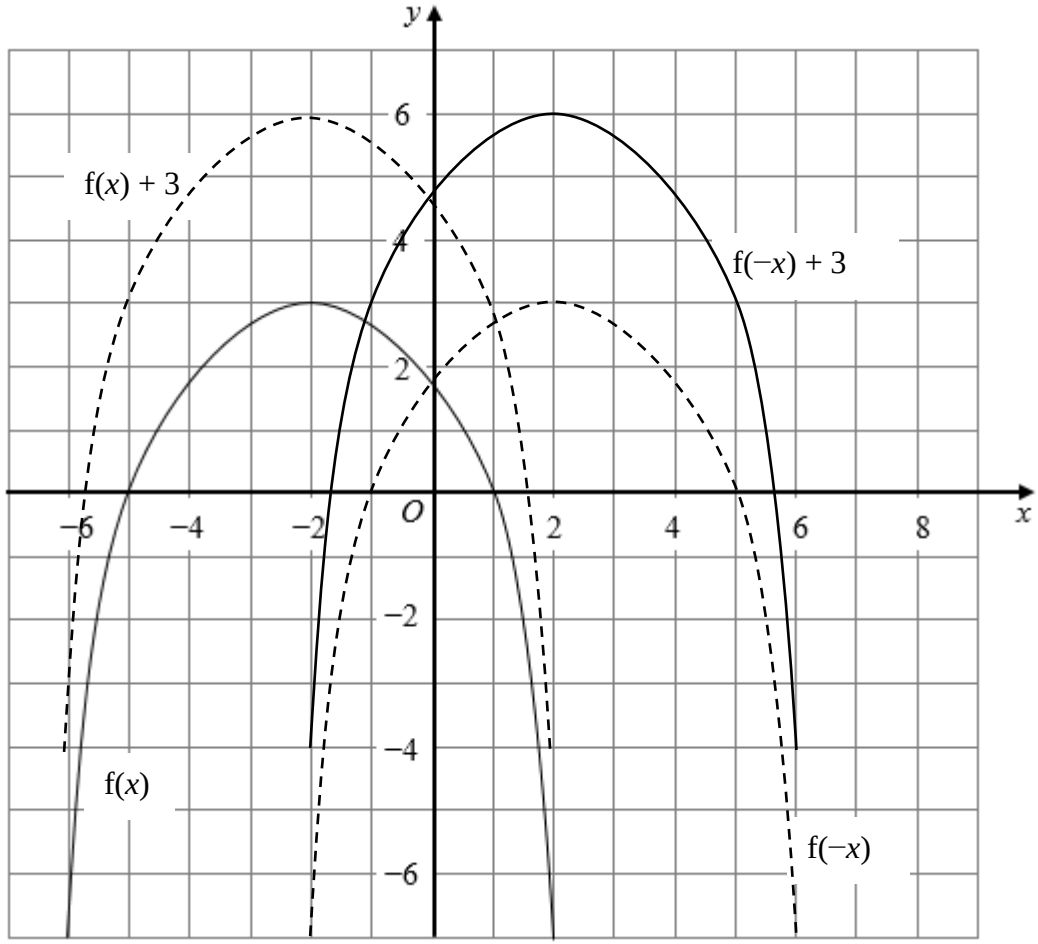
		Modification	Mark scheme notes
13		Wording added 'Look at the diagram for Question 13 in the Diagram Booklet. It shows triangle ABC.'; Wording removed 'ABC is a triangle.' Diagram enlarged and rotated so AC is horizontal. Angle moved outside angle arc and angle arc made smaller. Wording added 'AB = 15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

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

Question	Answer	Mark	Mark scheme	Additional guidance
3	Shown with reasons	M1	for method to find *ACD* using parallel lines eg *BCA* = 125 **and** *ACD* = 180 – 125 (= 55) **or** *BCF* = 180 – 125 (= 55) = *ACD* **or** *FCD* = 125 **and** *ACD* = 180 – 125 (= 55) **or** *CFG* = 180 – 125 (= 55) = *ACD*	Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		M1	for method to find *ADC* eg 180 – 110 (= 70) **or** for method to find *CAD* eg 180 – (“70” + “55”) (= 55) or 110 – “55” (= 55)	
		A1	for *ACD* = 55 **and** *CAD* = 55	
		C1	for one correct parallel lines reason linked to their method eg Corresponding angles are equal Allied angles / Co-interior angles add up to 180 Alternate angles are equal	Underlined words need to be shown; reasons need to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram).
		C1	for one other reason stated linked to their method eg Angles on a straight line add up to 180 Angles in a triangle add up to 180 Vertically opposite angles are equal OR Vertically opposite angles are equal The exterior angle of a triangle is equal to the sum of the interior opposite angles. Angles in a quadrilateral add up to 360. Accept “4-sided shape”	

Question	Answer	Mark	Mark scheme	Additional guidance
6	144	P1	for using the ratio, eg $x = 2y$ **or** $2y + 2y + y$ (= 180) **or** 2 + 2 + 1 (= 5 (parts))	The first two marks may be awarded in either order
		P1	for using angle facts to give an equation, eg $x + x + y = 180$ **or** $2y + 2y + y = 180$ **or** $y + w = 180$ **or** $5x \div 2 = 180$ oe **or** $w = 2x$ **or** for $180 \div 5$ (= 36)	Award P2 for $x = 72$ or $y = 36$
		P1	for a complete process, eg $180 - (180 \div 5)$	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
24	12.2	P1	for process to find *AP*, eg $\frac{5}{7} \times 14.7$ (= 10.5) **or** for showing the required angle on a diagram eg with an arc	Check diagram for working
		P1	for process to find *MP*, eg $\sqrt{"10.5"^2 + 1.9^2}$ oe (= 10.6...) or for a process to find *TP*, eg $\sqrt{"10.5"^2 + 1.9^2 + 2.3^2}$ oe (= 10.9...)	
		P1	for using appropriate trigonometry ratio to find angle *TPM* , eg tan *TPM* $= \frac{2.3}{\text{“10.6...”}}$ or sin *TPM* $= \frac{2.3}{\text{“10.9...”}}$ or cos *TPM* $= \frac{"10.6..."}{\text{“10.9...”}}$	
		A1	for answer in the range 12.1 to 12.2	If an answer is shown in the range in working and then incorrectly rounded award full marks.


y
x
O
6
4
2
−2
−4
−6
−6
−4
−2
2
4
6
8
f(x) + 3
f(−x) + 3
f(x)
f(−x)

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: ±5°
Measurements of length: ±5 mm

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
2		Wording added 'Look at the diagram for Question 2 in the Diagram Booklet. It shows'. Wording removed 'Here is'. Spike removed. Spinner straightened up. Centre dot added. Spinner enlarged. Wording added 'below'. Table turned vertically, enlarged and left aligned.	Standard mark scheme
3		Wording added 'Look at the table for Question 3 in the Diagram Booklet.' Wording added 'in the Diagram Booklet'. Table enlarged.	Standard mark scheme
4		Wording added 'Look at the diagram for Question 4 in the Diagram Booklet. It shows a number line.' Wording 'a' removed and replaced with 'the'. Wording 'Here is her answer' removed and replaced with 'Her answer in shown in the Diagram Booklet.' Diagram enlarged. Open headed arrows.	Standard mark scheme
8		Wording added 'Look at the diagram for Question 8 in the Diagram Booklet. You may be provided with a model. They show'. Wording removed 'The diagram shows'. Diagram enlarged. Table added to the diagram. Frame removed from the formula.	Standard mark scheme
9		Wording added 'Look at the diagram for Question 9 in the Diagram Booklet. It shows'. Wording removed 'is shown'. Wording 'the' removed and replaced with 'a'. Axis labels moved to the top of the vertical axis and to the right of the horizontal axis. Diagram enlarged. Open headed arrows. L label moved up.	Standard mark scheme

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
12		Wording added 'Look at the diagram for Question 12 in the Diagram Booklet. It'. Wording removed 'The diagram'. Diagram enlarged. Shading changed. Angle moved outside of the angle arc and angle arc made smaller. Radius label moved to the left. Wording added 'PO = OQ = 6.2 cm An angle is marked on the diagram.'	Standard mark scheme
13		Wording added 'Look at the diagram for Question 13 in the Diagram Booklet. It is a cumulative frequency graph.' Wording added 'in the Diagram Booklet'. Diagram enlarged. Grid lines changes on the grid to go up in increments of 20 on the x axis. Graph line changed to go through the points, (0,0), (40, 20), (50, 30), (60, 40), (70, 50), (80, 60), (90, 70), and (130, 80). Open headed arrows. Axis labels moved to the top of the vertical axis and to the left of the horizontal axis. Right axis labelled.	(a) M1 for a correct method eg 80 – 70 (= 10) A1 for 10/80 or 1/8 or 0.125 or 12.5% (b) B1 for 60 (no tolerance) (c) M1 for UQ=80 or LQ=40 A1 for 40 (d) standard mark scheme using their figures for "40"
15		Wording added 'Look at the diagram for Question 15 in the Diagram Booklet. It'. Wording removed 'The diagram'. Wording added 'BD = 22 cm DA = 32 cm AE = 21.6 cm EC = 58.4 cm' Diagram enlarged.	Standard mark scheme
16		Wording removed 'The diagram shows'. Wording added 'is shown below.' Numbers left aligned and circles removed.	Standard mark scheme
18	(a)	Wording added 'Look at the diagram for Question 18(a) in the Diagram Booklet. It shows triangle P and triangle Q on a grid.' Triangle P moved. Triangle Q added to the diagram. Diagram enlarged. Shading changed. Triangles labelled 'triangle P' and 'triangle Q'. Axis labels moved to the top of the vertical axis and to the right of the horizontal axis. Grid cut at $x = 7$. Cut out shapes provided. Wording removed 'Enlarge triangle P by a scale factor -1½ with centre of enlargement (-2, 1)'. Wording added 'Describe the single transformation that maps triangle P onto triangle Q. Two cut out shapes may be available if you wish to use them.'	B2 for all three aspects: enlargement, scale factor -1½ , centre (-2, 0) (B1 for two aspects) Award B0 for more than one transformation described.

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
18	(b)	Wording added 'Look at the diagram for Question 18(b) in the Diagram Booklet. It shows triangle P and triangle R on a grid.' Wording removed 'a combined transformation of'. Wording 'followed by a translation to give triangle R.' removed and replaced with 'to give triangle R. Triangle R is then translated.' Wording added 'A cut out shape is provided if you wish to use it.' Diagram repeated from part (a) but with triangle P and triangle R only. Shading changed. Triangles labelled 'triangle P' and 'triangle R'. Diagram enlarged. Axis labels moved to the top of the vertical axis and to the right of the horizontal axis. Grid cut at $x = 7$. Cut out shape provided.	Standard mark scheme
19		Wording added 'Look at the diagrams for Question 19 in the Diagram Booklet. You may be provided with three models for this question and an additional two formulae models.' Diagrams added to show 2D view of frustum F and solid S. Diagrams enlarged. Small cone labelled on diagrams 1 and 2. Dashed lines made longer and thicker. Open headed arrows. Labels moved to the left. Frame removed from the formulae. Wording changed to 'The frustum F of a cone is made by removing a small cone with height 10 cm from a larger solid cone with height 15 cm and base diameter 24 cm as shown by Diagram 1, Diagram 2 and the models. Diagram 3 and Diagram 4 show the solid S made by removing the frustum F from a solid hemisphere.'	Standard mark scheme
20	(b)	Wording added 'Look at the diagram for Question 20(b) in the Diagram Booklet. It shows'. Wording 'is shown on the grid' removed and replaced with 'on a grid'. Diagram enlarged. Axis labels moved to the top of the vertical axis and to the right of the horizontal axis. Wording added 'in the Diagram Booklet'. Grid cut at x=8.	Standard mark scheme
21		Wording added 'Look at the diagram for Question 21 in the Diagram Booklet. It shows'. Wording removed 'are'. Diagram enlarged. Angles moved outside of the angle arcs and angle arcs made smaller. Wording added 'Angle DAC = 35° Angle AEB = 28°'	Standard mark scheme
22		Wording added 'Look at the information for Question 22 in the Diagram Booklet.' Information moved to the Diagram Booklet. Wording added 'Use the information shown in the Diagram Booklet.'	Standard mark scheme

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
24		Wording added 'Look at the Diagram 1 and Diagram 2 for Question 24 in the Diagram Booklet. You may be provided with a model. Diagram 1 and the model show'. Wording removed 'The diagram shows'. Wording added 'Diagram 2 shows face TAD of the triangular prism.' Diagram enlarged. Diagram added to show face TAD. Dashed lines made longer and thicker. Point P added on the diagram. Angle arc for TPM added. Side lengths added to the diagram. Wording 'AB = 14.7 cm' and 'BC= 3.8 cm' removed and replaced with 'AB = DC = 14.7 cm' and 'DA = BC = 3.8 cm'. Dotted lines added for PT and PM.	Standard mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
7	Shown	M1	for deriving a suitable equation, eg $4x + 15 + 2x + 15 + 4x + 8 + 3x - 3 = 360$ $(13x + 35 = 360)$ or $4x + 15 + 2x + 15 = 180$ $(6x + 30 = 180)$ or $4x + 8 + 3x - 3 = 180$ $(7x + 5 = 180)$	
		M1	(dep) for a method to isolate terms in x, eg $4x + 2x + 4x + 3x = 360 - 15 - 15 - 8 + 3$ or $4x + 2x = 180 - 15 - 15$ or $4x + 3x = 180 - 8 + 3$	
		A1	for solving equation to $x = 25$	
		C1	for substituting $x = 25$ into $A + B$ or $C + D$ and showing = 180, and gives a suitable statement, eg co-interior/allied angles (sum to 180), **or** since $A + B = 180$ the lines are parallel	If starting with an equation = 180 need to substitute into the opposite pair.
			Alternative solution assuming it is a trapezium	
7	Shown	M1	for deriving a suitable equation, eg $4x + 15 + 2x + 15 = 4x + 8 + 3x - 3$ $(6x + 30 = 7x + 5)$	
		M1	(dep) for a method to isolate terms in x, eg $15 + 15 - 8 + 3 = 4x + 3x - 4x - 2x$	
		A1	for solving equation to $x = 25$	
		C1	for a fully correct statement, eg since $A + B = 180$ the lines are parallel	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
4	180 – 4*e* and reason	M1	for angle *ACD* = *e* **or** for angle *ADC* + angle *BAD* = 180 **or** for angle *BAX* = 3*e* (where *X* lies on *DA* extended)	Angles must be clearly labelled on the diagram or otherwise identified
		A1	for 180 – 4*e* oe	May be unsimplified
		C1	(dep M1) for an appropriate reason relating to parallel lines from eg alternate angles are equal or allied angles / co-interior angles add up to 180 or for corresponding angles are equal	Underlined words need to be shown Reason needs to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram)

Question	Answer	Mark	Mark scheme	Additional guidance
6	55	P1	for process to find the sum of the interior angles of a pentagon, eg $180 \times (5 - 2)$ (= 540) oe	Can be implied by the shape correctly divided into triangle and quadrilateral or three triangles with correct angle sums marked
		P1	for the start to a process of giving each angle in a common form, eg $d = 3c$ **or** $e = 2c$ **or** x, $3x$, $2x$	Can be implied by division by 7 or 1, 1, 3, 2 given in a ratio eg 1 : 2 : 1 : 3
		P1	for process to find the value of c, eg ([540] – 155) ÷ 7 oe or for a correct equation in one variable, eg $c + 155 + c + 3c + 2c = [540]$ oe	Where [540] is what they believe to be the angle sum of the pentagon
		A1	cao	

6	12	P1
		
		P1
		
		P1
		
		A1
			for (interior angle =) (180 ÷ 3) + (360 ÷ 4) (= 150)
			
			for (exterior angle =) 180 – "150" (= 30)
			or
			for "150" = $\frac{(n-2)\times 180}{n}$ oe
			
			for 360 ÷ "30"
			or
			for a correct process to solve the equation as far as "30"n = 360
			
			cao
				150 may be seen on diagram.
				
				May be seen on diagram
				Exterior angle of 30 implies P1P1
				
				A correct answer with no supportive working gets 0 marks
				
				Minimum supportive working is P1P1
				or
				Trials of interior angle sum
				Finding 1800 ÷ 150 = 12 oe with 12 as answer scores P1P1P1A1

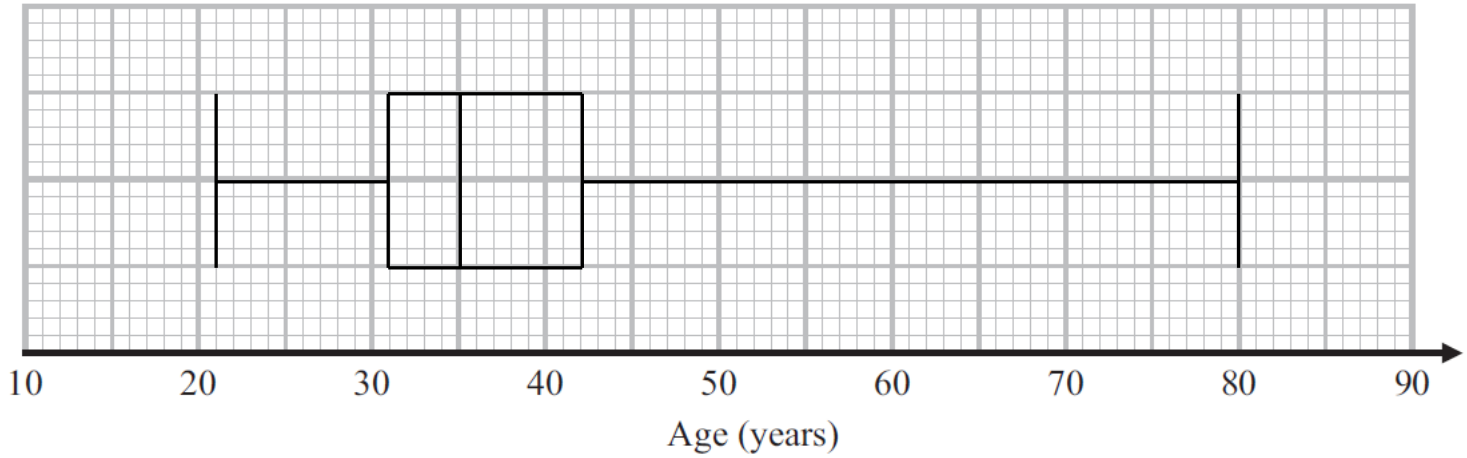
Paper: 1MA1/1H

19	17	P1 P1 P1 A1	for a process to use trigonometry to find BG eg $\frac{BG}{15} = \tan 27$ **or** $7.64(28\ldots)$ for a process to find to find EG eg $\frac{15}{EG} = \cos 52$ **or** 24.3(64...) for a process to use trigonometry to find angle GEB eg $\tan GEB = \frac{"7.64..."}{"24.36..."}$ for an answer in the range 17 to 17.6	Other methods are possible for all P marks but only award the mark at the point of an equation with the correct length or angle as the only unknown

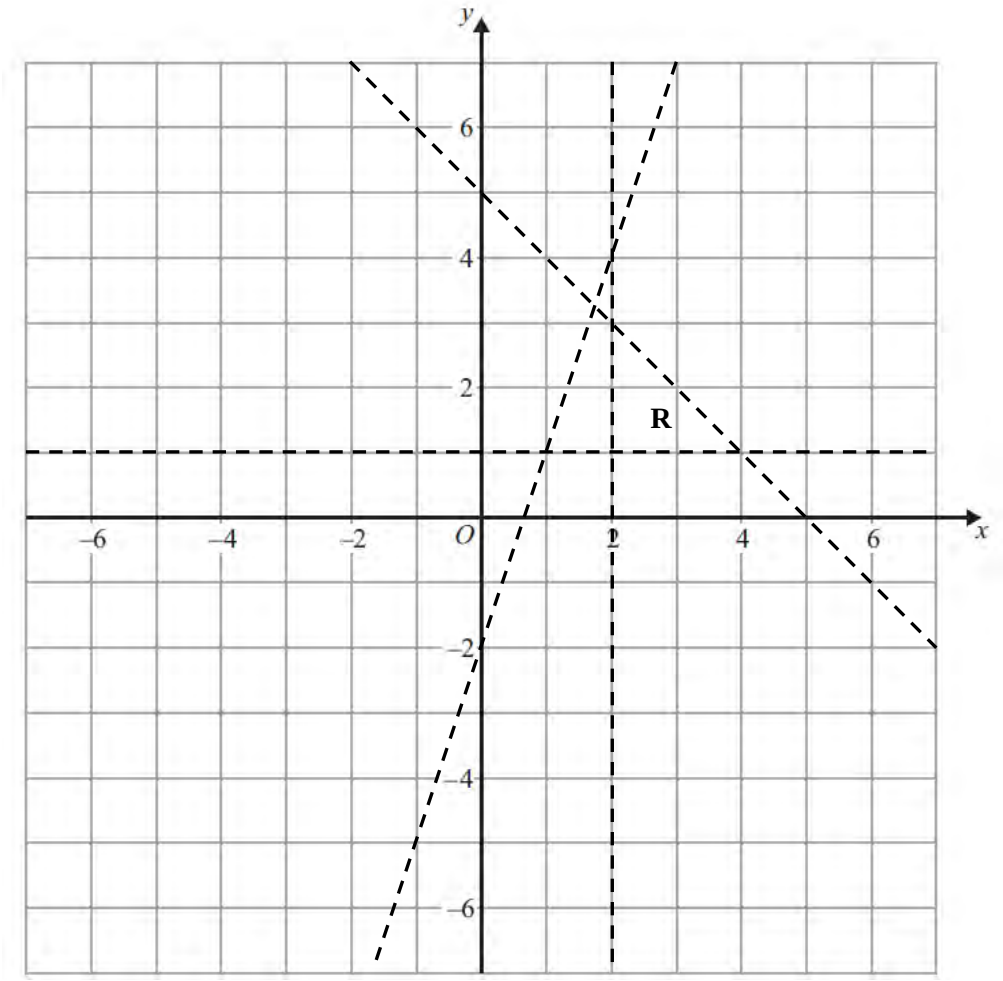
Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
23	73	P1	for process to work with cosine eg $\left(DB^2 =\right)12^2+9^2-2\times12\times9\times\cos 60\ (=117)$	
		P1	for a correct order of operations to find DB, eg $\sqrt{225-216\times\cos 60}$ **or** $\sqrt{"117"}\ (=10.8...)$	$\sqrt{117}=3\sqrt{13}$ Can be implied by correct use in subsequent calculations
		P1	for working with sine rule and 60° eg $\frac{\sin CBD}{9}=\frac{\sin 60}{[DB]}$ **or** $\sin CBD = 0.720...$ **or** $CBD = 46.10...$	3rd and 4th P1 can be awarded in any order [*DB*] must be clearly identified but may not be correct, but cannot be 6 or 9 or 12
		P1	for working with sine rule and 125° eg $\frac{\sin ABD}{6}=\frac{\sin 125}{[DB]}$ **or** $\sin ABD = 0.454...$ **or** $ABD = 27.02...$	*CBD* and *ABD* may be given as a variable, award marks unless contradicted
		A1	for answer within the range 72.5 to 73.5	

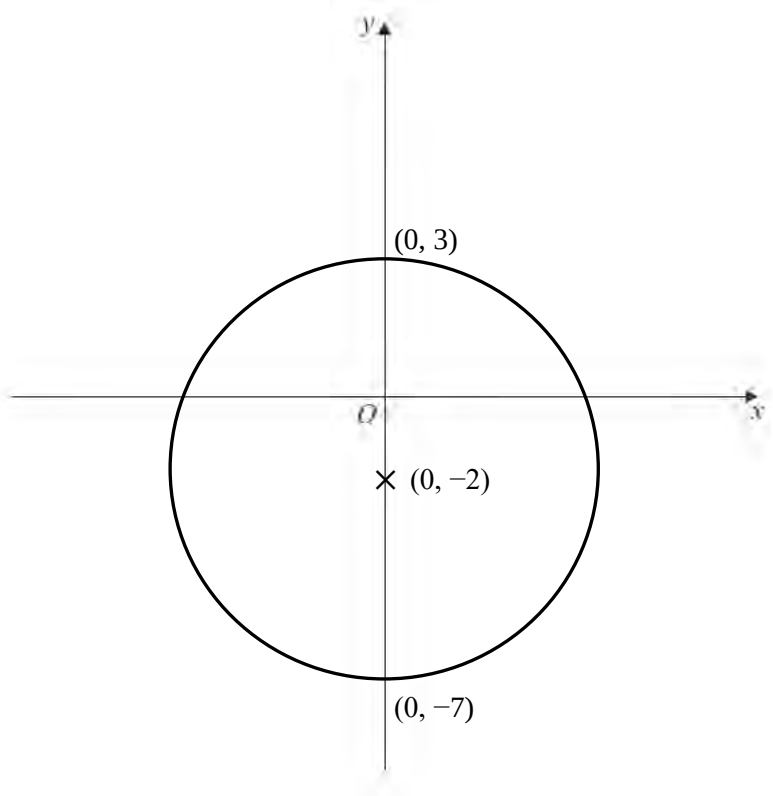
Question 12a



Qu15



Qu22



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

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

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

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
3		Wording changed: 'Look at the diagram for Question 3 in the Diagram Booklet. It shows a plan…' m changed to metres. Wording added: 'The triangle has a base of 16 metres and a height of 14 metres.' Diagram enlarged. Open headed arrows.	Standard mark scheme
4		Wording changed: 'Look at the diagram for Question 4 in the Diagram Booklet. It shows point C on a grid. 1 square length on the grid represents 1cm.' Wording added: 'in the Diagram Booklet' Diagram enlarged. Cross changed to a solid dot.	Standard mark scheme
6		Wording changed: 'Two lists of numbers are shown below.' Braille: Wording changed 'Below are two lists of numbers'	Standard mark scheme
7		Wording changed: 'Look at the diagram for Question 7 in the Diagram Booklet. It shows right-angled triangle ABC. AB = 7cm BC = 4cm Angle BCA = x° Angle ABC is a right angle.' Diagram enlarged. Angles moved outside of angle arcs and angle arcs made smaller.	Standard mark scheme
9		Letter 'a' changed to 'p' and letter 'b' changed to 'q'	Standard mark scheme but note the change of letters
11	(a)	Wording added: 'Look at the diagram for Question 11 in the Diagram Booklet. It shows an incomplete probability tree diagram.' Wording added: 'in the Diagram Booklet. There are four spaces to fill.' Diagram enlarged. Braille: Wording added 'by writing the missing values labelled (i) to (iv).'	Standard mark scheme but note change of letter

12	(a)	Wording added: 'Look at the diagram for Question 12 in the Diagram Booklet. It shows a blank grid.' Wording added 'below'. Values in the table changed from 21, 80, 31, 42, 35 to 25, 60, 30, 45, 35 Wording added: 'on the blank grid in the Diagram Booklet.' Diagram enlarged. Open headed arrows. Grid cropped at 20 and 70. Braille: Wording added 'Drawing film and Bumpons are provided if you wish to use them.'	Standard mark scheme but note change of values
	(b)	'31' changed to '30' and '42' changed to '45'.	Standard mark scheme
15		Wording added: 'Look at the diagram for Question 15 in the Diagram Booklet. It shows a grid.' Last inequality changed to $y < 3x - 1$ Diagram enlarged. Open headed arrows. Vertical and horizontal axis cropped at -2 and 6 Braille: Wording changed: 'On the grid show the region R that satisfies all these inequalities. Shade or mark with a square bumpon the region.' Braille: Wording added 'Drawing film and Bumpons are provided if you wish to use them.'	Standard mark scheme but note change from $y < 3x - 2$ to $y < 3x - 1$
16		Wording changed: 'Look at the diagram for Question 16 in the Diagram Booklet. It shows two jars that are mathematically similar. The smaller jar has volume 90 cm^3 and height marked h cm. The larger jar has volume 1350 cm^3 and height 12 cm.' Diagram enlarged. Open headed arrows. 3D diagram removed and replaced with a 2D view.	Standard mark scheme
17		Wording changed: 'Look at the diagram for Question 17 in the Diagram Booklet. It shows a sketch…' Diagram enlarged. Open headed arrows. Cross changed to a solid dot.	Standard mark scheme

19		Wording changed: 'Look at diagrams 1-4 for Question 19 in the Diagram Booklet. You may be provided with a model. They are NOT accurate. ABCDEFGH is a cuboid. The model shows faces CBGH, GFEH and CDEH with a frame work to show the other sides of the cuboid. There is a rod inside the model to show BE. Diagram 1 shows a 3D view of the cuboid. Diagram 2 shows face CBGH. Diagram 3 shows face GFEH. Diagram 4 shows the internal triangle GEB. On the diagrams, BH, GE and BE are shown with dashed lines. Diagram enlarged. 2D views added. Model provided. Braille: 3D diagram removed and replaced with 2D views.	Standard mark scheme
20		Wording added: 'Look at the diagram for Question 20 in the Diagram Booklet.' Letter 'f' changed to 'p'. Diagram enlarged. Open headed arrows.	Standard mark scheme but note change of letter
22		Wording added: 'Look at the diagram for Question 22 in the Diagram Booklet. It shows x and y axes crossing at the origin, O' Diagram enlarged. Open headed arrows. Braille: Wording changed 'Describe or sketch on the axes circle B.' Braille: Wording changed from 'Show' to 'Write'. Braille: Wording added 'Drawing film and Bumpons are provided if you wish to use them.'	Standard mark scheme
23		Wording changed: 'Look at the diagram for Question 23 in the Diagram Booklet. It shows quadrilateral ABCD.' Wording added: BC = 12cm CD = 9cm DA = 6cm Angle BCD = 60° Angle DAB = 125°' Diagram enlarged. Angles moved outside of angle arcs and angle arcs made smaller.	Standard mark scheme

GCSE

Mark Scheme

Mathematics A (1387)

June 2003

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NOTES ON MARKING PRINCIPLES

NOTES ON MARKING PRINCIPLES

1 Three types of mark are available

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

2 Abbreviations

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

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

3 If no working shown, then

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

4 Marking instructions

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

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

5 Style of marking

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

6 Follow Through Marks

Follow throughs are guided by two principles:

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

7 Probability

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

8 Linear Equations

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

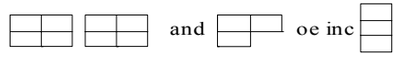
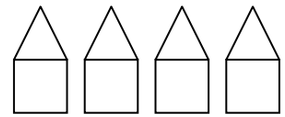
9 Parts of questions

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

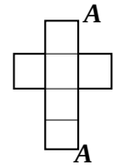
Paper 5501

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

Paper 5501

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

Paper 5501

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

Paper 5501

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

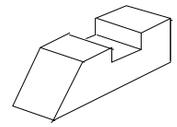
Paper 5501

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

Paper 5501

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

Paper 5501

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

Paper 5502

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

Paper 5502

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

Paper 5502

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

Paper 5502

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

Paper 5502

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

Paper 5502

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

Paper 5503

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

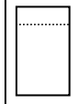
Paper 5503

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

Paper 5503

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

Paper 5503

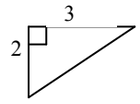
No	Working	Answer	Mark	Notes
11 (a)	Bryani was correct $4 \times 3^2 = 4 \times 9 = 36$	Bryani	2	M1 for 4×9 or $4 \times 3 \times 3$ or "square the three/x then multiply by four" A1 Bryani **SC** 4×3^2 with Bryani gets B2
(b)			1	B1 cao
12 (a)			3	B2 for rectangle height 4 squares, base 3 squares (B1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

Paper 5503

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

Paper 5503

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



Paper 5503

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

Paper 5504

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

Paper 5504

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

Paper 5504

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

Paper 5504

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

Paper 5504

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

Paper 5504

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

Paper 5504

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

Paper 5504

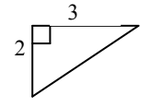
No	Working	Answer	Mark	Notes
22 (a)		No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice	1	B1 for a consistent answer
(b)	$\frac{1}{6}, \frac{5}{6}$ + labels		3	B1 for $\frac{5}{6}$ on the red dice, *not six* branch B1 for a fully complete tree diagram with all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

Paper 5505

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

Paper 5505

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



Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5505

No	Working	Answer	Mark	Notes
23 (a)(i)		$6\mathbf{b} - 6\mathbf{a}$	2	B1 for $6\mathbf{b} - 6\mathbf{a}$ oe
(ii)		$6\mathbf{a}$		B1 for $6\mathbf{a}$ oe
(b)	$\overrightarrow{EX} = \overrightarrow{EB} + \overrightarrow{BX}$ $= 12\mathbf{b} + ½\ \overrightarrow{BC}$	$12\mathbf{b} - 3\mathbf{a}$	2	M1 for $\overrightarrow{EX} = \overrightarrow{EB} + \overrightarrow{BX}$ oe vector journey in a form ready for straightforward substitution A1 for $12\mathbf{b} - 3\mathbf{a}$ oe
(c)	$\overrightarrow{AY} = \frac{5}{3}\overrightarrow{AB}$ or $\overrightarrow{BY} = \frac{2}{3}\overrightarrow{AB}$ $\overrightarrow{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\overrightarrow{XY} = 4\mathbf{b} - \mathbf{a}$ $\overrightarrow{EY} = 4\overrightarrow{XY}$ or $\overrightarrow{EX} = 3\overrightarrow{XY}$ or $\overrightarrow{EY} = \frac{4}{3}\overrightarrow{EX}$	Printer Answer	3	B1 for either $\overrightarrow{AY} = \frac{5}{3}\overrightarrow{AB}$ or $\overrightarrow{BY} = \frac{2}{3}\overrightarrow{AB}$ oe B1 ft for either $\overrightarrow{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\overrightarrow{XY} = 4\mathbf{b} - \mathbf{a}$ ft only on parts (*a*) and (*b*) B1 for either $\overrightarrow{EY} = 4\overrightarrow{XY}$ or $\overrightarrow{EX} = 3\overrightarrow{XY}$ or $\overrightarrow{EY} = \frac{4}{3}\overrightarrow{EX}$ oe **plus** conclusion of *E*, *X*, *Y* on the same straight line
24 (a)(i)		$(5, -4)$	4	B1 cao
(ii)		$(2, -9)$		B1 cao
(iii)		$(2, 4)$		B1 cao
(iv)		$(1, -4)$		B1 cao
(b)		$(x-2)^2 - 4$	4	B4 for $(x-2)^2 - 4$ oe eg. $x^2 - 4x$ (B3 for $(x+2)^2 - 4$ or $(x-2)^2 + 4$) (B2 for $x^2 - 4$ or $(x-2)^2$ OR $x^2 + bx$, $b \neq 0$ OR $(x+2)^2 + 4$ OR $f(x-2) - 4$) (B1 for $x^2 + 4$ or $(x+2)^2$ or $ax^2 + bx$ or $x^2 + bx + c$ OR $x - 2 - 4$ or $x^2 - 2 - 4$, $a, b, c \neq 0$)

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

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

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NOTES ON MARKING PRINCIPLES

NOTES ON MARKING PRINCIPLES

1 Three types of mark are available

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

2 Abbreviations

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

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

3 If no working shown, then

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

4 Marking instructions

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

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

5 Style of marking

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

6 Follow Through Marks

Follow throughs are guided by two principles:

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

7 Probability

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

6 Linear Equations

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

8 Parts of questions

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

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

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

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

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

PAPER 5501					
	No	Working	Answer	Mark	Notes
18	(a)(i)		60	2	B1 for 60
	(ii)				B1 for all **angles equal** so equilateral triangle oe
	(b)(i)		130	3	B1 for 130
	(ii)				B1 for isosceles triangle oe or 2 angles equal accept $\angle Q = \angle R$ B1 for angles on a straight **line** add up to **180°**oe (180° could be in working)
	(c)		64	1	B1 for 64
19	(a)		1	1	B1 for 1
	(b)		3	1	B1 for 3
	(c)	$9\times1+3\times2+5\times3+3\times4$ (= 42) "42" ÷ 20	2.1	3	M1 for 9×1, 3×2, 5×3, 3×4 or for 42 seen M1 (dep) for "42" ÷ 20 A1 for 2.1 or $2\frac{1}{10}$ or $2\frac{2}{20}$
20	(a)		09 05	1	B1 for 09 05 oe
	(b)		7	1	B1 for 7
	(c)		10	1	B1 for 10
	(d)	7km in 20 mins	21	3	B1 for 20 (minutes) oe or $\times3$ seen M1 for $\frac{"7"}{"20"}$ A1 cao [SC: "7" × 3 seen gets B1 M1]

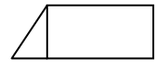
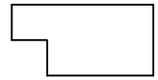
PAPER 5501				
No	**Working**	**Answer**	**Mark**	**Notes**
21	Vertices of new triangle at (2, −2) (2, 6) and (6, −2)	Correct triangle drawn	3	B3 cao (B2 for either correct triangle in wrong translated position or for 2 vertices correct) (B1 a right angled triangle with horizontal length 4 or vertical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

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

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

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

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

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

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

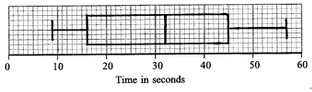
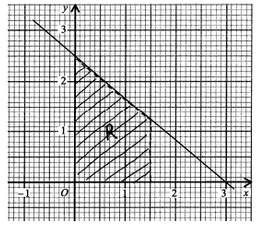
PAPER 5503					
No		**Working**	**Answer**	**Mark**	**Notes**
1			10.	1	B1 for 10
2	(a)(i)		$3e + 2f$	2	B1 for $3e + 2f$
	(ii)		$3p^2$		B1 for $3p^2$
	(b)	$5 \times -3 + 1$	-14	2	M1 for $5 \times -3 + 1$ A1 for -14
3		1974 6580 8554	855.4	3	M1 for complete correct method with relative place value correct,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

PAPER 5503					
	No	Working	Answer	Mark	Notes
6	(a)	$\frac{11}{12}-\frac{10}{12}$	$\frac{1}{12}$	2	M1 for correctly writing both fractions to a common denominator A1 for $\frac{1}{12}$ oe
	(b)	$\frac{70\times400}{200}$	140	2	B2 for 140 (accept 136) (B1 for sight of any two of 70, 400 or 200)
7	(a)(i)		60	2	B1 for 60
	(ii)				B1 for all angles equal so equilateral triangle oe
	(b)(i)		130	3	B1 for 130
	(ii)				B1 for isosceles triangle oe B1 for angles on a straight line add up to 180°oe
	(c)		64	1	B1 for 64
8		$9\times1+3\times2+5\times3+3\times4$ (=42) "42" ÷ 20	2.1	3	M1 for 9×1, 3×2, 5×3, 3×4 or for 42 seen M1 (dep) "42" ÷20 A1 for 2.1 or $2\frac{1}{10}$ or $2\frac{2}{20}$
9	(a)		09 05	1	B1 for 09 05 oe
	(b)		7	1	B1 for 7
	(c)		10	1	B1 for 10
	(d)	7 km in 20 minutes	21	3	B1 for 20 (minutes) oe or $\times3$ seen M1 for $\frac{"7"}{"20"}$ A1 cao SC: "7" $\times3$ gets B1 M1

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

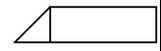
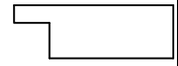
PAPER 5503					
No		**Working**	**Answer**	**Mark**	**Notes**
15			Tick boxes 1,3 & 6	3	B1 for $\frac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2\left(c^2+d^2\right)$ (−B1 for each additional expression ticked (>3) to a minimum of 0)
16		200×0.2	40	2	M1 for 200×0.2 or $\frac{40}{200}$ seen A1 for 40
17	(a)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

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

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

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

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

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

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

PAPER 5504					
	No	Working	Answer	Mark	Notes
12	(a)		Reason	1	B1 makes a mention of bias, either directly, or making reference to an insufficient or biased range of responses.
	(b)(i)		Reason	1	B1 make some mention of any one of (a) an insufficient range of responses (b) no mention of money (c) no time frame in the question (d) misunderstanding of "a lot" or "not much"
					B2
	(ii)		Question	2	B1 for each of the following upto B2 (a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors OR For suggesting a generally improved question (a) a question clearly in the context of changes to the canteen (b) at least 3 boxes showing a full range of responses
13	(a)	$20y - 18y = 16 - 9$ oe $2y = 7$	3½ oe	3	M1 $20y - 18y = 16 - 9$ oe M1 $2y = 7$ A1 cao
	(b)	$40 - x = 3(4 + x)$ $40 - x = 12 + 3x$ $40 - 12 = x + 3x$ $4x = 28$	7	3	M1 multiplying through by 3: $3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$ A1 $40 - 12 = x + 3x$ A1 cao
14	(a)		$12(x\text{-}4)$	1	B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe $x = 12\ (x - 4)$ gets B0
	(b)		$18x\text{-}48$	2	M1 $6x +$ "$12(x - 4)$" or $6x +$ "$12x - 48$" A1 ft a linear expression $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$

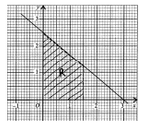
PAPER 5504					
No		**Working**	**Answer**	**Mark**	**Notes**
15		x $x^3 - 2x$ 4.1 60.7(21) 4.2 65.6(88) 4.3 70.9(07) Accept answer to 1 dp 4.22 66.7(114) or more 4.23 67.2(269) 4.24 67.7(45) 4.25 68.2(656)	4.2	4	B2 for trial $4.1 \leq x \leq 4.3$ evaluated (B1 for trial $4 < x < 5$ evaluated) B1 for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

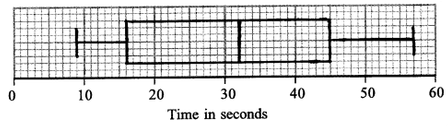
PAPER 5504					
	No	Working	Answer	Mark	Notes
20	(a)	$10^2 + 6^2$ or 136 $\sqrt{(100+36)}$ or $\sqrt{136} = 11.66\ldots$	11.7	3	M1 $10^2 + 6^2$ or 136 seen M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$ A1 11.66 – 11.7
	(b)	$\cos x = \frac{8}{10}$ or 0.8 $x = \cos^{-1} 0.8 = 36.869^\circ$	36.9	3	M1 for $\cos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

PAPER 5504					
	No	Working	Answer	Mark	Notes
23	(a)		0.4, 0.6 0.4, 0.6, 0.4	2	B1 for LHS: (0.6), 0.4 B1 for RHS: 0.6, 0.4, 0.6, 0.4
	(b)	(30 × 42) – (25 × 42.8) = 1260 – 1070 = 190 190 ÷ 5 =	38	3	M1 for (30 × 42) – (25 × 42.8) or 1260 – 1070 or 190 seen M1 (dep) for "190" ÷ 5 A1 cao
24	(a)	£12000 × 0.25 = £3000; £12000 – £3000 = £9000 £9000 × 0.25 = £2250; £9000 – £2250 = £6750 £6750 × 0.25 = £1687.50; £6750 – £1687.50 =	£5062.50	3	M1 for 12000 × 0.75 (=9000) oe or £3000 or £23437.50 seen M1 (dep) for at least two further depreciation calculations (complete steps) A1 cao **OR** M2 for $12000 \times (0.75)^3$ or 5062.50 seen (M1 for $12000 \times (0.75)^n$, $n = 2$ or 4)
	(b)	0.8 × 0.8 × 0.8 × 0.8 (oe)	0.4096	2	M1 0.8^4 (oe) A1 cao

PAPER 5505					
	No	Working	Answer	Mark	Notes
1	(a)(i) (ii) (b)	 LCM = 3 × 13 × 17 = 3 × 221	2.21 0.013 663	2 2	B1 for 2.21 B1 for 0.013 M1 for 3 × 13 × 17 oe A1 for 663
2			Tick boxes 1,3 & 6	3	B1 for $\frac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2(c^2 + d^2)$ (−B1 for each additional expression ticked (>3) to a minimum of 0)
3	(a) (b)	200 × 0.2 0.2 + 0.4	40 0.6	2 2	M1 for 200 × 0.2 or $\frac{40}{200}$ seen A1 for 40 M1 for 0.2 + 0.4 A1 for 0.6
4	(a) (b)	eg 2 | 108 2 | 54 3 | 27 3 | 9 3 12	$2^2 \times 3^3$ 12	3 1	M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error (M1 for 108 written as a correct product with only one non-prime or equivalent division or a full process with 2 calculation errors.) A1 for $2^2 \times 3^3$ (accept 2 × 2 × 3 × 3 × 3) B1 for 12
5		Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2 cm long		2	M1 relevant pair of arcs crossing within tramlines A1 SC M1A0 for full construction of a line perpendicular to AB not through P
6		15 × 10	150 cm^3.	3	M1 for 15 × 10 A1 for 150 B1 for cm^3

PAPER 5505					
	No	Working	Answer	Mark	Notes
7	(a)		k^3.	1	B1 for k^3.
	(b)(i)	$4x + 20 + 3x - 21$	$7x - 1$	4	M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better) A1 for $7x - 1$
	(ii)	$x^2 + 3yx + 2xy + 6y^2$	$x^2 + 5xy + 6y^2$		M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$ A1 for $x^2 + 5xy + 6y^2$
	(c)		$(p+q)(p+q+5)$	1	B1 for $(p+q)(p+q+5)$
	(d)		m^8	1	B1 for m^8.
	(e)		$6r^3t^6$	2	B2 for $6r^3t^6$ (B1 for $.....r^3t^6$ or for $6....t^6$)
8	(i)	Least length = 100.5	100.5	2	B1 for 100.5
	(ii)	Greatest length = 101.5	101.5		B1 for 101.5; ACCEPT 101.499 or better
9		$6\frac{2}{5} = \frac{32}{5}$ Area of triangle = $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ (= 2) Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6) Perimeter of square = 4 × 6	24	5	B1 for $6\frac{2}{5} = \frac{32}{5}$ oe or $3\frac{1}{5} = \frac{16}{5}$ oe or $\frac{30}{8} + \frac{2}{8}$ oe (or implied by area of triangle=2) M1 for $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ oe M1 for (area of square) = 18 × product of two lengths A1 = $\sqrt{18 \times "2"}$ A1 for 24

PAPER 5505					
	No	Working	Answer	Mark	Notes
10	(a)	$6y = 15 - 5x$	$y = \frac{15-5x}{6}$	2	M1 for either $6y = 15 - 5x$ or for $\frac{5x}{6} + y = \frac{15}{6}$ or $-6y = 5x - 15$ or a correct ft on sign error to $y =$ A1 for $y = \frac{15-5x}{6}$ oe
	(b)	$6k + 5(-21) = 15$	20	2	M1 for subst. of $x = -21$ (or $x = 21$) into given eq^n or answer to (a) A1 for $k = 20$
	(c)(i)		Region R indicated	3	B2 correct region shaded (accept unshaded if R clear) (B1 shaded (R) region satisfies 3 of the 4 given inequalities with same boundaries)
	(ii)		(1,1)		B1 for (1,1)
11	(a)		$y = 2x + 6$	2	B2 for $y = 2x + 6$ (B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, $m \neq 0$ or for $2x+6$)
	(b)	Grad of $AB = 2$; Grad of $BC = \frac{-1}{"2"}$	$y = -\frac{1}{2}x + 6$	2	M1 for Grad of $BC = \frac{-1}{"2"}, -\frac{1}{2}$ or grad of $BC = -\frac{1}{\text{grad of AB}}$ A1 ft for $y = -\frac{1}{2}x + 6$ oe ft on wrong coeff. of x in (a)
	(c)	Eg A rectangle is always a cyclic quadrilateral because the opposite angles of a rectangle always add up to 180° (90+90)		1	B1 for valid explanation. (eg lines from the pt of int. of diagonals of rect to all 4 vertices are equal(radii))
12		Vertices of new triangle at $(-1, -4)$ $(-4, 2)$ and $(2, 2)$	Correct triangle drawn	3	B3 cao (B2 for 3 correct vertices no triangle or triangle with 2 correct vertices (B1 for triangle with two of six co-ordinates correct from using P as centre or any isosceles triangle with base 6 and height 6)

PAPER 5505					
	No	Working	Answer	Mark	Notes
13	(a)		32	1	B1 for 32 (accept 31.5 to 33.5 inclusive)
	(b)			3	B1 for ends of whiskers at 9 and 57 (with a box) B1 for ends of box at 16 and 45/46 ($\pm$ 0.5) B1for median marked at "32"or complete box and whisker diagram drawn with a median inside the box
	(c)	Median(B)>Median(G); on average boys take longer IQR(B)>IQR(G); times for boys have a greater spread		2	B1 eg for comparison of medians (ft on diagrams) B1 eg for comparison of (interquartile) ranges (ft on diagram)
14		Reading top to bottom frequencies are 20; 18; 45; 52		2	B2 all correct (B1 for one frequency correct)
15	(a)	$1600 = p\,q^0$.; $400 = pq^2$ $q^2 = 0.25$	$p = 1600$ $q = 0.5$	3	M1 for either $400 = pq^2$ or $1600 = pq^0$ B1 for $p = 1600$ A1 for $q = 0.5$
	(b)	$V = pq^{-2}$	6400	2	M1 for recognition that t = –2 A1 for 6 400

PAPER 5505					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	(I) $AB = AC$ (triangle ABC is isosceles) (II) PB = PC tangents (from a point to a circle are) equal (III) AP = AP (common side) so the 2 triangles are congruent ,SSS.		3	B3 for I, II, III with congruency reason (B2 for any two of I, II or III) (B1 for any one of the I, II or III)
	(b)	$BPC = 20°$ PBC (or PCB) = 90-1/2 "20" (= 80°) $BAC = PBC$ = "80"	50°	4	B4 for 50° (B3 for $BAC = 80°$) (B2 for $PBC = 80°$ or $PCB = 80°$) (B1 for $APC = 10°$ or $BPC = 20°$ or a middle angle = 90°) SC if clear numerical slip seen eg "PBC = 180 – 90 – 10 = 70" then goes on to get correct ft angle $ABC = 55$ deduct 1 from total so this cand would get B4–1 = B3
17	(a)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $= \overrightarrow{OA} + \frac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ $= 6\mathbf{a} + 4\mathbf{c} - 4\mathbf{a}$	$2\mathbf{a} + 4\mathbf{c}$	3	M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ or any correct vector journey involving $\overrightarrow{OP}$ M1 for $\overrightarrow{AP} = \frac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ oe or $\overrightarrow{CP} = \frac{1}{3}(-6\mathbf{c} + 6\mathbf{a})$ oe or reverse vectors A1 for $2\mathbf{a} + 4\mathbf{c}$ oe (accept unsimplified)
	(b)	Eg $\overrightarrow{OM} = \overrightarrow{OC} + \overrightarrow{CM} = 6\mathbf{c} + 3\mathbf{a}$ $\overrightarrow{OM} = 1.5\overrightarrow{OP}$	$\overrightarrow{OM} = 1.5\overrightarrow{OP}$ so OPM is a straight line	2	B1 for $\overrightarrow{OM} = 6\mathbf{c} + \frac{1}{2}(6\mathbf{a})$ or $\overrightarrow{PM} = 2\mathbf{c} + \mathbf{a}$ unsimplified or reverse vectors B1 for a fully correct proof.

PAPER 5505					
	No	Working	Answer	Mark	Notes
18	(a)		4	1	B1 for 4 condone $\pm$ 4
	(b)		2	1	B1 for 2 condone ± 2
	(c)	$\sqrt{160} = 4\sqrt{10}$; $\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]\times 100$ $\left[\frac{6\sqrt{10}-\sqrt{10}}{6\sqrt{10}}\right]\times 100$	$\frac{500}{6}$	4	B1 for **either** $\sqrt{160} = 4\sqrt{10}$ or $\sqrt{8} = 2\sqrt{2}$ **or** $\sqrt{20} = 2\sqrt{5}$ M1 for $\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]$ oe $(\times 100)$ B1 for either $6\sqrt{10} - \sqrt{10}$ or $6\sqrt{10}$ A1 for $\frac{500}{6}$ (accept 83.3 if no obvious earlier error)

PAPER 5505					
	No	Working	Answer	Mark	Notes
19	(a)(i)		$(2x-7)(x-14)$	3	M1 x^2 term and constant term (± 98) obtained or $2x(x-14) - 7(x-14)$ or $x(2x-7) - 14(2x-7)$ A1 for $(2x-7)(x-14)$
	(ii)		$x = \frac{7}{2}$; $x = 14$		B1ft ft (i) provided of form $(2x\pm a)(x\pm b)$
	(b)(i)		$\frac{7}{n+7}$	3	B1 for $\frac{7}{n+7}$ oe
	(ii)	$\frac{7}{n+7} = \frac{2}{5} \Rightarrow 2(n+7) = 5 \times 7$ $2n = 21$	n=10.5 is not possible since n has to be an integer		M1 for $2(n+7) = 5\times 7$ or $n+7=5\times 3.5$ (can be implied) ft (b)(i) fractional in terms of n and < 1 A1 ft for n=10.5 not possible (since n not integer) oe
	(c)	$2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right) = \frac{4}{9}$ $14n\times 9 = 4(n+7)^2$ $14n\times 9 = 4(n^2+14n+49)$ $4n^2+56n+196-126n = 0$	$2n^2 - 35n + 98 = 0$	5	M1 for $\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ seen M1 for $2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ oe $(=\frac{4}{9})$ M1(dep on 1st M) elimination of fractions within an equation B1 3 terms correct in expansion of $(n+7)^2 = n^2 + 7n + 7n + 49$ A1 full valid completion to printed answer

PAPER 5505					
	No	Working	Answer	Mark	Notes
	(d)	$\frac{7}{n+7}\times\frac{7}{n+7}=\frac{7}{21}\times\frac{7}{21}=$	$\frac{1}{9}$	2	M1 for $\frac{7}{n+7}\times\frac{7}{n+7}$ or better or ft [answer (b)(i)]^2 or $1-\frac{4}{9}-(\frac{n}{n+7})^2$ A1 for $\frac{1}{9}$ oe cao
20	(a)(i)		$y=1+\sin x$	2	B1 for $y=1+\sin x$
	(ii)		$y=2\sin x$		B1 for $y=2\sin x$ SC both (i) f(x) + 1, (ii) 2f(x) B1
	(b)	Stretch parallel to y-axis scale factor 3 Stretch parallel to x-axis scale factor $\frac{1}{2}$		3	M1 for 'stretch' A1 for Stretch parallel to y-axis scale factor 3 oe A1 for Stretch parallel to x-axis scale factor $\frac{1}{2}$ oe SC if M0 award BI for "sf 3 vertically" **and** "sf $\frac{1}{2}$ horizon."

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

PAPER 5506					
	No	Working	Answer	Mark	Notes
5	(a)		1.0×10^{-9}	1	B1 accept 1×10^{-9} or just 10^{-9}
	(b)	$1 \div (5 \times 10^{-9})$	2×10^{8}	2	M1 for $1 \div$ ("5×10^{-9}") or digit 2 with zeros only seen Condone omission of bracket for M1. A1 cao
6	(a)	$\frac{6.27 \times 4.52}{4.81 + 9.63} = \frac{28.3404}{14.44} = 1.962631579$	1.9626…	2	B2 for 1.9626… (B1 for 28.34… or 14.44)
	(b)		1.96	1	B1 ft from (a) as rounded to 1dp or 2dp. Do not accept 2, 2.00, but accept 2.0
7			$d = 4n + 6$	2	B2 $d = 4n + 6$ oe (B1 $d = 4n + k$, k an integer $\neq 6$, $4n + 6$, $n = 4n + 6$)
8		Vol = $\pi \times 3.8^2 \times 2.5 = \pi \times 14.44 \times 2.5$ $= 45.36\ldots \times 2.5 = 113.411$ Mass = "113" × 1.5 = 170.1165	170	4	M1 for $\pi \times r^2 \times 2.5$ where r = is 3.8 or 7.6 A1 if $r = 3.8$ M1 for "113" × 1.5 A1 for 169.5 – 170.3 cao

PAPER 5506					
	No	Working	Answer	Mark	Notes
9	(a)	$10^2 + 6^2$ or 136 $\sqrt{(100 + 36)}$ or $\sqrt{136} = 11.66\ldots$	11.7	3	M1 for $10^2 + 6^2$ or 136 seen M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$ A1 11.66 – 11.7
	(b)	Cos x = 8/10 or 0.8 $x = \cos^{-1} 0.8 = 36.869^o$	36.9	3	M1 for cos = $\frac{8}{10}$, cos = 0.8(oe) M1 (dep) for $\cos^{-1}$ (oe) A1 for 36.86 – 36.9 M1 Use of sine rule and x found M1 for $x = 90 - \sin^{-1}$("0.8") A1 for 36.86 – 36.9
10		$18x - 6y = 99$ $12x - 4y = 66$ $8x + 6y = 18$ $12x + 9y = 27$ $26x = 117$ $-13y = 39$	$x = 4\frac{1}{2}$ $y = -3$	4	M1 correct process to eliminate either x or y (condone one error) A1 cao for non – eliminated one. M1 (dep on 1st M1) for correct substitution of their found value. A1 cao (need both)

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

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

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

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

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

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

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

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

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GCSE

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Summer 2005
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.

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

Paper 5521/01

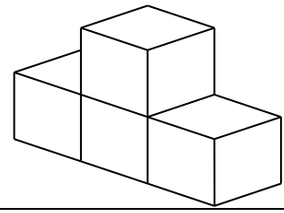
No	Working	Answer	Mark	Notes
4	286 × 43 = 11440 + 12298 = 12298 43 × 286 = 258 + 3440 + 8600 = 12298 286 × 40 = 1140 286 × 3 = 858 1140+858=12298 x | 40 | 3 200 | 8000 | 600 | 8600 80 | 3200 | 240 | 3440 6 | 240 | 18 | 258 12298 2 8 6 1 | 0 8 | 3 2 | 2 4 | 4 2 | 0 6 | 2 4 | 1 8 | 3 2 9 8	12298	3	M2 for 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)	$1\div0.8$ or $2.50\div2$	1.25	2	M1 for $1.00\div0.8$ or $2.50\div2$ or 125 or appropriate combination eg $1+\frac{1}{2}\times0.50$ 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)	$30\times4+8\times2$	136	2	M1 $30\times4+8\times2$ 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- $21\frac{1}{3}$	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- $21\frac{1}{3}$ 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)	× 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)

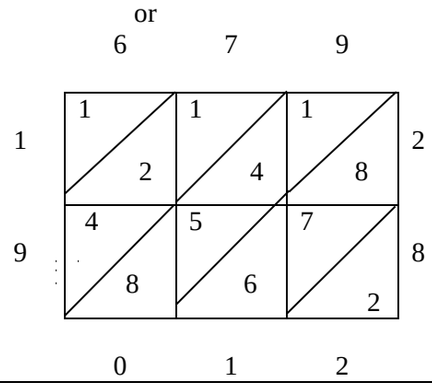
Paper 5521/02				
No	**Working**	**Answer**	**Mark**	**Notes**
10 (a)		1.5 – 2.0	1	B1 for height between 1.5m – 2.0m inclusive
(b)	Height of man × "2.5"	3 – 6	3	B3 for height between 3m – 6m inclusive (B2 for multiplying (a) by a number between 2 and 3 inclusive) (B1 for multiplying (a) by a number)
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)

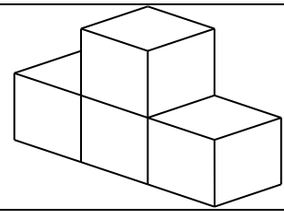
Paper 5521/02					
No		Working	Answer	Mark	Notes
19	(a)		Correct plane	2	B2 for a correct plane defined by showing at least 2 lines. (B1 for a line of symmetry on one face)
	(b)		Correct net	2	B2 cao (B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle 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 $2\times(180-90-\text{"}\frac{150}{2}\text{"})$ 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		$360^o \div 18$ (=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 $360 \div 18$ 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(±1) B1 cao for 15(±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)	4 x + 8 = 54 4 x = 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)	 π × 2.45	3:1 7.7	1 2	B1 cao M1 for π × 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 × 100 × 100 A1 cao
13		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

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" ÷ 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 ± 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)		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)		$(x + 3)(x - 3)$	1	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) (b)	$x+0.3+0.2+x=1$ 0.3×200	0.25 60	2 2	M1 for $x+0.3+0.2+x=1$ oe, or $0.5\div2$ A1 oe M1 0.3×200 A1 cao Accept 60 out of 200 (in words) SC B1 for $\frac{60}{200}$
10	(a) (b)		$(-12)-4\quad-2\quad(0)8$ 5 points plotted accurately points joined with smooth curve	3 2	B3 for all correct [(B1 for each one correct) 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 $360^\circ - 90 - 90 - "150"$ 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 $x = 0.3939\ldots$ so $100x = 39.3939\ldots$ $99x = 39$ so $x = \frac{39}{99} = \frac{13}{33}$		3	M1 for $100x = 39.39\ldots$ 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" ÷ 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 ± 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

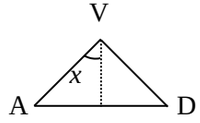
Paper 5525/06					
No		Working	Answer	Mark	Notes
12	(a)	$84 = 6.7\pi + 2 \times 6.7 + 2a$ $2a + 13.4 = 62.95\ldots$ or $2a + 34.44 = 84$	24.8	3	M1 for substituting correctly, π may be left M1 for correct rearrangement as far as $\pm 2a$ A1 for $24.7 - 24.8$
	(b)	$P = \pi r + 2r + 2a$ $P - 2a = \pi r + 2r$ $P - 2a = (\pi + 2)r$	$\frac{P-2a}{\pi+2}$	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)	$x = \frac{-17 \pm \sqrt{17^2 - 4\times 6\times(-39)}}{2\times 6}$ $= \frac{-17 \pm \sqrt{289+936}}{12}$ $x = +\frac{18}{12}$ or -4.33	1.5, $-\frac{13}{3}$	4	M1 for $x = \frac{-17 \pm \sqrt{17^2 - 4\times 6\times(-39)}}{2\times 6}$ up to signs in b & c M1 for $x = \frac{-17 \pm \sqrt{1225}}{12}$ 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 = ±39 A1 x = 1.5 or – 4.33, or better
		$x^2 + \frac{17}{6}x - \frac{39}{6} = 0$ $\left(x+\frac{17}{12}\right)^2 - \left(\frac{17}{12}\right)^2 - \frac{39}{6} = 0$ $\left(x+\frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$			OR M1 for $\left(x+\frac{17}{12}\right)^2$ *seen* M1 $\left(x+\frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$ 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.

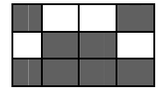
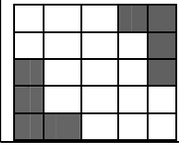
9 Parts of questions

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.

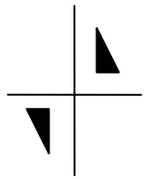
Paper 5521_01					
No		Working	Answer	Mark	Notes
1		Cat ||||/||| 8 Dog ||||	6 Fish || 2 Hamster |||| 4	8, 6, 2, 4	3	M1 for attempt to tally or one frequency correct in either column A1 for 1 frequency correct or all tallies correct in correct column A1 for all frequencies correct (accept if /20)
2			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 ÷ 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 × –10 = –20 –20 ÷ 4	–5	3	M1 for substitution of 2 and –7 into $p(q-3)$ or sight of -20 or –14 – 6 M1dep for '–20' ÷ 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)	1×26+2×26+3×23+4×25 = 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)		5	3	B1 cao
	(ii)		9		B1 cao
	(iii)		6		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

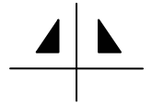
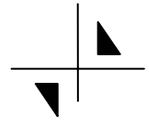
No	Working	Answer	Mark	Notes
5	315 × 24 24 × 315 1260 6300 7560 7200 7560 **3 1 5** 0 6 | 0 2 | 1 0 → **2** 1 2 | 0 4 | 2 0 → **4** 7 5 6 0 **300 10 5** 6000 | 200 | 100 → **20** 1200 | 40 | 20 → **4** 6000+200+100+1200+40+20 = 7560 **3 0.1 0.05** 60 | 2 | 1 → **20** 12 | 0.4 | 0.2 → **4** 60 + 2 + 1 + 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. $40 \div 8$), may be implied by marks or number on one edge of diagram or by 5 or 6 seen M1 for attempt at 3 divisions ($40 \div 8$, $40 \div 8$, $60 \div 10$), 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 $40 \times 40 \times 60$ **or** $8 \times 8 \times 10$ **or** 96000 or 640 seen M1 for $40 \times 40 \times 60$ **and** $8 \times 8 \times 10$ or 96000 **and** 640 seen M1 (dep on 1st M1) for "$(40 \times 40 \times 60)$" ÷ "$(8 \times 8 \times 10)$" 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" ÷ 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 × $(1.055)^3$ 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 × $(1.055)^3$ or 2348.48(…) or 2348.49 seen (M1 for 2000 × $(1.055)^n$, $n \neq 3$) 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 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 $4(q\text{-}t)$ 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	$AB^2 = 8^2 + 9^2 – 2×8×9×\cos40$ $AB^2 = 64 + 81 – 144×\cos40$ $AB^2 = 145 – 144 × 0.766$ $AB^2 = 145 – 110.31… = 34.6896$ $AB = \sqrt{34.6796} = 5.8897877$	5.89	3	M1 Subs in Cos Rule: $8^2 + 9^2 – 2×8×9×\cos40$ M1 correct order of evaluation of $8^2 + 9^2 – 2×8×9×\cos40$ 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

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

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

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

PMT

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 $\frac{21\sqrt{3}}{3}$)

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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Mark Scheme (Results)

March 2012

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

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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

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

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

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

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

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

<table>
<tr><th colspan="5">5MB2H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>7</td><td></td><td>10 × 8/5 = 16
60 – 16

OR
60 × 5/8 = 37.5
37.5 – 10</td><td>44 km or
27.5 miles</td><td>3</td><td>B1 for 5 miles = 8 km or equivalent statement or use of conversion factor 8/5 or 5/8
M1 for 10 × ‘8/5’ (= 16) or 60 × ‘5/8’ (= 37.5)
A1 for 44 km or 27.5 miles, accept76 km or 47.5 miles (units must be quoted)</td></tr>
<tr><td>8</td><td></td><td><table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>–10</td><td>–6</td><td>–2</td><td>2</td><td>6</td><td>10</td></tr></table>
OR

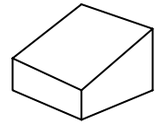
Using $y = mx + c$

gradient = 4
y intercept = –2</td><td>Straight line from
(–2, –10) to (3, 10)</td><td>3</td><td>(Table of values)
M1 for at least 2 correct attempts to find points by substituting values of x
M1 (dep) 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 $x = 3$

(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 $x = -2$ and $x = 3$

(Use of $y = mx + c$)
M2 line segment of $y = 4x - 2$ drawn (ignore any additional incorrect segments)
(M1 for line drawn with gradient of 4 OR line drawn with y intercept of –2 and a positive gradient)
A1 for correct line between $x = -2$ and $x = 3$</td></tr>
</table>

PMT

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

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

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

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

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		. 0.25 = 0.2555… 0.25555…×10 = 2.5555… 0.25555…×100 = 25.5555… 25.5555…– 2.5555… = 23 **Alternative Method** x = 0.25555 … 10x = 2.5555 … 100x = 25.5555… 90x = 23	$\frac{23}{90}$	3	M1 for 0.25555... or 0.2 + 0.05555… M1 for two correct recurring decimals that, when subtracted, would result a terminating decimal, and attempting the subtraction or $\frac{2.3}{9}$ or $\frac{253}{990}$ A1 cao **Alternative Method** M1 for x = 0.25555… M1 for two correct recurring decimals that, when subtracted, would result a terminating decimal, e.g. 10x = 2.5555..., 100x = 25.5555… and attempting the subtraction or 9x = 2.3 or 90x = 23 or 900x = 230 or $\frac{2.3}{9}$ or $\frac{253}{990}$ A1 cao SC: B1 for fraction with denominator 90 if M0
15		Grad = $\frac{1}{3}$ $3 = 6 \times \frac{1}{3} + c$ $c = 1$	$y = \frac{1}{3}x + 1$	3	M1 for $-3 \times m = -1$ oe or $\frac{1}{3}$ seen M1 for $3 = 6 \times$ '$\frac{1}{3}$' $+ c$ or $y - 3 =$ '$\frac{1}{3}$'$(x - 6)$ A1 for $y = \frac{1}{3}x + 1$ oe

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$\frac{15}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$	$3\sqrt{5}$	2	M1 for $\frac{15}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$ A1 for $\frac{15\sqrt{5}}{5}$ or better
	(b)	$(1 + \sqrt{3})(1 + \sqrt{3})$ $= 1 + \sqrt{3} + \sqrt{3} + 3$ $= 4 + 2\sqrt{3}$	4, 2	2	M1 for $1\times1 + 1\times\sqrt{3} + 1\times\sqrt{3} + \sqrt{3}\times\sqrt{3}$ oe A1 cao
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 $\frac{3a-b}{ba-b^2}$

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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)		(2, 3)	2	B1 cao
	(ii)		(–3, 1)		B1 cao
	(b)		Point plotted at (3, –4)	1	B1 cao
6	(a)		– 5	1	B1 cao
	(b)		6	1	B1 for 6 or – 6
	(c)		3	1	B1 cao
7			(P, B), (P, S), (P, L) (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)		Walk	1	B1 cao
	(b)	24 ÷ 4 =	6	2	M1 for 24 ÷ 4 oe or ¼ oe seen A1 cao

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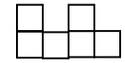
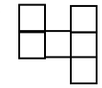
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Isosceles triangle	1	B1 for isosceles triangle
	(b)		Rectangle with area 12 cm^2	2	M1 for rectangle drawn A1 cao
10	(a)		A marked at 0	1	B1 for A marked at 0 (within overlay)
	(b)		B marked at 1/4	1	B1 for B marked at 1/4 (within overlay)
11	(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

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.

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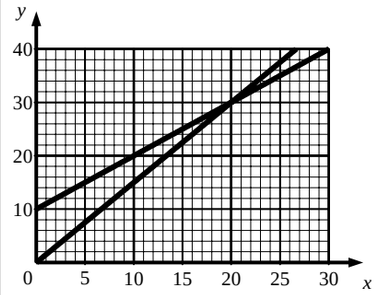
1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
18*	(a)		10	1	B1 cao
	(b)	 **Miles** 0 10 20 30 40 50 **Ed** 0 15 30 45 60 75 **Bill** 10 20 30 40 50 60	Ed is cheaper up to 20 miles, Bill is cheaper for more than 20 miles	3	M1 for correct line for Ed intersecting at (20,30) ±1 sq tolerance **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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NOTES ON MARKING PRINCIPLES

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

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

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

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

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

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

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

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

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

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

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			$4n + 2$	2	B2 for $4n + 2$ oe (eg $4 \times n + 2$ or $n4 + 2$, …) or nth = $4n + 2$ (B1 for a linear expression in $4n$ e.g. $4n + a$ ($a \neq 2$) or $n = 4n + 2$) (B0 for $n = 4n$ 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

PMT

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

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)

PMT

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)

PMT

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 cm^2

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

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

5MB2H_01					
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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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 cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

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

11 Linear equations

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

12 Parts of questions

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

13 Range of answers

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

Guidance on the use of codes within this mark scheme
M1 – method mark 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_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		183 × 47 1281 7320 8601 **or** **or** 4000 + 3200 +120 + 700 + 560 + 21 = 8601 **or** 183 × 100 = 18 300 183 × 50 = 18 300 ÷ 2 =9150 183 × 3 = 549 9150 – 549 = 8601	86.01	3	M1 for a complete method to multiply 183 by 47 and attempt at addition (condone one multiplication error) A1 for digits 8601 given as the answer B1 (dep on M1) for correctly writing their answer to 2 decimal places

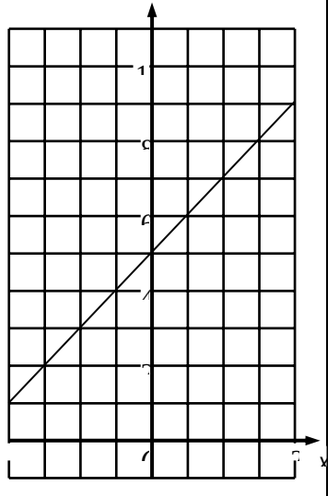
	1	8	3	×
	4	32	12	4
8	7	56	21	7
	6	0	1	

100	80	3	
4000	3200	120	40
700	560	21	7

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
2	(a)	Plot (2, 250) and (3.1, 190)	Plot points	1	B1 for both points plotted accurately
	(b)		Relationship	1	B1 for "As the distance from the centre increases the monthly rent decreases" or the nearer you are to the centre the more you have to pay oe (accept negative correlation)
	(c)		200 to 260	2	M1 for attempting a correct method, eg a line of best fit **or** any other indication, on a line that could be used as a line of best fit eg line to graph at $x = 2.8$or a mark on the line at 2.8 A1 for value in the range 200 to 260
3	(a)		2 reasons	2	B2 for 2 different reasons from given examples (B1 for 1 reason from given examples) eg No time frame eg No box for less than £10 accept no box for zero or none or £0 eg Overlapping intervals or boxes or £30 and/ or £50 in two boxes
	(b)		1 reason	1	C1 for reason why the sample is biased eg • they are **only** in the CD store, • the people in the store are more likely to buy CDs • she needs to ask people outside the store oe

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		3, 7, 9	2	B2 for all three values correct in the table (B1 for 2 values correct)
	(b)		graph of $y = 2x + 5$	2	**(From their table of values)** M1 ft for plotting at least 2 of their points (any points from their table must be correctly plotted) A1 for correct line from $x = -2$ to $x = +2$ **(Use of $y = mx + c$)** M1 for line drawn with gradient of 2 **or** line drawn with a y intercept of 5 **and** a positive gradient) A1 for correct line from $x = -2$ to $x = +2$

x	–2	–1	0	1	2
y	(1)	3	(5)	7	9



1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		$6n - 3$	2	M1 for attempt to establish linear expression in n with coefficient of 6 e.g. $6n + k$ where k is an integer (accept $n = 6n - 3$ for one mark) A1 cao
	(b)		No + Reason	1	C1 ft from their answer to part (a) for decision and explanation eg " stating no and because all the terms in the sequence are odd **and** 150 is even" **or** "no and '$6n - 3$' = 150, $n = 153/6$ ... so n is not an integer" **or** Continuing the sequence to show terms 147 **and** 153 and state "no as 150 is not in the sequence" oe

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)		8	1	B1 for 8 (.00)
	(b)		550	4	M1 for 600 – 200 (= 400) M1 for correct method to convert '$400' to £ M1 (dep on the previous M1) for 800 – '$400' in £s A1 for value in the range 540 –560 **OR** M1 for correct method to convert $600 **and** $200 to pounds M1 for '375'–'125' M1 (dep on the previous M1) 800 –'250' A1 for a value in the range 540-560 **OR** M1 for correct method to convert £800 to dollars M1 for '1280' + 200 – 600 M1 (dep on the previous M1) for attempt to convert '$880' back to £ A1 for value in the range 540 – 560
7	(a)		$6x - 3y$	2	M1 for an attempt to combine terms in x **or** terms in y correctly eg $5x + x(= 6x)$, $4y - 7y(= -3y)$ A1 for $6x - 3y$ oe
	(b)	$7x + 14 = 7$ or $x + 2 = 1$ $7x = -7$	$x = -1$	2	M1 for correctly expanding the bracket or an attempt to divide both sides by 7 e.g. $7x + 14$ or $x + 2 = 7 \div 7$ oe A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			09 36	3	M1 for listing 9, 18, 27, 36, 45, ...(at least 3 correct multiples with at most one incorrect) M1 for listing 12, 24, 36, 48, ... (at least 3 correct multiples with at most one incorrect) A1 for 09 36 or 9 36 (am) **OR** M1 for listing 9.09 9.18 9.27 9.36 ...(at least 3correct times with at most one incorrect) M1 for listing 9.12 9.24 9.36 ... (at least 3 correct times with at most one incorrect) A1 for 09 36 or 9 36 (am) **OR** M1 for $9 = 3 \times 3$ **or** $12 = 2 \times 2 \times 3$ (could be in factor tree) M1 for $9 = 3 \times 3$ **and** $12 = 2 \times 2 \times 3$ (could be in a factor tree) A1 for 09 36 or 9 36 (am) **SC B2** for 9 36 pm or (after) 36 (minutes) on the answer line
9	(a)		a^9	1	B1 for a^{4+5} or a^9
	(b)		$9e^5f^6$	2	B2 cao (B1 for two of 9, e^{6-1}, f^{8-2} as a product)
	(c)		3	1	B1 (accept ± 3 but not just –3)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*10		Angle *AED* = 38 alternate angles are equal Angle *ADE* = (180 – 38) ÷ 2 = 71 *x* = 180 – 71 base angles of an isosceles triangle are equal angles in a triangle add up to 180 angles on a straight line sum to 180 **OR** angle *AEF* = 142 allied angles/co-interior angles add up to 180 *ADE* = 142 ÷ 2 = 71 base angles of an isosceles triangle are equal exterior angle of a triangle is equal to the sum of the interior opposite angles , *x* = 180 – 71 angles in a straight line add to 180 **OR** Angle *AED* = 38 alternate angles are equal for angles *BAE* and *AED* **and** *BAD* and *ADC* (*x*) Angle *DAE*= (180 – 38) ÷ 2 = 71 base angles of an isosceles triangle are equal angles in a triangle add up to 180 **Or** Angle *AED* = 38 alternate angles are equal Angle *ADE* = (180 – 38) ÷ 2 = 71 base angles of an isosceles triangle are equal and angles in a triangle sum to 180 *x* = 38 + 71 alternate angles *BAD* and *ADC*(*x*) are equal	*x* = 109	4	B1 for angle *AED* = 38 or *AEF* = 142 M1 for a complete method to find one of the base angles of the isosceles triangle C2 (dep M1) for *x* = 109 with complete reasons (C1 (dep M1) for one reason correctly used and stated)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11			730	5	M1 for $\frac{5}{100}\times 200$ (= 10) oe M1 for $\frac{10}{100}\times 350$ (= 35) oe M1 for 6 × '10' **or** 4 × '35' M1 (dep on M1 earned for a correct method for a percentage calculation) for "60" + "140"+ 530 A1 cao **Or** M1 for 6 × 200 (= 1200) or 4 × 350 (= 1400) M1 for $\frac{5}{100}\times "1200"(=60)$ oe M1 for $\frac{10}{100}\times "1400"(=140)$ oe M1(dep on M1 earned for a correct method for a percentage calculation) for "60" + "140"+ 530 A1 cao

PMT

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12			240	4	M1 for 16 × 2 (= 32 girls) M1 for 16 + '16 × 2' (= 48) M1 (dep on the previous M1) for (16 + '32')× 5 **or** (16 + '32') × (4 + 1) A1 cao OR M1 for 1 : 2 = 3 parts M1 for 5 schools × 3 parts (= 15 parts) M1 (dep on the previous M1) for '15' parts × 16 A1 cao **SC B2** for 176 given on the answer line
13			54	3	M1 for 180 – 360 ÷ 5 **or** 108 seen as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao **OR** M1 for 180 × (5 – 2) (= 540) ÷ 5 or 108 given as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao

PMT

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		8, 23, 53, 70, 77, 80	1	B1 cao
	(b)		graph	2	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error A1 cao for correct graph with points joined by curve or straight line segments [SC B1 if the shape of the graph is correct and 5 points of their points are **not** at the ends but consistently within each interval **and** joined.]
	(c)	Readings at 60 and 20 420 to 440 – 280 to 295	120 – 160	2	M1 (dep on cf graph) for use of either cf = 20 or cf = 60 A1 ft from a cf graph
	(d)	80 – 71 to 74	6 – 9	2	M1 (dep on cf graph) for evidence of reading off the cf axis from £530 0n the wages axis (could be the answer) A1ft for 6 - 9

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15			Required region	4	M1 arc radius 5 cm centre *C* M1 bisector of angle *BAD* M1 line 3 cm from *DC* A1 for correct region identified (see overlay)
16	(a)		820 000	1	B1 cao
	(b)		3.76×10^{-4}	1	B1 cao
	(c)		5×10^{8}	2	M1 for $2.3 \div 4.6 \times 10^{12-3}$ oe or 500 000 000 or 0.5×10^{9} A1 cao (accept 5.0×10^{8}
17			$\frac{12}{13}$	3	M1 for multiplying throughout by 10 oe or writing LHS as a single fraction e.g $2(4x - 1) + 5(x + 4) = 3\times 10$ or $\frac{2(4x-1)+5(x+4)}{10}$ or $\frac{2(4x-1)}{10} + \frac{5(x+4)}{10}$ M1 (dep) for a complete correct method to obtain linear equation of the form $ax = b$ (condone one arithmetic error in multiplying out the bracket) A1 for $\frac{12}{13}$ oe (decimal equivalent is 0.923…)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18		**Q** at (– 3, 1), (– 6, 1) (–5, 3) (– 3, 3) **R** at (–3, – 1), (–6, – 1), (–5, – 3) (–3, –3)	Rotation 180° about (–1, 0)	3	M1 for showing **R** correctly on the grid without showing **Q or** for showing **Q and R** correctly on the grid A1 for rotation of 180° A1 for (centre) (–1, 0) **Or** M1 for showing **R** correctly on the grid without showing **Q or** for showing **Q and R** correctly on the grid A1 for Enlargement Scale Factor –1 A1 for centre (–1, 0) **NB** Award no marks for any correct answer from an incorrect diagram or any Accuracy marks if more than one transformation is given
19			68	3	M1 for angle *OBC* = 90° or angle *OAC* = 90° (may be marked on the diagram or used in subsequent working) M1 for correct method to find angle *BOC* or *AOC* or *AOB* e.g. angle *BOC* = 180 – 90 – 34 (= 56) or angle *AOC* = 180 – 90 – 34 (=56) or angle *AOB* = 180 – 2 × 34 (= 112) A1 cao **NB** (68 must be clearly stated as an answer and not just seen on diagram)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)(i)		$(x - 9)(x - 3)$	3	M1 for $(x \pm 9)(x \pm 3)$ A1 for $(x - 9)(x - 3)$
	(ii)		$x = 9$, $x = 3$		B1 cao
	(b)		$(y + 10)(y - 10)$	1	B1 for $(y + 10)(y - 10)$
*21		$(n + 1)^2 - n^2$ $= n^2 + 2n + 1 - n^2 = 2n + 1$ $(n + 1) + n = 2n + 1$ OR $(n + 1)^2 - n^2$ $= (n + 1 + n)(n + 1 - n)$ $= (2n + 1)(1) = 2n + 1$ $(n + 1) + n = 2n + 1$ OR $n^2 - (n + 1)^2 = n^2 - (n^2 + 2n + 1) = -2n - 1 = -(2n + 1)$ Difference is $2n + 1$ $(n + 1) + n = 2n + 1$	proof	4	M1 for any two consecutive integers expressed algebraically eg n and $n + 1$ M1(dep on M1) for the difference between the squares of 'two consecutive integers' expressed algebraically eg $(n + 1)^2 - n^2$ A1 for correct expansion and simplification of difference of squares, eg $2n + 1$ C1 (dep on M2A1) for showing statement is correct, eg $n + n + 1 = 2n + 1$ and $(n + 1)^2 - n^2 = 2n + 1$ from correct supporting algebra
22		Vertices at (–2, –4), (–4, –4), (–4, –6), (–2, –5)	Correct diagram	3	M1 for a similar shape in the correct orientation in the third quadrant M1 for an image in the correct orientation of the correct size A1 cao

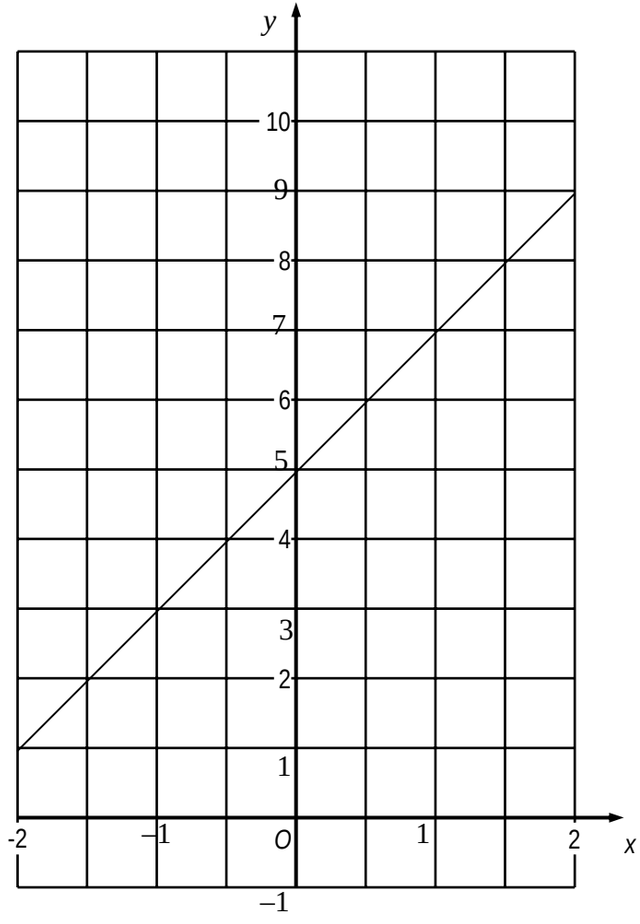
1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			75π	3	M1 for $(4 \times \pi \times 5^2) \div 2$ oe M1 for $\pi \times 5^2$ oe A1 for 75π accept 235.5 Condone the use of $\pi = 3.14\ldots$
24		EE + CC + HH **Or** EC+EH+CE+CH+HE+HC **Or** E,not E+ C,not C + H,not H	$\frac{76}{110}$	5	M1 for use of 10 as denominator for 2nd probability M1 for $\frac{4}{11}\times\frac{3}{10}$ *or* $\frac{5}{11}\times\frac{4}{10}$ *or* $\frac{2}{11}\times\frac{1}{10}$ M1 for $\frac{4}{11}\times\frac{3}{10}+\frac{5}{11}\times\frac{4}{10}+\frac{2}{11}\times\frac{1}{10}\left(=\frac{34}{110}\right)$ M1 (dep on previous M1 for $1 - \text{`}\frac{34}{110}\text{'}$ A1 for $\frac{76}{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $\frac{4}{11}\times\frac{5}{10}$ or $\frac{4}{11}\times\frac{2}{10}$ or $\frac{5}{11}\times\frac{4}{10}$ or $\frac{5}{11}\times\frac{2}{10}$ or $\frac{2}{11}\times\frac{4}{10}$ or $\frac{2}{11}\times\frac{5}{10}$ M2 for $\frac{4}{11}\times\frac{5}{10}+\frac{4}{11}\times\frac{2}{10}+\frac{5}{11}\times\frac{4}{10}+\frac{5}{11}\times\frac{2}{10}+\frac{2}{11}\times\frac{4}{10}+\frac{2}{11}\times\frac{5}{10}$ (M1 for at least 3 of these) A1 for $\frac{76}{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $\frac{4}{11}\times\frac{7}{10}$ *or* $\frac{5}{11}\times\frac{6}{10}$ *or* $\frac{2}{11}\times\frac{9}{10}$ M2 for $\frac{4}{11}\times\frac{7}{10}+\frac{5}{11}\times\frac{6}{10}+\frac{2}{11}\times\frac{9}{10}$ (M1 for two of these added) A1 for $\frac{76}{110}$ oe **PTO for SC's**

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
					SC: B2 for $\frac{76}{121}$ **SC:** B1 for $\frac{4}{11}\times\frac{4}{11}+\frac{5}{11}\times\frac{5}{11}+\frac{2}{11}\times\frac{2}{11}$ $(=\frac{45}{121})$ **Or** $\frac{4}{11}\times\frac{5}{11}+\frac{4}{11}\times\frac{2}{11}+\frac{5}{11}\times\frac{4}{11}+\frac{5}{11}\times\frac{2}{11}+\frac{2}{11}\times\frac{4}{11}+\frac{2}{11}\times\frac{5}{11}$ **Or** $\frac{4}{11}\times\frac{7}{11}+\frac{5}{11}\times\frac{6}{11}+\frac{2}{11}\times\frac{9}{11}$
25	(a)		sketch		M1 for inverting the parabola, so maximum is at (–2, 0) A1 for parabola passing through all three of the points (–2, 0), (0, –4), (–4, –4)
	(b)		$y = f(x - 6)$	1	B1 for $y = f(x - 6)$ or $y = (x - 4)^2$ oe

PMT

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)		**6b – 3a**	1	B1 for **6b – 3a** oe
	(b)			4	M1 for $\overrightarrow{AX} = \frac{1}{3}\overrightarrow{AB}$ or $\frac{1}{3}$ '(**6b – 3a)'** or ft to **2**b **–** a M1 for $\overrightarrow{OY} = \overrightarrow{OB} + \overrightarrow{BY}$ = **6b** + 5**a** – **b** (= 5**b** + 5**a)** oe M1 for $\overrightarrow{OX}$ = 3**a** + '2**b** – **a'** = 2**a** + 2**b** oe **Or** $\overrightarrow{OX} = 6\mathbf{b} - \frac{2}{3}$ '(6**b** – 3**a**)' (= 2**a** + 2**b)** oe C1 for $\frac{2}{5}\overrightarrow{OY} = \frac{2}{5} \times 5(\mathbf{a} + \mathbf{b}) = 2(\mathbf{a} + \mathbf{b}) = \overrightarrow{OX}$

4.



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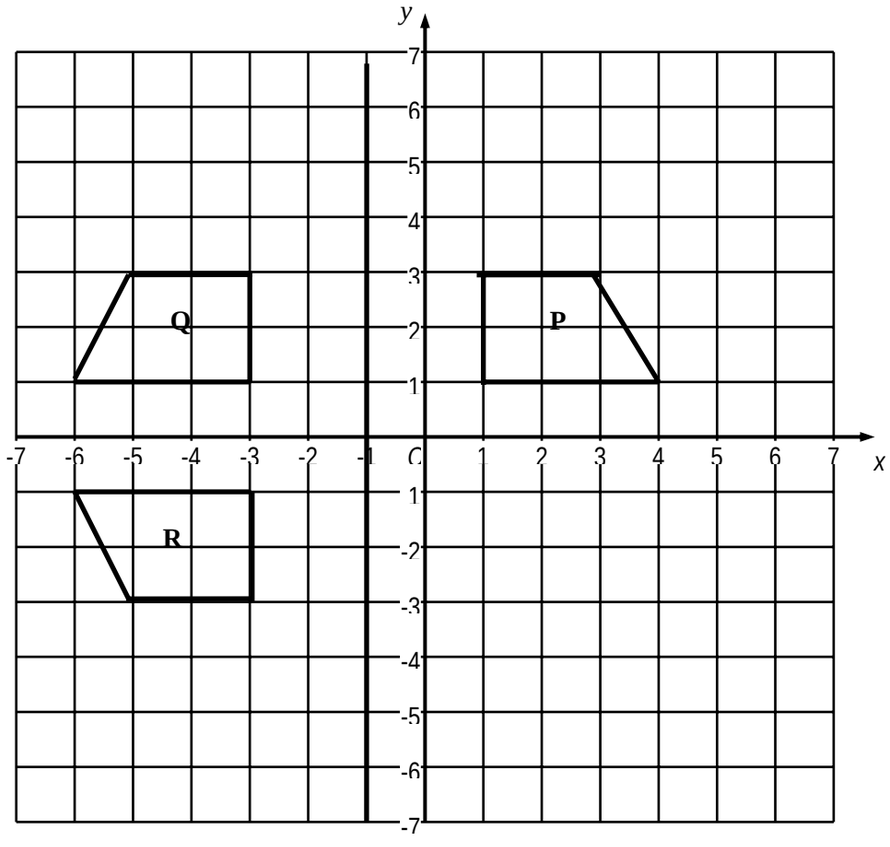

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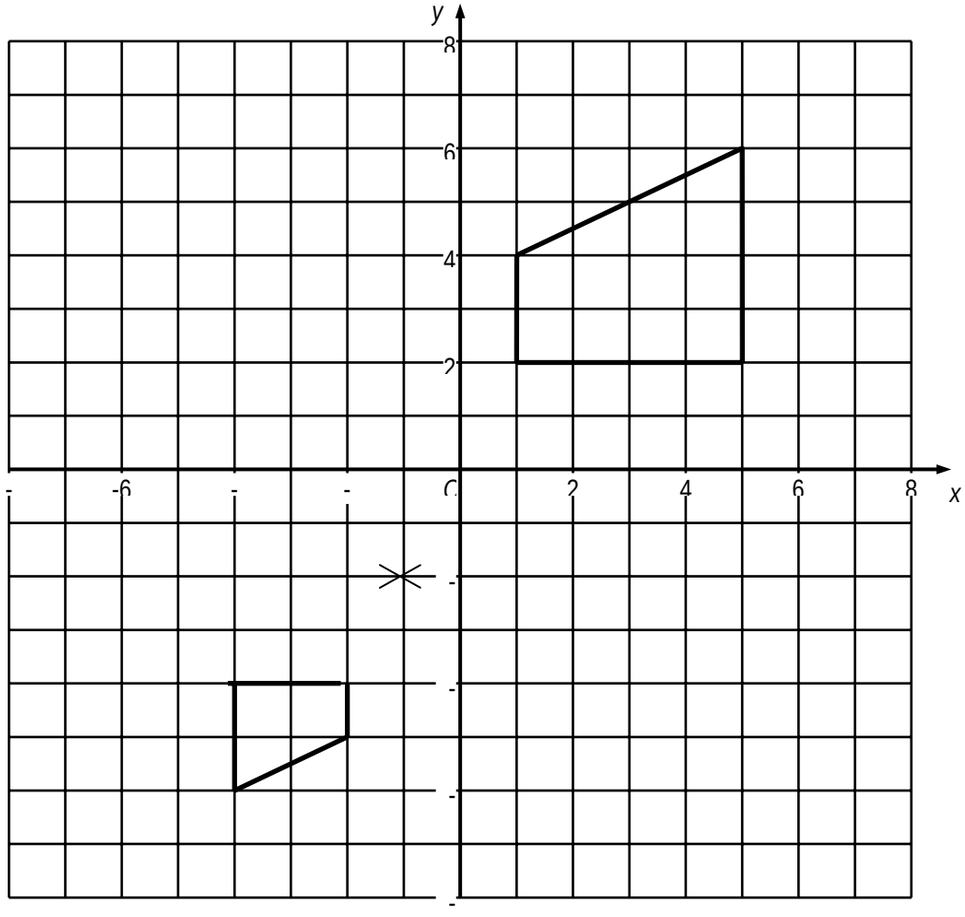
22



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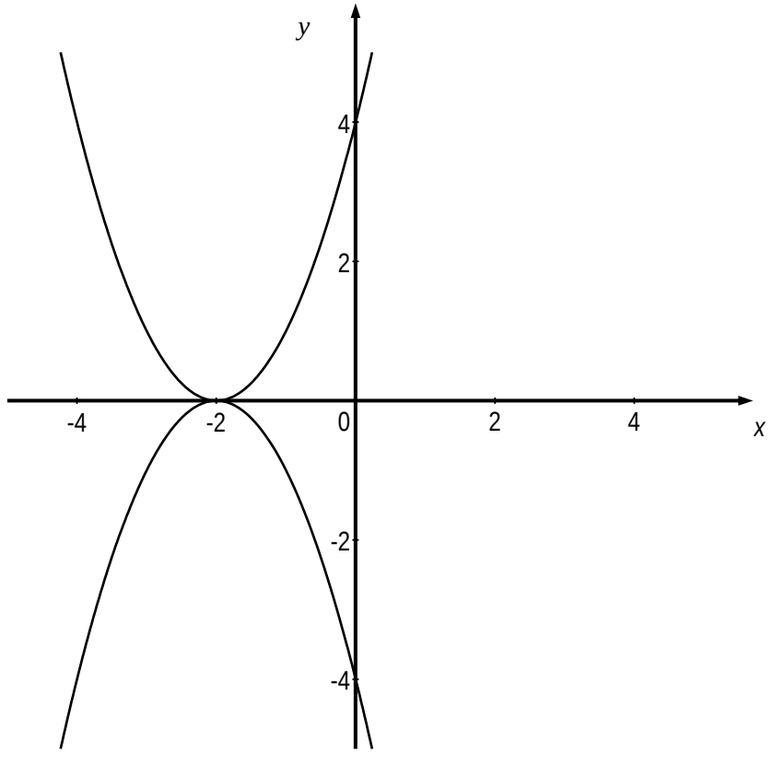
25(a)



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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
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 labelling conventions.

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

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

7 With working

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

8 Follow through marks

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

9 Ignoring subsequent work

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

10 Probability

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

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

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

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

Guidance on the use of codes within this mark scheme
M1 – method mark 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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PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			350	3	M1 for finding 30% of 500 (=150) M1 dep for subtraction of discount from 500 A1 cao OR M1 for 1 − 0.3 (= 0.7) M1 dep for 500 × "0.7" A1 cao
2	(a)		$2e - f$	2	M1 (implied) for $2e$ or $-f$ A1 oe
	(b)		$6x + 10$	2	M1 for $2 \times 3x$ $(= 6x)$ or 2×5 $(= 10)$ A1 cao
3			375 25 1250 500	3	M1 for $15 \div 6$ $(= 2.5)$ oe (can be implied by one answer correct) A1 for two answers correct B1 all correct
*4			Yes 200 > 180 oe	4	M1 for converting using figures from the graph or for 5 miles = 8 km oe M1 for correct method to convert 240 km into miles (=150 miles) or to convert 350 miles into km (= 560 km) or to convert 180 miles into km (= 288 km) M1 (dep on M2) for correct method for comparison eg 180 miles with 350 − 150 (= 200) miles eg 288 km with 560 − 240 (= 320) km C1 for a correct statement that she will have to stop oe with appropriate supporting evidence eg Yes and 200 miles is too far eg Yes and 330 < 350 eg Yes and 20 miles under" oe eg Yes and 320 > 288

PMT

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		x^6	1	B1 cao
	(b)		y^2	1	B1 cao
	(c)		t^6	1	B1 cao
6			500	4	M1 for a correct method to convert cm to m or m to cm or cm^3 to m^3 or m^3 to cm^3 (can be implied eg 4 packets drawn in container height) M1 for correct method for one volume or correct method to get at least 2 multipliers from packet to container (can be implied on the diagram) M1 for complete correct method (ignore incorrect conversions) A1 cao

PMT

PAPER: 5MB2H_01					
Question		Working	Answer	Mark	Notes
*7			80	4	B1 for $EBF = 50$ or $ABE = 50$ M1 for angles given that can lead to $x = 80$ as the next step eg $EBF = 50$ and $ABE = 50$ eg $EBF = 50$ and $BFG = 100$ eg $EBF = 50$ and $BFE = 80$ eg $EBF = 50$ and $DEB = 130$ and $ABE = 50$ A1 cao C1 for stating correct reasons appropriate to their method shown eg Base angles of an isosceles triangle are equal. with Angles in a triangle add up to 180° with Alternate angles are equal eg Base angles of an isosceles triangle are equal. with Alternate angles are equal with Angles on a straight line add up to 180° eg Base angles of an isosceles triangle are equal. with The exterior angle of a triangle is equal to the sum of the opposite interior angles. with Allied angles / Co-interior angles add up to 180°

PMT

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			blue paint 5 white paint 4	5	M1 attempts multiples of either 12 or 15 (at least 3 but condone errors if intention is clear) M1 attempts multiples of both 12 and 15 (at least 3 but condone errors if intention is clear) M1 (dep on M1) for a division of 60 by 12 or 15, or counts up "multiples" or answer blue : white in the ratio 5 : 4 A1 blue paint 5; white paint 4 OR M1 correct expansion of either number into factors M1 correct expansion of both number into factors M1 (dep on M1) demonstrates two expansions that include 3 oe A1 blue paint 5; white paint 4
9			$2n + 1$	2	M1 for $2n$ or $2n + k$ where $k \neq 1$ A1 for $2n + 1$
10	(a)		$2x^2 + 7x + 3$	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) A1 cao
	(b)		$4x(x + 2y)$	2	M1 for $4x(ax + by)$, a & b integers or $ax(x + 2y)$ or any expression with brackets which multiplies to give $4x^2 + 8xy$ A1 cao

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		$0.0034\times10^{5} = 340$ $34\times10^{-5} = 0.00034$ $-3.4\times10^{-3} = -0.0034$ $3.4\times10^{4} = 34\,000$ $34\times10^{2} = 3400$	-3.4×10^{-3} 34×10^{-5} 0.0034×10^{5} 34×10^{2} 3.4×10^{4}	3	M1 for changing at least 1 correctly to standard form or for changing at least 1 correctly to an ordinary number M1 at least 3 correct changes to standard form or at least 3 correct changes to ordinary numbers A1 ordered [S.C. B2 (if no working) for 4 in the correct order or all correct but reverse order]
12			20	3	M1 for indication that angle between a tangent and radius is 90 (could be seen on the diagram) M1 for OAC = 20 or AOC = 70 or BOC = 140 or ABC = ACB or BCA = $\frac{180-40}{2}$ (= 70) A1 cao
13			62	4	M1 for B to C time = 210 ÷ 70 (= 3 h) M1 for A to B dist = (5 − "3") × 50 (= 100) M1 (dep on M1) for average speed = total distance ÷ total time or 210 + "(2 × 50)" ÷ 5 A1 cao

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		**Front or Back**: ½ × 3x(13x – 3 + 5x − 3) = 27x^2 − 9x or ½ (4x)(3x) + 3x(5x − 3) **Top**: (5x − 3)(x + 2) = 5x^2 + 7x − 6 **Bottom**: (13x−3)(x + 2) = 13x^2 + 23x − 6 **Each Side**: 5x(x + 2) = 5x^2 + 10x **Total SA** = 2(27x^2 − 9x) + 2(5x^2 + 10x) + (5x^2 + 7x – 6) + (13x^2 + 23x − 6) = (54 + 10 + 5 + 13) x^2 + (−18 + 20 + 7 + 23) x + (− 6 − 6)	82x^2 + 32x − 12	4	M1 finds the area of at least 2 faces (condone omission of brackets) M1 writes a correct algebraic expression for the area of at least 3 different faces M1 correct expressions for all 6 faces and adds C1 (dep on M3) for correct algebraic expression as a correct summary

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PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$x = 0.15555\ldots$ $10x = 1.5555\ldots$ $9x = 1.4$ $x = \frac{1.4}{9} = \frac{14}{90}$ OR $x = 0.1 + y$ where $y = 0.0555\ldots$ $10y = 0.5555\ldots$ $100y = 5.5555..$ $90y = 5$ so $y = 5/90$ $x = 0.1+5/90= 1/10+ 5/90$	$\frac{7}{45}$	3	M1 for $0.155(5\ldots)$ or $0.1+ 0.055(5\ldots)$; 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 with a correct fraction for their 2 recurring decimals A1 for $\frac{7}{45}$ [**SC**: B1 for an answer of $\frac{15}{99}$ oe, with or without working]
16			$30 - 10\sqrt{5}$	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 $25 - 10\sqrt{5} + 5$ A1 cao
17			$y = -\frac{1}{2}x + 2$	3	M1 for gradient = $-\frac{1}{m}$ or $-\frac{1}{2}$ M1 for substitution of $x = -2$, $y = 3$ into their $y = mx + c$ where c is a constant to be found A1 for $y = -\frac{1}{2}x + 2$ oe eg accept $2y + x = 4$
18			$\frac{3x}{x+4}$	3	M1 for $3x(x - 2)$ M1 for $(x - 2)(x + 4)$ A1 cao

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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		**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	

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Mark Scheme (Results)

November 2014

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

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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_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(i)		3484	1	B1 cao
	(ii)		34.84	1	B1 cao
	(iii)		670	1	B1 cao
*2			Maths with correct comparative figure(s)	2	M1 for correct method to find figure(s) to compare, eg $\frac{32}{80}\times 100$ (=40) oe **or** 0.38×80 oe (=30.4) C1 for maths with 40% or 30.4 or $\frac{40}{100}$ and $\frac{38}{100}$ oe
3		8 | 4 8 9 9 | 0 0 1 1 2 3 5 7 8 10 | 2 3 6 8 11 | 0 5 8 | 4 represents 84(cm)	correct stem and leaf with key	3	B2 for a fully correct ordered diagram (B1 for a correct unordered diagram or ordered with at most two errors or omissions with stems 8, 9, 10 and 11 present) B1 for a correct key (units not necessary) Accept stem written as 80, 90, etc. but key only if consistent with this
4			$T = 6x + 8y$	3	M1 for $6x$ **or** $8y$ oe **or** $T=$ (a linear expression in x and y) M1 for $6x + 8y$ oe or $T = 6x$ $(+ay)$ oe or $T = 8y$ $(+bx)$ oe A1 for $T = 6x + 8y$ oe

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		$y > 0.5$	2	M1 for clear intention to subtract 5 from both sides of inequality or equation **or** divide all terms of the inequality or equation by 6 **or** $6y > 3$ **or** 0.5 oe seen A1 for $y > 0.5$ oe as final answer
	(b)		$-3 < x \leq 4$	2	B2 for $-3 < x \leq 4$ oe (B1 for one correct inequality, eg $-3 < x$ **or** $x > -3$ **or** $x \leq 4$ **or** $4 \geq x$ **or** $-3 \leq x < 4$) NB Accept the use of any letter
*6		554 ×27 3878 11080 14958 1 0 1 0 0 8 3 5 3 5 2 8 1 4 9 5 8	Yes with correct working	4	M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation. A1 for £149.58 or 42p (spare) C1 ft (dep on M1) for correct decision for their total cost **OR** M1 for a complete grid with not more than 1 multiplication error, addition not necessary M1 (dep) for addition of all the appropriate elements of the calculation A1 for £149.58 or 42p (spare) C1 ft (dep on M1) for correct decision for their total cost **PTO**

		<table><tr><th>500</th><th>50</th><th>4</th><th>×</th></tr><tr><td>10 000</td><td>1000</td><td>80</td><td>2 0</td></tr><tr><td>3500</td><td>350</td><td>28</td><td>7</td></tr></table> 10000 1000 3500 350 80 28 14958			**OR** M1 for sight of a complete partitioning method, condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation. A1 for £149.58 or 42p (spare) C1 ft (dep on M1) for correct decision for their total cost **OR** M1 for 150.0... ÷ 27 at least 5 seen and 15 carried or $\frac{50}{9}$ M1 (dep) for full correct process to divide 150 by 27 or $5\frac{5}{9}$ A1 for £5.55 or £5.56 o**r** £5.55... C1 ft (dep on M1) for correct decision for their plant cost **OR** M1 for 150.0…÷ 5.54 at least 2 seen and 392 carried M1 (dep) for full correct process to divide 150 by 5.54 A1 for 27 (.07…) C1 ft (dep on M1) for correct decision for their number of plants

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			9	4	M1 for method to find area of one rectangle, eg 15 × 8 (=120) or 15 × 11 (=165) M1 (dep) for subtracting from/by given area, eg (138 – "120") (=18) or "165" – 138 (=27) M1 for final step from complete method shown, eg 15 − "18"÷ 3 or "27" ÷ 3 A1 cao **OR** M1 for a correct expression for the area of one rectangle, eg (8 + 3) × (15 − x) or 8 × x M1 (dep) for a correct equation eg (8 + 3) × (15 − x) + 8 × x = 138 M1 for correct method to isolate x, eg 3x = 27 A1 cao
*8			x = 130 + correct reasons	4	M1 for angle BFG = 65 may be seen on diagram M1 (dep) for correct method to calculate x, eg (x=) 65 + 65 (=130) **or** (x=) 180 − (180 – 2 × 65) (=130) C2 for x = 130 **and** full appropriate reasons related to method shown (C1 (dep on M1) for any one appropriate reason related to method shown) eg alternate angles; base angles in an isosceles triangle are equal; angles in a triangle add up to 180°; angles on a straight line add up to 180°; exterior angle of triangle = sum of two interior opposite angles; co-interior angles add up to 180° (allied angles) NB Any reasons stated **must** be used

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		2 reasons	2	B2 for two different reasons (B1 for 1 reason) eg No units (of distance) eg Overlapping intervals or boxes or 2 and/or 3 in two boxes eg Missing box (no box for more than 6 (km/miles) or "other" or 4.5 (km/miles))
	(b)		question	2	B1 for a suitable question which includes a time frame (time frame could appear with response boxes) B1 for at least 3 relevant non-overlapping response boxes and exhaustive [Do not allow inequalities in response boxes]
10			construction	2	M1 for a pair of arcs or a single arc, centre C, that cut line AB **and** at least one pair of arcs not at C within guidelines A1 for perpendicular within guidelines with appropriate construction arcs **OR** M1 for an arc, centre A radius AC **and** an arc centre B radius BC. The two arcs must intersect below AB A1 for perpendicular within guidelines with appropriate construction arcs (SC If M0 scored, B1 for correct perpendicular line within guidelines)
11			900	4	M1 for 0.2×7000 (=1400) or 1.2×7000 (=8400) oe M1 for $7000 +$ "1400" $-$ 3000 (=5400) oe M1 for "5400" $\div 6$ A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		$e(3e + 5)$	1	B1 for $e(3e + 5)$
	(b)		4	3	M1 for intention to expand brackets, eg $7k - 21$ or division of all terms on RHS by 7 as first step, eg $\frac{3}{7}k - \frac{5}{7}$ M1 for correct method to isolate terms in k in an equation A1 cao
	(c)		$2x^2 - 13x - 24$	2	M1 for 4 terms correct ignoring signs or 3 out of no more than 4 terms correct A1 cao
	(d)		$-\frac{1}{3}$	3	M1 for clear intention to multiply both sides by 4 or split into individual fractions on LHS M1 for correct method to isolate term in f in an equation, ft from equations of form $a + bf = c$, where $a, b, c \neq 0$ A1 cao
13	(a)		$2\times2\times3\times3\times5$	3	M1 for a continual prime factorisation (at least two consecutive steps correct) or at least two stages of a factor tree correct M1 for a fully correct factor tree or list 2,2,3,3,5 A1 for $2\times2\times3\times3\times5$ or $2^2\times3^2\times5$
	(b)		Eg 6, 30	2	M1 for two numbers with an HCF of 6 **or** for two numbers with a LCM a multiple of 15 A1 for two numbers with an HCF of 6 **and** a LCM a multiple of 15 (eg (6, 30), (12, 30), …) **OR** M1 for 2×3 **and** 3×5 **or** for $2\times3\times5$ A1 for two numbers with an HCF of 6 **and** a LCM a multiple of 15 eg (6, 30) (12, 30) …

<table>
<tr><th colspan="6">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>14</td><td></td><td></td><td>25</td><td>4</td><td>M1 for 600 ÷ 4 (=150)
M1 for 4500 ÷ “150” (=30)
M1 for 750 ÷ “30”
A1 for 25 with supporting working

OR
M1 for 4500 ÷ 750 (=6) or 750 ÷ 4500 (=$\frac{1}{6}$)
M1 for 600 ÷ 4 (=150) or 600 ÷ “6” (=100) or 600 × "$\frac{1}{6}$" (=100)
M1 for “150” ÷ “6” or “100” ÷ 4 or 150 × "$\frac{1}{6}$"
A1 for 25 with supporting working

OR
M1 for 4500 ÷ 750 (=6) or 750 ÷ 4500 (=$\frac{1}{6}$)
M1 for $\frac{1}{4} \times \frac{1}{"6"} \left(=\frac{1}{24}\right)$
M1 for "$\frac{1}{24}$" × 600
A1 for 25 with supporting working</td></tr>
<tr><td>15</td><td>(a)</td><td></td><td>correct box plot</td><td>2</td><td>M1 for a box drawn with at least 2 correct points from LQ, Median and UQ or with maximum value of 290 plotted
A1 for a fully correct box plot</td></tr>
<tr><td></td><td>*(b)</td><td><table><tr><td></td><td>girls</td><td>boys</td></tr><tr><td>Med</td><td>170</td><td>190</td></tr><tr><td>Range</td><td>230</td><td>210</td></tr><tr><td>IQR</td><td>120</td><td>100</td></tr></table></td><td>2 comparisons</td><td>2</td><td>C1 for a correct comparison of a measure of spread (using either range or IQR) or ft their box plot
C1 for a correct comparison of medians (accept averages)

For the award of both marks at least one of these comparisons must be in the context of the question.</td></tr>
</table>

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		correct graph	2	M1 for 5 or 6 or 7 points plotted correctly at the ends of the intervals (overlay) A1 cao for correct graph with points joined by curve or straight line segments [SC: B1 if the shape of the graph is correct and 5 or 6 or 7 of their points are **not** at the ends but are plotted consistently within (10,20) (20,30) (30,40) etc.]
	(b)		No with supporting figures	2	M1 for 0.1 × 200 (=20) **or** 0.9×200 (=180) **or** sight of 180 used on cf axis **or** 200 – 186 (=14) A1 ft for correct decision with 20 and "9" **or** 20 and 14 **or** "age" from reading graph at 180 **OR** M1 for method to find percentage of workers who are over 65, eg $\frac{200-"191"}{200} \times 100$ (=4.5%) **or** method to find percentage of workers who are over 60 (from table), eg $\frac{200-186}{200} \times 100$ (=7%) or $\frac{200-190}{200} \times 100$ (=5%) A1 ft for correct decision with "4.5"% or 7% or 5%

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17			25	4	M1 for complete method to work out interior angle of a regular octagon **or** 135° identified as an interior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg "135" − "110" or (8×"135" − 4×"135" − 4×"110") ÷ 4 or (3×180 − 2×"135" − 2×"110") ÷ 2 A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg 180 − "45" − "110" A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *JKF* or angle *JKF* identified as 70° M1 (dep on M2) for complete method to work out angle *KFE*, eg "70" − "45" A1 for 25 with supporting working

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		7.5	2	M1 for $\frac{12}{18}$ oe **or** $\frac{18}{12}$ oe **or** $\frac{12}{5}$ oe **or** $\frac{5}{12}$ oe A1 cao
	(b)		45	3	M1 for $\left("\frac{3}{2}"\right)^2$ oe or $\left("\frac{2}{3}"\right)^2$ oe M1 for complete method to find area of shaded region, eg $36 \times "1.5"^2 - 36$ A1 cao (SC B2 for 81)
19	(a)		8, (4), (2), 1, 0.8, 0.5	2	B2 all 4 correct Accept $\frac{4}{5}$ in place of 0.8 and $\frac{1}{2}$ in place of 0.5 (B1 for 2 or 3 correct)
	(b)		correct graph	2	M1 (ft dep on B1) for 5 or 6 points plotted correctly from their table (overlay) A1 cao for correct curve drawn from (0.5,8) to (8, 0.5)
20			128π	5	M1 for $\frac{4\pi r^2}{2} = 32\pi$ oe A1 for (r =) 4 M1 for $2\times\pi\times"4"\times10$ (=80π) **or** $\pi\times"4"^2$ (=16π) or ft their r M1 for 32π + "80π" + "16π" oe or 402.1 −402.3 or ft their r A1 cao
21		$3-\sqrt{2}+3\sqrt{2}-\sqrt{2}\sqrt{2}$	$1+2\sqrt{2}$	2	M1 for 4 terms correct ignoring signs or 3 out of no more than 4 terms correct A1 cao

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					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			$\frac{156}{336}$	4	**Method 1 (Combinations for odd T)** M1 for one probability for odd T, eg $P(2,3,4) = \frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}$ or $P(2,4,5) = \frac{1}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $P(3,3,5) = \frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $P(3,5,5) = \frac{2}{8} \times \frac{4}{7} \times \frac{3}{6}$ or $P(5,5,5) = \frac{4}{8} \times \frac{3}{7} \times \frac{2}{6}$ M1 for adding at least two probabilities for odd T, eg $\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6} + \frac{1}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $3\left(\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}\right)$ M1 for completely correct method, ie $6\left(\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}\right) + 6\left(\frac{1}{8} \times \frac{1}{7} \times \frac{4}{6}\right) + 3\left(\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}\right) + 3\left(\frac{2}{8} \times \frac{4}{7} \times \frac{3}{6}\right) + \left(\frac{4}{8} \times \frac{3}{7} \times \frac{2}{6}\right)$ oe A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **OR** **Method 2 (Combinations for even T)** M1 for one probability for even T, eg $P(3,4,5) = \frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $P(2,3,3) = \frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}$ or $P(2,5,5) = \frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}$ or $P(2,3,5) = \frac{1}{8} \times \frac{2}{7} \times \frac{4}{6}$ or $P(4,5,5) = \frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}$ or $P(3,3,4) = \frac{2}{8} \times \frac{1}{7} \times \frac{1}{6}$ M1 for adding at least two probabilities for even T, eg $\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6} + \frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}$ or $3\left(\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}\right)$ M1 for completely correct method, ie $1 - [6\left(\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}\right) + 3\left(\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}\right) + 3\left(\frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}\right) + 6\left(\frac{1}{8} \times \frac{2}{7} \times \frac{4}{6}\right) + 3\left(\frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}\right) + 3\left(\frac{2}{8} \times \frac{1}{7} \times \frac{1}{6}\right)$ oe A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **PTO**

					Method 3 (Combinations of odd and even numbers- odd totals) M1 for one probability for odd T, eg P(E,E,O) =. $\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}$ or P(O,O,O) = $\frac{6}{8}\times\frac{5}{7}\times\frac{4}{6}$ M1for adding at least two probabilities for odd *T,* eg 3 $\left(\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}\right)$ or $\left(\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}\right)+\left(\frac{6}{8}\times\frac{5}{7}\times\frac{4}{6}\right)$ M1 for completely correct method, ie 3 $\left(\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}\right)+\left(\frac{6}{8}\times\frac{5}{7}\times\frac{4}{6}\right)$ A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **OR** **Method 4 (combinations of odd and even numbers- even totals)** M1 for probability for even T, ie = $\frac{2}{8}\times\frac{6}{7}\times\frac{5}{6}$ M1 for adding at least two probabilities for even *T,* eg 3 $\left(\frac{2}{8}\times\frac{6}{7}\times\frac{5}{6}\right)$ M1 for completely correct method, ie $1-3\left(\frac{2}{8}\times\frac{6}{7}\times\frac{5}{6}\right)$ A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **SC (with replacement)** For example, M0 M1 for adding at least two probabilities for odd or even *T,* eg P(E,E,O) = $\frac{2}{8}\times\frac{2}{8}\times\frac{6}{8}$ or P(O,O,O) = $\frac{6}{8}\times\frac{6}{8}\times\frac{6}{8}$ M1 for completely correct method, eg 3 $\left(\frac{2}{8}\times\frac{2}{8}\times\frac{6}{8}\right)+\left(\frac{6}{8}\times\frac{6}{8}\times\frac{6}{8}\right)$ or $\frac{288}{512}$ oe, eg $\frac{9}{16}$ or 0.56(25) A0

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*24		$2y = 3x - 4$ $y = \frac{3}{2}x - 2$; $m = \frac{3}{2}$ $\frac{3--1}{1-4} = -\frac{4}{3}$ $\frac{3}{2} \times -\frac{4}{3} = -2$	No with reason	4	M1 for $\frac{3}{2}$ oe or $y = \frac{3}{2}x\left(-\frac{4}{2}\right)$ oe M1 for method to find gradient of AB, eg $\frac{3--1}{1-4}$ **or** $\frac{-1-3}{4-1}$ **or** $-\frac{4}{3}$ oe A1 for identifying gradients as $\frac{3}{2}$ oe **and** $-\frac{4}{3}$ oe C1 (dep on M1) for a conclusion with a correct reason, eg No as product of $\frac{3}{2}$ and $-\frac{4}{3}$ is not −1, ft from their two gradients
25	(i)		(3, −1)	3	B1 cao
	(ii)		(1.5, −4)		B1 for (1.5, −4) accept 1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$ for x coordinate
	(iii)		(−3, −4)		B1 cao

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

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

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

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
3		Stem and leaf diagram – extra line put in at the bottom	
5		Larger gaps between numbers	
10		Line AB put horizontal Small vertical line at either end of line AB	
12	(c)	*x* changed to *y*	
15	(b)	Table changed 50, 250, 175, 100, 225 Box plots labeled – Box plot (a) and Box plot (b) and both extended to 400 with a 2 cm grid Lines moved to 25, 125, 200, 225, 250	
16		Table changed to 20, 70, 140, 170, 185, 195, 200 Grid 1½ cm for 10 on y axis (this one gives 10 people over 60): x axis is 3cm for 10 years. Age (years) 90 column removed	
18		Shading reversed – AEFG is shaded Question wording altered to reflect this	

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Mark Scheme (Results)

Summer 2015

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

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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

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		15 | 6 9 16 | 4 5 7 7 8 9 17 | 2 3 6 6 8 9 18 | 0 2 3 8 19 | 0 2 with key	3	B2 for a correct ordered stem and leaf diagram (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required)
	(b)		15	2	M1 for a method to find "3" as a percentage of the total number of men, eg $\frac{"3"}{"20"}\times 100$ oe $\frac{"3"\times 5}{100}$ or ft from their diagram A1 for 15 cao
2	(a)		36	1	B1 cao
	(b)		2.5 oe	2	M1 for collecting the terms in x or the number terms in an equation, eg. $5x - x + 4 = 14$ or $5x = 14 - 4 + x$ A1 for 2.5 oe (accept $\frac{10}{4}$)
3			Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (non-overlapping and exhaustive) [Do not allow inequalities in response boxes]

PAPER: 1MA0_1H

Question	Working	Answer	Mark	Notes
*4	1195 4780 + 5975 2 3 9 0 4 | 0 6 | 1 8 | 2 5 | 1 0 | 1 5 | 4 5 | 5 9 7 5 | | 200 | 30 | 9 | | 20 | 4000 | 600 | 180 | | 5 | 1000 | 150 | 45 | 4000 + 1000 + 600 + 150 + 180 + 45 = 5975	Kirsty's Plants with correct calculations	5	M1 for complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation or digits 5975 M1 for a complete method to find 120% of £52.50 A1 for 59.75 and 63(.00) C1 (dep on M2) for correct conclusion for their figures **OR** M1 for the start of a method to divide £52.50 by 25, eg. 2 rem 2 M1 for a complete method to divide £52.50 by 25, condone one arithmetic error, or digits 21 M1 for a complete method to find 120% of '£2.10' A1 for 2.52 C1 (dep on M2) for correct conclusion for their figures **OR** M1 for a complete method to find 120% of £52.50 M1 for the start of a method to divide '63' by 25, eg. 2 rem 13 M1 for a complete method to divide '63' by 25, condone one arithmetic error, or digits 252 A1 for 2.52 C1 (dep on M2) for correct conclusion for their figures

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5			12	3	M1 for a method to find volume of a cuboid, eg. $2 \times 10 \times 15$ (= 300) or $5 \times 5 \times x$ (= $25x$) M1 (dep) for "300" ÷ "25" oe A1 cao OR M1 for 10 ÷5 (= 2) and 15 ÷ 5 (= 3) or 10 ÷5 (= 2) and 2 ÷ 5 (= 0.4) M1 (dep) for 2 × "2" × "3" or 15 × "2" × "0.4" A1 cao
6	(a)		Relationship	1	B1 for a description of a dynamic relationship eg "The older the car the lower the price" or "The newer the car the greater the price" oe (accept negative correlation)
	(b)		6400 to 7000	2	M1 for a single straight line segment with negative gradient that could be used as a line of best fit or vert. line from 3.5 or a point plotted at (3.5, y), where y is in the range 6400 to 7000 A1 for 6400 - 7000
7	(a)		Triangle with vertices at (–3, 3), (–3, 4) and (–1, 4)	2	B2 for a triangle with vertices at (–3, 3), (–3, 4), (–1, 4) (B1 for triangle in correct orientation and size or rotated 90° clockwise about centre O or three correct vertices without joining)
	(b)		Reflection in line $y = x$	2	B1 for reflection B1 for (in the line) $y = x$ Note: award no marks if more than one transformation is given

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		$2g - 3h$	2	M1 for $2g$ or $-3h$ A1 for $2g - 3h$ or $-3h + 2g$
	(b)		$y(y - 2)$	1	B1
	(c)		p^5	2	M1 for $\frac{p^{3+4}}{p^2}\left(=\frac{p^7}{p^2}\right)$ or $p^{3-2} \times p^4$ $(= p^1 \times p^4)$ or $p^3 \times p^{4-2}$ $(= p^3 \times p^2)$ A1 cao
9		40, 80, 120 15, 30, 45, 60, 75, 90, 105, 120 40 = 2 × 2 × 2 × 5 15 = 3 × 5	3 and 8 or any multiple of 3, 8	3	M1 for multiples of both 40 and 15 (at least 2 of each shown but condone errors if intention is clear) or for 40 × 15 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15, eg. 120, 240, 600 condoning one arithmetic error in any lists of multiples shown A1 for 3, 8 or any multiple of 3, 8 OR M1 for factors 2,2,2,5 and factors 3,5 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15 A1 for 3, 8 or any multiple of 3, 8

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*10			Has enough (with evidence)	5	M1 for splitting the shape (or showing recognition of the "absent" triangles) and using a method to find the area of one shape M1 for a complete method to find the total area, (= 9 m^2) M1 (dep on M1) for a method to find the number of packs required from their total area, eg. "9" ÷ 2 = 4.5 rounded up to 5 M1 for a method to find 75% of 24.80 or 75% of the cost of their total number of packs, eg. 24.80 × "5" × $\frac{75}{100}$ (= 93) or 24.80 × $\frac{75}{100}$ (= 18.6) C1 for a conclusion supported by fully correct answers, eg. showing 9 (m^2), 5 (packs) and 93 or 7 (from 100 – 93) OR M1 for method to find 75% of £24.80, eg. 24.80 × $\frac{75}{100}$ (= 18.6) M1 for method to find total number of packs Mary can buy, eg. 100 ÷ "18.60" = 5.3.... truncated to 5 or 10 (m^2) M1 for finding area of one relevant shape or showing how one pack (2 m^2) can fit in the diagram M1 (dep on previous M1) for complete method to show that 5 packs can cover the floor C1 for a conclusion supported by fully correct answers, showing the capacity (10) greater than total area (9)

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		$\frac{2}{10}$	2	M1 for $\frac{2}{a}$ with a > 2 or $\frac{b}{10}$ with $b < 10$ A1 for $\frac{2}{10}$ oe
	(b)		£10 or 1000p	3	M1 for "$\frac{2}{10}$" × 100 (= 20) or 30(p) × 100 (= 3000p or £30) M1 (dep) for "30(p) × 100" – (£)1 × "20" oe A1 ft from (a), provided the answer is not negative. Units must be shown
*12			40° with reasons	4	M1 for finding one related angle using parallel lines A1 for $x = 40(^o)$ C2 for full reasons linked to appropriate method eg. alternate angles are equal **and** angles in a triangle add up to 180° eg. angles on a straight line add up to 180° **and** corresponding angles are equal **and** alternate angles are equal eg. co-interior (allied) angles add up to 180° **and** exterior angle of a triangle is equal to sum of interior opposite angles Other solutions may include reasons such as: vertically opposite angles are equal the sum of angles at a point is equal to 360° (C1 (dep on M1) for one appropriate reason linked to parallel lines)
13			48	5	M1 for 8 – 2 (= 6) M1 (indep) for $x^2 + 8^2$ (provided $x \leq 8$) M1 (dep on previous M1) fo $\sqrt{"x"^2 + 8^2}$ or $\sqrt{"100"}$ M1 (dep on M2) for 4 × 2 + 4 × "10" A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14			54	3	M1 for any correct use of distance, speed, time formulae, eg.10 ÷ 40 (=0.25) or 15 min M1 (dep) for a complete method to find speed from G to H, eg.18 ÷ (35 – "15") × 60 oe. A1 cao
15	(a)		(3, 6.5)	2	M1 for a method to find either the *x* coordinate or the *y* coordinate of the midpoint or $x = 3$ or $y = 6.5$ oe A1 cao [SC: B1 for (6.5, 3)]
	*(b)		No and correct working	3	M1 for a method to work out a gradient between any relevant pair of points (ie 2 of points A, B, C or D), eg. $\frac{9-4}{8--2}\left(=\frac{5}{10}\right)$ M1(dep) for a method to work out the gradient between another pair of points which can be used for comparison; one gradient must be through D. C1 for "no" and a correct explanation based on two correct gradients OR M1 for a method to work out a gradient between any relevant pair of points (ie 2 of points A, B, C or D), eg. $\frac{9-4}{8--2}\left(=\frac{5}{10}\right)$ M1 (dep) for using their gradient to work out an equation of a straight line in the form $y = mx + c$ and substituting in an appropriate point C1 for "no" and a correct explanation based on correct working OR M2 for (100, 55) or (102, 56) C1 for "no" and a correct explanation based on correct coordinates.

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		4, 20, 56, 80, 94, 100	1	B1 cao
	(b)		graph	2	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error, or if the shape of the graph is correct for 5 or 6 points plotted not at the ends but consistently within each interval and joined A1 cao for correct graph with points joined by curve or straight line segments
	(c)		47 to 49	1	B1 for 47 to 49 or ft their cf graph at cf = 50
	(d)		13 to 16	2	M1 for reading a value from their cf graph at time = 63 (84 to 87) A1 for answer in the range 13 to 16 or ft from their graph
17			18	4	M1 for a method to find the exterior angle of a pentagon eg. $360 \div 5$ (=72) or the interior angle of a pentagon, eg. $180 - 360 \div 5$ (= 108) A1 for 72 or 108 M1 (dep M1) for a fully complete method to find the required angle, *DCF* A1 for 18 or ft their interior or exterior angle

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18			Region identified	4	M1 for the graph of $x + y = 7$ or $y = 2x$ drawn M1 for the graphs of $x + y = 7$, $y = 2x$ and $y = 3$ drawn M1 for any correct shading (in or out), satisfying at least two correct inequalities where the shading must extend from the appropriate lines. A1 for correct region identified by either shading in, or shading out; the letter R is not required. Accept without shading only with the correct region indicated by R. NB accept lines that are solid or dotted/dashed etc or lines defined by unambiguous shading
19	(a)		Proof	3	M1 for $\frac{6}{n}$ or $\frac{5}{n-1}$ M1 for $\frac{6}{n} \times \frac{5}{n-1} \left(= \frac{1}{3}\right)$ A1 for fully correct algebra leading to $n^2 - n - 90 = 0$
	(b)		10	3	M1 for correct start to a solution, eg. $(n \pm 10)(n \pm 9)$ or substitution into the quadratic formula, condoning one sign error or $(n - 0.5)^2 - 0.25 - 90$ A1 for $(n - 10)(n + 9)$ or for 10 and –9 or $\frac{1 \mp 19}{2}$ oe A1 for 10 only
20			$a = \frac{4p - 5}{3 + p}$ or	4	M1 for multiplying both sides by $4 - a$ as the first step M1 (dep) for isolating their two terms in a M1 (dep) for factorising their two term expression in a A1 for $a = \frac{4p - 5}{3 + p}$ or $a = \frac{5 - 4p}{-p - 3}$

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
21			Proof	3	M1 for (x =) 0.04545(...) or 1000x = 45.4545(...), accept 1000x = 45.$\dot{4}\dot{5}$ or 100x = 4.54545(...), accept 100x = 4.$\dot{5}\dot{4}$ or 10x = 0.4545(...) ,accept 10x = 0.$\dot{4}\dot{5}$ M1 for finding the difference between two correct, relevant recurring decimals for which the answer is a terminating decimal A1 (dep on M2) for completing the proof by subtracting and cancelling to give a correct fraction eg $\frac{45}{990} = \frac{1}{22}$ or $\frac{4.5}{99} = \frac{1}{22}$
22	(a)		$\frac{1}{8}$	1	B1 for $\frac{1}{8}$ oe
	(b)		1.5	1	B1 for 1.5 oe
	(c)		3	2	M1 for √12×√12 – √12×√3 – √3×√12 + √3×√3 or √144 – √36 – √36 + √9 oe. with no more than one sign error A1 cao OR M1 for writing (√12 – √3) as (2√3 – √3) (= √3) A1cao

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			$\frac{14}{3}$	5	M1 for correct substitution into a volume formula for a cylinder or a cone, eg. $\frac{1}{3}\times\pi\times3^2\times4$ (= 12π) or $\pi\times3^2\times(6-4)$ (= 18π) or $\pi\times3^2\times h$ (= 9πh) or $\pi\times3^2\times(h-2)$ M1 for method to find volume after 5 hours, eg. "12π" + "18π" (= 30π) M1 (dep on M1) for use of a correct ratio, eg. "30π" × $\frac{9}{5}$ (= 54π) or "30π" × $\frac{4}{5}$ (= 24π) M1 for deriving an equation in h, eg. "54π" = "9πh" + "12π" A1 for $\frac{14}{3}$ or equivalent fraction
24	(a) (i)		(0, 5)	3	B1 cao
	(ii)		(3, 10)		B1 cao
	(iii)		(1, 5)		B1 cao
	(b)		Translation of $\begin{pmatrix}0\\-4\end{pmatrix}$ oe	1	B1 for a correct transformation, eg. translation of $\begin{pmatrix}0\\-4\end{pmatrix}$ or translation of 4 units in the negative y-direction, oe.

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

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

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q1	(a)	An extra horizontal line has been added at the bottom of the diagram.	B2 for a correct ordered stem and leaf diagram (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required)
Q1	(b)	An extra horizontal line has been added at the bottom of the diagram.	M1 for a method to find "3" as a percentage of the total number of men, eg $\frac{"3"}{"20"}\times 100$ oe $\frac{"3"\times 5}{100}$ or ft from their diagram A1 for 15 cao
Q2	(b)	MLP only: x changed to y	M1 for collecting the terms in y or the number terms in an equation, eg. $5y - y + 4 = 14$ or $5y = 14 - 4 + y$ A1 for 2.5 oe (accept $\frac{10}{4}$)

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q5		2 models provided for all candidates. MLP also have diagrams. In text, wording is added to give the dimensions of the first cheese.	M1 for a method to find volume of a cuboid, eg. 2 × 10 × 15 (= 300) or 5 × 5 × x (= 25x) M1 (dep) for "300" ÷ "25" oe A1 cao OR M1 for 10 ÷5 (= 2) and 15 ÷ 5 (= 3) or 10 ÷5 (= 2) and 2 ÷ 5 (= 0.4) M1 (dep) for 2 × "2" × "3" or 15 × "2" × "0.4" A1 cao
Q6	(a)	Diagram enlarged. Crosses changed to filled in circles. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Right axis is labelled.	B1 for a description of a dynamic relationship eg "The older the car the lower the price" or "The newer the car the greater the price" oe (accept negative correlation)
Q6	(b)	Diagram enlarged. Crosses changed to filled in circles. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Right axis is labelled.	M1 for a single straight line segment with negative gradient that could be used as a line of best fit or vert. line from 3.5 or a point plotted at (3.5, y), where y is in the range 6400 to 7000 A1 for 6400 - 7000
Q7	(a)	Grids enlarged. Triangles A, B and C have dotty shading.	B2 for a triangle with vertices at (–3, 3), (–3, 4), (–1, 4) (B1 for triangle in correct orientation and size or rotated 90º clockwise about centre O or three correct vertices without joinin
Q7	(b)	Grids enlarged. Triangles A, B and C have dotty shading.	B1 for reflection B1 for (in the line) $y = x$ Note: award no marks if more than one transformation is given

PMT

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q10		Diagram enlarged. Measurement lines for 1 metre and 2.2 metres are removed. Dashed measurement line for 3.4 metres.	M1 for splitting the shape (or showing recognition of the "absent" triangles) and using a method to find the area of one shape M1 for a complete method to find the total area, (= 9 m^2) M1 (dep on M1) for a method to find the number of packs required from their total area, eg. "9" ÷ 2 = 4.5 rounded up to 5 M1 for a method to find 75% of 24.80 or 75% of the cost of their total number of packs, eg. 24.80 × "5" × $\frac{75}{100}$ (= 93) or 24.80 × $\frac{75}{100}$ (= 18.6) C1 for a conclusion supported by fully correct answers, eg. showing 9 (m^2), 5 (packs) and 93 or 7 (from 100 – 93) OR M1 for method to find 75% of £24.80, eg. 24.80 × $\frac{75}{100}$ (= 18.6) M1 for method to find total number of packs Mary can buy, eg. 100 ÷ "18.60" = 5.3.... truncated to 5 or 10 (m^2) M1 for finding area of one relevant shape or showing how one pack (2 m^2) can fit in the diagram M1 (dep on previous M1) for complete method to show that 5 packs can cover the floor C1 for a conclusion supported by fully correct answers, showing the capacity (10) greater than total area (9)

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q12		Diagram enlarged. AC, DF and PS made the same length. Angle arc put inside the angle size.	M1 for finding one related angle using parallel lines A1 for $x = 40(^{o})$ C2 for full reasons linked to appropriate method eg. alternate angles are equal **and** angles in a triangle add up to 180° eg. angles on a straight line add up to 180° **and** corresponding angles are equal **and** alternate angles are equal eg. co-interior (allied) angles add up to 180° **and** exterior angle of a triangle is equal to sum of interior opposite angles Other solutions may include reasons such as: vertically opposite angles are equal the sum of angles at a point is equal to 360° (C1 (dep on M1) for one appropriate reason linked to parallel lines)
Q13		Diagrams enlarged. 8 cm moved above the diagram. In text, wording gives the dimensions.	M1 for 8 – 2 (= 6) M1 (indep) for $x^2 + 8^2$ (provided $x \leq 8$) M1 (dep on previous M1) fo $\sqrt{"x"^2 + 8^2}$ or $\sqrt{"100"}$ M1 (dep on M2) for 4 × 2 + 4 × "10" A1 cao

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q16	(a)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5.	B1 cao
Q16	(b)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5. Grid enlarged. Both axes 3 cm for 20 with an intermediate line. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Right axis is labelled.	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error, or if the shape of the graph is correct for 5 or 6 points plotted not at the ends but consistently within each interval and joined A1 cao for correct graph with points joined by curve or straight line segments
Q16	(c)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5.	B1 for 47 to 49 or ft their cf graph at cf = 50
Q16	(d)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5. 63 minutes changed to 65.	M1 for reading a value from their cf graph at time = 63 (85 to 90) A1 for answer in the range 10 to 15 or ft from their graph
Q17		Diagram enlarged.	M1 for a method to find the exterior angle of a pentagon eg. 360 ÷ 5 (=72) or the interior angle of a pentagon, eg. 180 – 360 ÷ 5 (= 108) A1 for 72 or 108 M1 (dep M1) for a fully complete method to find the required angle, *DCF* A1 for 18 or ft their interior or exterior angle

PMT

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q18		Grid enlarged.	M1 for the graph of $x + y = 7$ or $y = 2x$ drawn M1 for the graphs of $x + y = 7$, $y = 2x$ and $y = 3$ drawn M1 for any correct shading (in or out), satisfying at least two correct inequalities where the shading must extend from the appropriate lines. A1 for correct region identified by either shading in, or shading out; the letter R is not required. Accept without shading only with the correct region indicated by R. NB accept lines that are solid or dotted/dashed etc or lines defined by unambiguous shading
Q20		MLP only: a changed to m.	M1 for multiplying both sides by $4 – m$ as the first step M1 (dep) for isolating their two terms in m M1 (dep) for factorising their two term expression in m A1 for $m = \frac{4p-5}{3+p}$ or $m = \frac{5-4p}{-p-3}$
Q23		Model provided for all candidates. Diagram also for MLP.	M1 for correct substitution into a volume formula for a cylinder or a cone, eg. $\frac{1}{3}\times\pi\times3^2\times4$ (= 12π) or $\pi\times3^2\times(6-4)$ (= 18π) or $\pi\times3^2\times h$ (= 9πh) or $\pi\times3^2\times(h-2)$ M1 for method to find volume after 5 hours, eg. "12π" + "18π" (= 30π) M1 (dep on M1) for use of a correct ratio, eg. "30π" × $\frac{9}{5}$ (= 54π) or "30π" × $\frac{4}{5}$ (= 24π) M1 for deriving an equation in h, eg. "54π" = "9πh" + "12π" A1 for $\frac{14}{3}$ or equivalent fraction

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q24	(a) (i)	Diagram enlarged. Cross changed to filled in circle.	B1 cao
Q24	(a)(ii)	Diagram enlarged. Cross changed to filled in circle.	B1 cao
Q24	(a)(iii)	Diagram enlarged. Cross changed to filled in circle.	B1 cao
Q24	(b)	Diagram enlarged. Cross changed to filled in circle.	B1 for a correct transformation, eg. translation of $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ or translation of 4 units in the negative y-direction, oe.

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Mark Scheme (Results)

Summer 2015

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

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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.

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7 With working

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

8 Follow through marks

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

9 Ignoring subsequent work

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

10 Probability

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

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

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

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

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

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question 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 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		$5^1/_4$	1	B1 for $5^1/_4$ oe
(b)		12	2	M1 for (28 ÷ 7) × 3 oe A1 cao
(c)		4000	2	M1 for 20 or 200 A1 for 4000 – 4040
2	−2 −1 0 1 2 3 7 5 3 1 −1 −3	Correct graph	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) 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 $x = 3$ **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ 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 $x = -2$ and $x = 3$ **(Use of $y = mx + c$)** M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of –2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$

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5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
3		270	3	M1 for 9÷0.1 (=90) or 4.5÷1.5 (=3) oe M1 for "3" × "90" oe (=270) A1 cao OR M1 for 4.5÷0.1 (=45) or 9÷1.5 (=6) oe M1 for "6" × "45" oe (=270) A1 cao OR M1 for 9×4.5 (=40.5) or 1.5×0.1(=0.15) oe M1 for "40.5" ÷ "0.15" (=270) oe A1 cao
4		3, 5, 7	2	M1 for at least two consecutive numbers substituted into $2n+1$ or at least two of 3, 5 ,7 A1 cao
5		150 cm^3	3	M1 for a complete method to find the volume A1 for 150 B1 (indep) for cm^3
6	3000 ÷ 20=150 150 ÷ (14+1) = 10 10 × 0.5 = 20 20 × 3.99	79.80	4	M1 for amount of petrol or oil or mixture M1 for use of ratio M1(dep on M1, M1) for total cost of bottles A1 for 79.8(0)

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5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
7 (a)		$5y + 4$	2	M1 for $3\times y-3\times 2$ or $2\times y+2\times 5$ A1 cao
(b)		w^2	1	B1 cao
(c)		$5(x + 4)$	1	B1 cao
8	1.15 × 2000 (=2300) 1.10 × 2300	2530	3	M1 for a correct method to find the amount at the end of the first year M1(dep) for a correct method to find the amount at the end of the second year A1 cao
9		Italy with reason	3	B1 for 5 miles = 8km oe M1 for change to consistent units from $70\times r$ with $1.5 \le r \le 1.7$ or $130 \times s$ with $0.6 \le s \le 0.7$ C1 for Italy identified and 112 kph stated or Italy identified and 81.(25) mph stated oe

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5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
*10		27	4	M1 for 360÷5 (=72) or 360÷8 (=45) M1 for '72' – '45' A1 for $x = 27$ C1 (dep on M1) for sum of exterior angles of polygon is 360 degrees oe OR M1 for 3×180÷5 (=108) or 6×180÷8 (=135) M1 for '135' – '108' A1 for $x = 27$ C1 (dep on M1) for sum of interior angles of polygon is $180(n - 2)$ oe degrees or angles in a triangle sum to 180 degrees OR M1 for 360÷8 (=45) or 3×180÷5 (=108) M1 for 180 – ('108'+'45') A1 for $x = 27$ C1 (dep on M1) for sum of exterior angles of polygon is 360 degrees oe and angles on a straight line sum to 180 degrees
11		0.0025 2.5×10^{-2} 2.5×10^{2} 2500	2	M1 for converting all numbers to same form with at least one conversion correct A1 for fully correct order with correct numbers in any correct form (SC B1 if one number incorrectly placed or all 4 numbers listed in reverse order)
12 (a)		(5, 3, 4)	1	B1 cao
(b)		point	1	B1 cao

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5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
13		$x^2+10x+22$	4	M1 for $(x+8) - (x+5)$ (=3) or $(x+4) - (x+2)$ (=2) M1 for area of one rectangle eg $(x+2)(x+5)$ (= $x^2+7x+10$) M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4)$ (= $x^2+7x+10 + 3x+12$) A1 cao
14 (a)		1	1	B1 cao
(b)		$\frac{1}{16}$	2	M1 for two of cube root, square, reciprocal A1 cao
15 (a)		$(y-7)(y+2)$	2	B2 cao (B1 for $(y \pm 7)(y \pm 2)$)
(b)		$\sqrt{5}+29$	2	M1 expand brackets, with at least 3 correct terms including signs or 4 correct terms ignoring signs eg $2\sqrt{5}\times3\sqrt{5}-2\sqrt{5}+3\sqrt{5}-1\times1$ A1 for $\sqrt{5}+29$ or $29+\sqrt{5}$
(c)		$\sqrt{3}$	2	M1 for $\frac{6}{\sqrt{12}}\times\frac{\sqrt{12}}{\sqrt{12}}$ oe or $\sqrt{12}=2\sqrt{3}$ A1 cao

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5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
16		$y = 2x - 1$	4	M1 for $\left(\frac{6+-2}{2}, \frac{1+5}{2}\right)$ oe M1 for $\frac{-1}{-0.5}$ oe (=2) M1(dep on previous M1) for using $y =$ '2'$x + c$ with their coordinates for the midpoint used correctly to find c A1 for $y = 2x - 1$ oe
*17		proof with reasons	5	M1 for using x oe for AOB or CPB or consistent use of three letter notation M1 for correct use of at least one circle theorem or for extending PR and CA to meet at 'X' and using triangles OBX and PCX A1 for correct proof C2 for fully correct reasons for each stage of proof (C1 for any relevant circle theorem reason) Possible reasons: Angles in a triangle add up to 180° Angles in a quadrilateral (4 sided shape) add up to 360° Angles on a straight line add up to 180° The tangent to a circle is perpendicular (90°) to the radius (diameter) Tangents from an external point are equal in length. Reasons must be relevant for method shown.

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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		**Modification**	**Notes**
Q2		Grid has been enlarged.	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) 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 $x = 3$ **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ 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 $x = -2$ and $x = 3$ **(Use of $y = mx + c$)** M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of –2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$

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PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q3		Diagram has been enlarged. 9 metres moved to top of diagram 4.5 metres moved to the left of diagram.	M1 for 9÷0.1 (=90) or 4.5÷1.5 (=3) oe M1 for "3" × "90" oe (=270) A1 cao OR M1 for 4.5÷0.1 (=45) or 9÷1.5 (=6) oe M1 for "6" × "45" oe (=270) A1 cao OR M1 for 9×4.5 (=40.5) or 1.5×0.1(=0.15) oe M1 for "40.5" ÷ "0.15" (=270) oe A1 cao
Q5		Model provided for all candidates. Also a diagram is provided for MLP. Wording added: right-angled before triangular prism.	M1 for a complete method to find the volume A1 for 150 B1 (indep) for cm^3

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PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q7	(c)	MLP *x* changed to y.	B1 cao
Q10		Diagram has been enlarged.	M1 for 360÷5 (=72) or 360÷8 (=45) M1 for '72' – '45' A1 for *x* = 27 C1 (dep on M1) for sum of exterior angles of polygon is 360 degrees oe OR M1 for 3×180÷5 (=108) or 6×180÷8 (=135) M1 for '135' – '108' A1 for *x* = 27 C1 (dep on M1) for sum of interior angles of polygon is 180(*n* - 2) oe degrees or angles in a triangle sum to 180 degrees OR M1 for 360÷8 (=45) or 3×180÷5 (=108) M1 for 180 – ('108'+'45') A1 for *x* = 27 C1 (dep on M1) for sum of exterior angles of polygon is 360 degrees oe and angles on a straight line sum to 180 degrees
Q12	(a)	Model provided for all candidates. Also enlarged diagram provided for MLP. On the model and diagram the point C is marked in the correct place, with an additional mark either side of the C	B1 cao
Q12	(b)	Question has been changed: "The point C has been marked on the cuboid. Write down the co-ordinates of point C". (1 mark) (_____, _____, _____)	B1 cao

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PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q13		Diagram has been enlarged. MLP *x* changed to y.	M1 for $(x+8) - (x+5)$ (=3) or $(x+4) - (x+2)$ (=2) M1 for area of one rectangle eg $(x+2)(x+5)$ ($= x^2+7x+10$) M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4)$ ($= x^2+7x+10 + 3x+12$) A1 cao
Q17		Diagram has been enlarged.	M1 for using *x* oe for *AOB* or *CPB* or consistent use of three letter notation M1 for correct use of at least one circle theorem or for extending *PR* and *CA* to meet at '*X*' and using triangles *OBX* and *PCX* A1 for correct proof C2 for fully correct reasons for each stage of proof (C1 for any relevant circle theorem reason) Possible reasons: Angles in a triangle add up to 180° Angles in a quadrilateral (4 sided shape) add up to 360° Angles on a straight line add up to 180° The tangent to a circle is perpendicular (90°) to the radius (diameter) Tangents from an external point are equal in length. Reasons must be relevant for method shown.

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Mark Scheme (Results)

November 2015

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

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

9 Ignoring subsequent work

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

10 Probability

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

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

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

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

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

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question 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 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.			6 525 900 450	3	M1 for $\times 6 \div 4$ 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

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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

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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

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 Mathematic A (1MA0)
Higher (Non-Calculator) Paper 1H

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November 2016
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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

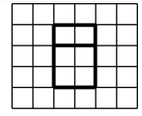
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1		Diagram drawn	3	B3 for fully correct shape (B2 for 3 or 4 vertices correct or enlargement scale factor 3 in wrong position or enlargement, centre *A*, with different scale factor) (B1 for 2 vertices correct or enlargement, not from *A*, with different scale factor)
2		17.6(0)	4	M1 18 × 6.45 (= 116.1(0)) or 18 × 645 = (11610) M1 for 18 × 6.45 – 98.50 in the correct order but units may not be consistent A1 for digits 1760 A1 (dep on M2) for correct placement of decimal point after subtraction (of appropriate values)
3 (a)		4	2	M1 for 20 ÷ 5 (=4) Allow build up method to 4 lots of 1:5 A1 cao
(b)		6	2	M1 for a full method to find the number of red counters needed eg 20 ÷ 2 – "4" A1 ft from (a)
4 (a)		5	1	B1 cao
(b)		Lines added	2	B1 for a horizontal line from (5, 8) to (6.30, 8) B1 for a single straight line with the correct gradient and length, down to the time axis eg (6.30, 8) to (8.30, 0)
5			2	B2 for correct side elevation (B1 for a rectangle with base 2 squares or height 3 squares)

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
6 (a)		$50 < a \leq 60$	1	B1 for correctly identifying the modal class interval e.g. 50 – 60 oe
(b)		Polygon	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments **or** all points plotted accurately and joined with last joined to first to make a polygon **or** all points at the correct heights and consistently within or at the ends of the intervals **and** joined (can include joining last to first to make a polygon)) NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.
7	$(7 + 3 + 3) \times (4 + 3 + 3) - 7 \times 4 = 102$ OR $2 \times 7 \times 3 + 2 \times 4 \times 3 + 4 \times 3 \times 3 = 102$	11	4	M1 for a correct method to find the area of one appropriate rectangle M1 for a complete method to find the area of the path M1 (dep on M1) for "102" ÷ 10 A1 cao from correct working
*8		Bathroom Mart and correct figures	4	M1 for $\frac{1}{3} \times 1500$ (= 500) or $\frac{2}{3} \times 1500$ (= 1000) M2 for a correct method to reduce 1500 by 60% and then by a further 15% eg 1500 × "0.4" × "0.85" (= 510) oe (M1 for method to find 60% or 40% of 1500 e.g. $\frac{60}{100} \times 1500$ (= 900) C1 for 510 **and** 500 with a correct conclusion.

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*9		95° with reasons	4	M1 for angle *DBC* = 180 – 125 (= 55) **or** angle *EAC* = 180 – 125 (=55) (May be on diagram) A1 for *x* = 95 C2 (dep on M1) with full reasons for their given method, e.g. angles on a straight line add up to 180° **and** angles in a triangle add up to 180° **and** corresponding angles are equal **or** allied angles / co-interior angles add up to 180° **and** angles in a triangle add up to 180° (C1 (dep on M1) for one appropriate reason linked to parallel lines) M1 for angle *CDB* = 125 – 30 (= 95)) (May be on diagram) A1 for *x* = 95 C2 (dep on M1) for full reasons, for their given method, e.g. exterior angles are equal to the sum of the interior opposite angles **and** corresponding angles are equal (C1 (dep on M1) for one of these appropriate reasons linked to parallel lines)
10 (a)		Diagram	2	B2 for fully correct solution with all three aspects with no ambiguity Aspect 1: circle at 3 Aspect 2: circle not shaded Aspect 3: arrow pointing left indicating extension beyond −4 or line extending beyond −4 (B1 for any two aspects)
(b)		$x \geq 5$	2	M1 for intention to add 7 to both sides (of inequality or equation) or to divide all 3 terms by 4 as a first step, or (*x* =) 5 A1 for $x \geq 5$ oe
11		125 miles or 200 km	3	B1 for 5 miles = 8 km or equivalent statement or for $\frac{5}{8}$ or $\frac{8}{5}$ used correctly M1 for method to use the correct conversion to find 40 (km) or 150 (miles) or $240 \times r$ with $0.6 \leq r \leq 0.7$ or $25 \times s$ with $1.5 \leq s \leq 1.7$ A1 for 200 km or 125 miles (units must be given)

PAPER: 1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		049	1	B1 for answer in range 47 to 51
	(b)		12	2	M1 for line drawn on a bearing of 320° ±2° A1 for answer in range 10 to 14
13	(a)		75	2	M1 for $3 \times 5 \times 5$ oe A1 cao
	(b)	$108 = 3t^2$ $t^2 = \frac{108}{3} = 36$	± 6	2	M1 for $(t^2 =) \frac{108}{3} (= 36)$ A1 for 6 or –6 or both
	(c)		$a = \frac{v-u}{t}$	2	M1 for subtracting u from both sides or dividing both sides by t as a first step A1 for $a = \frac{v-u}{t}$ oe
14		**B** at (1, 0), (1, –1), (3, –2) **C** at (–2, –1), (–2, –2), (0, –3) Rotation 90° clockwise (or 270° anti-clockwise) about (–2, 2)	Rotation 90° clockwise centre (–2, 2)	3	M2 for stating rotation 90° clockwise (or 270° anti-clockwise) or centre (–2, 2) (M1 for showing **B** and **C** correctly on the grid) A1 for a fully correct description NB Award a maximum of M1 if more than one transformation is given
15	(a)		–3, 8	2	M1 for $3 + (3 - 9) (= -3)$ oe or $5 + (5 - 2) (= 8)$ oe or $\frac{x+9}{2} = 3$ or $\frac{y+2}{2} = 5$ A1 cao
	(b)		$y = -0.5x + 6.5$	3	M1 for a correct method to find the gradient (= –0.5), ft the possible use of coordinates in part (a) M1 for method to find c eg substituting into $y =$ "–0.5"$x + c$ A1 for $y = -0.5x + 6.5$ oe

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
16		10	3	M1 for 15×7 (= 105) or 9×5 (= 45) M1 for $(15 \times 7 - 9 \times 5) \div (15 - 9)$ A1 cao
17 (a)	<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>0.25</td><td>**0.5**</td><td>**1**</td><td>2</td><td>**4**</td><td>**8**</td></tr></table>	0.5, 1, 4, 8	2	B2 for all 4 correct (B1 for 2 or 3 correct)
(b)		Correct graph	2	M1 for at least 5 points plotted correctly from their table, provided at least B1 scored in part (a) A1 cao for a correct graph drawn from (–2, 0.25) to (3, 8)
*18	Boys Girls Median: 115 112 Range: 41 33 IQR: 17 9	Comparison of data	4	B1 for correct median for girls or boys B1 for any correct range or IQR C1 for a correct comparison of the medians C1 ft for a correct comparison of the ranges or IQRs For the award of both C marks at least one of the comparisons made must be in the context of the question and all figures used for comparisons correct. OR B2 for an accurately drawn boxplot (superimposed) C1 for a correct comparison of the medians C1 for a correct comparison of the ranges or IQRs For the award of both C marks at least one of the comparisons made must be in the context of the question

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19	$4x - 2y = 26$ $x - 2y = 11$ $3x = 15$ $2x - y = 13$ $2x - 4y = 22$ $3y = -9$	$x = 5$ $y = -3$	3	M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) A1 for $x = 5$ and $y = -3$
20 (a)		1.21×10^4	2	M1 for 12.1×1000 (= 12100) oe A1 cao
(b)		4.5	3	M1 for $4.503 \times 10^9 \div 10^6$ (= 4503) oe or for $4.503 \times 10^9 \div 10^3$ (= 4503000) oe M1 for $4.503 \times 10^9 \div 10^6 \div 10^3$ (=4.503 with no other digits) A1 for cao
21		3.75 oe	3	M1 for a correct scale factor or ratio using two corresponding sides from similar triangles or two sides from the same triangle (may be seen in an equation) e.g $\frac{6}{1.5}$ oe or $\frac{1.5}{6}$ oe or $\frac{5}{6}$ or $\frac{6}{5}$ etc. (accept these written as ratios) M1 for a complete method to find ED A1

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
22		$9x^2 + 7x - 2$	4	M1 for finding an expression for a missing length eg $4x - 1 - x - x$ $(=2x - 1)$ or $x + 2 - 2x$ $(=2 - x)$ M1 for a correct expression for one area from the cross-section, eg. $x \times 2x$ or $(4x - 1)(x + 2 - 2x)$ or for one volume of cuboid(s), eg. $x \times 2x \times (x + 1)$ M1 for a complete method to find the volume A1 for $9x^2 + 7x - 2$ or $(9x - 2)(x + 1)$ oe
23 (i)		38 30	3	M1 for evidence of frequency density calculation, eg 6 on the frequency density axis for the height of the first column or 5 is 1 cm² can be implied by 30 as the second missing frequency A1 for 38 and 30
(ii)		30–50 bar height 0.8 cm		B1 for 30 – 50 bar of height 0.8 cm
24		1.2	3	M1 for $I \propto \frac{1}{d^2}$ or $I = \frac{k}{d^2}$ or $k = Id^2$ or $30 = \frac{k}{2^2}$ or $k = 120$ M1 (dep) for $I = \frac{"120"}{10^2}$ A1 cao

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25		$\frac{52}{72}$	4	B1 for $\frac{3}{8}$ or $\frac{2}{8}$ or $\frac{1}{8}$ seen as second probability M1 for $\frac{4}{9}\times\frac{3}{8}$ or $\frac{3}{9}\times\frac{2}{8}$ or $\frac{2}{9}\times\frac{1}{8}$ M1 for $1-(\frac{4}{9}\times\frac{3}{8}+\frac{3}{9}\times\frac{2}{8}+\frac{2}{9}\times\frac{1}{8})$ or $\frac{4}{9}\times\frac{3}{8}+\frac{4}{9}\times\frac{2}{8}+\frac{3}{9}\times\frac{4}{8}+\frac{3}{9}\times\frac{2}{8}+\frac{2}{9}\times\frac{4}{8}+\frac{2}{9}\times\frac{3}{8}$ A1 for $\frac{52}{72}$ oe OR B1 for $\frac{5}{8}$ or $\frac{6}{8}$ or $\frac{7}{8}$ seen as second probability M1 for $\frac{4}{9}\times\frac{5}{8}$ or $\frac{3}{9}\times\frac{6}{8}$ or $\frac{2}{9}\times\frac{7}{8}$ M1 for $\frac{4}{9}\times\frac{5}{8}+\frac{3}{9}\times\frac{6}{8}+\frac{2}{9}\times\frac{7}{8}$ A1 for $\frac{52}{72}$ oe SCB2 $\frac{52}{81}$ oe

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
26		8	4	M1 for $(2\sqrt{10})^2 - 2^2$ (= 36) A1 for (CD =) 6 M1 (dep on M1) for '6' × 4 – $\frac{1}{2}$ × '6' × 2 – $\frac{1}{2}$ × 2 × 2 – $\frac{1}{2}$ × ('6' – 2) × 4 C1 for area of 8 from fully correct working
27		32 : 45	5	M1 for a correct expression for surface area of the cylinder (=$2\times\pi\times3^2 + 6\pi h$) or surface area of the sphere (=$4\times\pi\times6^2$) M1 (dep) for equating 'surface area of cylinder' and '2 × surface area of sphere', $2\times\pi\times3^2 + 6\pi h = 2\times4\times\pi\times6^2$ M1 (dep) for a method to isolate h M1 for $\pi\times3^2\times$'45' oe and $\frac{4}{3}\times\pi\times6^3$ oe A1 cao

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

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

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

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
1		The enlargement has been drawn on the grid. Grid has been enlarged. Wording has been changed to: 'On the grid there are two shapes, shape X and shape Y. A point A is marked on the grid. Describe fully the transformation that maps shape X onto shape Y.'	B3 for an enlargement of scale factor 3 with centre A (B2 for 2 aspects described) (B1 for 1 aspect described)
4		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.	As standard mark scheme
5		Model provided for all candidates. Diagram enlarged and also provided for MLP. Wording has been changed to: 'They show a prism. An arrow points to the side elevation of the prism. Now look at the three shapes below the diagram of the prism, shape A, shape B and shape C. Which shape A, B or C shows the view from the direction of the arrow? [The three diagrams show: A the front elevation, B the plan and C the side elevation].	B2 for shape C only indicated (B1 for shape C and one other shown)

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
6	(a) (b)	The letter 'a' has been changed to 't' for all candidates. Frequency numbers have been changed to 5, 15, 15, 20, 5. Grid has been 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 with letter change Standard mark scheme Tolerance to **within** half a square
7		Diagram enlarged. Shading changed to dotty shading.	Standard mark scheme
9		Diagram has been enlarged. Wording added 'Angle CEA is marked x.'	Standard mark scheme
10	(a)	Diagram enlarged.	Standard mark scheme
12	(b)	North lines have been extended to 9cm. A line has been added between Y and L and this line has been extended to 9cm. The distance from point Y to T is now 10.8 cm. [Leeway will be needed for answering the question]. '80 km' changed to '100 km'.	M1 for line drawn on a bearing of 320 ±5 drawn A1 for an answer in the range 20 to 30

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
14		Grid has been enlarged. Triangle B and Triangle C have been drawn on the grid. Question changed to: 'A cut out shape has been provided.' '(a) Describe fully the transformation that maps triangle A onto triangle B. (b) Describe fully the single transformation that maps triangle B onto triangle C. (c) Describe fully the single transformation that maps triangle A onto triangle C.	(a) B1 for one aspect of rotation 90°clockwise or centre (0,1) (b) B1 for translation or vector $\begin{pmatrix}-3\\-1\end{pmatrix}$ (c) B1 for rotation of 90°clockwise with centre (−2,2)
	(a) (b)	The table has been turned to vertical format and left aligned. Wording added 'There are four spaces to fill.' Grid has been enlarged.	(a) Standard Mark scheme (b) Standard mark scheme- Allow extra tolerance
18		Diagram enlarged. Lines on the box plot have changed to, '95, 105, 115, 120, 135.'	Boys :Range 40, IQR 15 Standard Mark scheme
21		Diagram enlarged.	Standard Mark scheme

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
22		Model provided for all candidates. Diagram enlarged and also provided for MLP. MLP only: x changed to y.	M1 for finding an expression for a missing length eg $4y - 1 - y - y$ $(=2y - 1)$ or $y + 2 - 2y$ $(=2 - y)$ M1 for a correct eypression for one area from the cross-section, eg. $y \times 2y$ or $(4y - 1)(y + 2 - 2y)$ or for one volume of cuboid(s), eg. $y \times 2y \times (y + 1)$ M1 for a complete method to find the volume A1 for $9y^2 + 7y - 2$ or $(9y - 2)(y + 1)$ oe
23	(i)	Diagram enlarged. Distances have been changed to '30, 40, 30, 20, 20'. Wording added 'There are two spaces to fill.	M1 for evidence of frequency density calculation, eg 6 on the frequency density axis for the height of the first column or 5 is 1 cm² can be implied by 30 as the second missing frequency A1 for 40 and 30
	(ii)	'	B1 for 30 – 50 bar of height 1 cm
24		Braille only: letter 'I' changed to 'S'.	Standard Mark scheme
25		Diagram enlarged.	Standard Mark scheme
26		Diagram enlarged.	Standard Mark scheme
27		Two models provided for all candidates. Diagrams enlarged and also provided for MLP.	Standard Mark scheme

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Mark Scheme (Results)

November 2016

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

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NOTES ON MARKING PRINCIPLES

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

2 Mark schemes should be applied positively.

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

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

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

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

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

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

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

7 With working

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

8 Follow through marks

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

9 Ignoring subsequent work

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

10 Probability

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

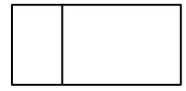
11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any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

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

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

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

Guidance on the use of codes within this mark scheme
M1 − method mark for appropriate method in the context of the question 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 November 2016						
Question		**Working**	**Answer**	**Mark**	**Notes**	**Type**
1	(a)		$7n - 4$	2	B2 for $7n - 4$ (B1 for $7n + k$, $k \neq -4$	G
	(b)	$3 \times 4^2 + 5$	53	2	M1 for $3 \times 4^2 + 5$ A1 cao	G
2	(a)	$7a + 4a - 8b$	$11a - 8b$	2	M1 for $4a - 8b$ A1 for $11a - 8b$	G
	(b)		n^{11}	1	B1 cao	C
	(c)		$5(x + 2)$	1	B1 cao	G
3			74	4	M1 for $200 - \frac{10}{100} \times 200$ (=180) M1 for "180" ÷ (1 + 2 + 7) (= 18) M1 for "18" × (1 + 2) + 20 A1 cao OR M1 for $200 - \frac{1}{10} \times 200$ (=180) M1 for $\frac{7}{10} \times 180$ (=126) M1 for 200 – "126" + 20 A1 cao	E
4			Plan 	2	M1 for 7 × 4 rectangle A1 for correct plan with dividing line	G

PMT

5MB2H November 2016					
Question	**Working**	**Answer**	**Mark**	**Notes**	**Type**
*5	(180 – 120) ÷ 2 = 30 (180 – 30) ÷ 2	75°	4	M1 for method to find angle *ADB* (or angle *ABD*) (180 – 120) ÷ 2 A1 for 75 C1 (dep on M1) for Alternate angles are equal **or** co-interior (allied) angles add up to 180° C1 (dep on M1) for Base angles of an isosceles triangle are equal **and** Angles in a triangle add up to 180°	E
6	30 ÷ 15 = 2 48 ÷ (6 – 2)	12	3	M1 for 30 ÷ 15 = 2 M1 for 48 ÷ (6 – "2") A1 cao	E
*7	120 ÷ 8 × 5 80 + 75 = 155 155 > 150 150 – 80 = 70 70 ÷ 5 × 8 112 < 120	No with reason	3	M1 for method to convert 120 km to miles 120 ÷ 8 × 5 (=75) M1 for 80 + '75' (=155) C1 for No with correct total distances in miles OR M1 for 150 – 80 = 70 M1 for complete method to convert 70 miles to km 70 ÷ 5 × 8 (=112) C1 for No with correct values for distance driven in France and mileage remaining.	E

5MB2H November 2016					
Question	**Working**	**Answer**	**Mark**	**Notes**	**Type**
8	$4 \times 3 = 12$ $2 \times 10 = 20$ $(12 + 20 + 20) \times 1.5$ $8 \times 10 \times 1.5 = 120$ $\frac{1}{2} \times 4 \times 7 \times 1.5 = 21$ $120 - 21 - 21$	78	4	M1 for method to find area of parallelogram or 2 triangles M1 for method to find whole cross sectional area M1 for complete method to find volume A1 cao OR M1 for method to find volume of enclosing cuboid or volume of a single cuboid. M1 for method to find volume of triangular prism(s) or for method to find volume of parallelogram prism(s) M1 for complete method to find volume of prism. A1 cao	E
9	$10 \times 4^2 - 4 - 21 = 135$ $2 \times 4 - 3 = 5$ $135 \div 5 = 27$ $10x^2 - x - 21$ $= (2x - 3)(5x + 7)$ $5 \times 4 + 7$	27	3	M1 for $10 \times 4^2 - 4 - 21$ (= 135) M1 for $135 \div (2 \times 4 - 3)$ A1 cao OR M1 for factorising to give $5x + 7$ or $5x + n$, $n \neq 7$ or $mx + 7$, $m \neq 5$) M1 (dep) for substitution of $x = 4$ into expression for length of rectangle A1 cao	E

PMT

5MB2H November 2016						
Question		**Working**	**Answer**	**Mark**	**Notes**	**Type**
10	(a)(i)		1	3	B1 cao	C
	(ii)		$\frac{1}{25}$		B1 for $\frac{1}{25}$ or 0.04	C
	(iii)		4		B1 cao	C
	(b)		$5a^4b^3$	2	B2 for $5a^4b^3$ (B1 for any two of 5, a^4, b^3 in a product)	E
11			$\frac{29}{35}$	4	M1 for writing both $4\frac{3}{5}$ and $2\frac{2}{3}$ or both $\frac{3}{5}$ and $\frac{2}{3}$, with a common denominator (a multiple of 15) with at least one correct numerator M1 for $4-2+\frac{9}{15}-\frac{10}{15}\left(=\frac{29}{15}\right)$ or $\frac{69}{15}-\frac{40}{15}$ M1 for "$\frac{29}{15}$" $\times \frac{3}{7}$ A1 for $\frac{29}{35}$ oe single fraction	E
12	(a)		0.00023	1	B1 cao	C
	(b)	$5.86 \times 10^6 = 5\,860\,000$ $4\,200\,000 = 4.2 \times 10^6$ 5.3 million $= 5\,300\,000 = 5.3 \times 10^6$	A C B	2	M1 for one correct conversion to or from standard form or answer reversed. A1 for A C B or numbers in correct order	G
13	(a)		(5, 2, 2)	1	B1 cao	E
	(b)		(4, 2, 1)	2	M1 for an answer of (a, 2, 1) or (4, b, 1) or (4, 2, c) or ft from (a) A1 (4, 2, 1) or ft from (a)	E

PMT

5MB2H November 2016					
Question	**Working**	**Answer**	**Mark**	**Notes**	**Type**
*14	360 – 90 – 90 – 110 = 70 180 – 60 – 70 360 – 90 – 90 – 60 = 120 360 – 110 – 120 = 130 360 – 90 – 90 − 130	50°	4	B1 for identifying 90 ° (may be on diagram) M1 for beginning method using *MON* = 110 eg 360 – 90 – 90 – 110 (= 70) M1 for completing method to find *BAC* eg 180 – 60 – 70 (=50) C1 for (angle *BAC* =) 50 and all reasons relevant to method used: Angle between tangent and radius is 90 Sum of angles in a quadrilateral is 360 Angles in a triangle add up to 180 OR B1 for identifying 90 ° (may be on diagram) M1 for beginning method using *NCP* = 60 eg 360 – 90 – 90 – 60 (= 120) M1 for completing method to find *BAC*, e.g. 360 – 110 – 120 = 130 360 – 90 – 90 – 130 (=50) C1 for (angle *BAC* =) 50 and all reasons relevant to method used: Angle between tangent and radius is 90 Sum of angles in a quadrilateral is 360 Angles around a point equal 360	E
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					
Question	**Working**	**Answer**	**Mark**	**Notes**	**Type**
16	$\frac{(\sqrt{5}+\sqrt{5}+6)}{2} \times (\sqrt{5}-2)$ $(\sqrt{5}+3)(\sqrt{5}-2)$ $5+3\sqrt{5}-2\sqrt{5}-6$ $\sqrt{5}(\sqrt{5}-2)+\frac{6(\sqrt{5}-2)}{2}$ $5-2\sqrt{5}+3\sqrt{5}-6$	$\sqrt{5}-1$	3	M1 for $\frac{(\sqrt{5}+\sqrt{5}+6)}{2} \times (\sqrt{5}-2)$ M1 for expansion $5+3\sqrt{5}-2\sqrt{5}-6$ with 3 terms out of 4 correct including signs or all 4 terms correct ignoring signs A1 cao OR M1 for $\sqrt{5}(\sqrt{5}-2)+\frac{6(\sqrt{5}-2)}{2}$ M1 for expansion $5-2\sqrt{5}+3\sqrt{5}-6$ with 3 terms out of 4 correct including signs or all 4 terms correct ignoring signs A1 cao	E
17	$\frac{-2}{6}=\frac{-1}{3}$ $1=3\times 3+c$	$y=3x-8$	4	M1 for gradient $\frac{-2}{6}$ M1 for use of $\frac{-1}{m}$ for perpendicular line M1 for substitution of (3,1) into their equation A1 for $y=3x-8$ oe	E



Mark Scheme (Results)

Summer 2017

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



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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.

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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

Paper: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (non-overlapping and exhaustive) [Do not allow inequalities in response boxes]
2			555	3	M1 for recognising that 1295 is 70% eg 70% = 1295 M1 for 10% = 1295 ÷ 7 (=185) or 1% = 1295 ÷ 70 (=18.5) or $1295 \times \frac{3}{7}$ oe or (1295 – 185) ÷ 2 or $1295 \times \frac{10}{7}$ oe (=1850) A1 cao
3		**£:** 189 ÷ 1.39= 135.97 174 ÷ 1.27 = 137.01 **SF:** 115 × 1.39 = 159.85 174 ÷ 1.27 × 1.39 = 190.44 **€:** 115 × 1.27 = 146.05 189 ÷ 1.39 × 1.27 = 172.68	London with correct comparable figures	3	M1 for method to convert one price to another currency, eg 189 ÷ 1.39 M1 for a complete method leading to 3 prices in the same currency or to figures that can be used to compare the 3 prices A1 for London and correct comparable figures (accept rounded or truncated to the nearest unit)
4	(a)		positive	1	B1 cao
	(b)		17 – 21.5	2	M1 for a single line segment with positive gradient that could be used as a line of best fit or a horizontal line from 21 or a point plotted at (x, 21) where x is in the range 17 – 21.5 A1 for answer in range 17 – 21.5

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*5		$x = 30^o$ with complete reasons	4	M1 for a correct first step, eg angle *GED* = 55 or angle *GAD* = 55 or angle *EGA* = 180 – 55 (= 125) A1 for 30 C2 for 30 with full reasons, appropriate to their given method eg alternate angles are equal **and** corresponding angles are equal **and** angles on a straight line add up to 180 eg corresponding angles are equal **and** angles in a triangle add up to 180 **and** alternate angles are equal (C1 (dep on at least M1) for one appropriate reason relating to parallel lines or opposite angles of a parallelogram)
6		23	3	M1 for method to find difference in cost, eg 23×24 – 425 (= 127) or for 425 ÷ (23×24) (= 0.7699...) or 24 – (425 ÷ 23) (=5.52…) M1 for $\frac{"127"}{"552"} \times 100$ oe or or 100 – "0.7699 "×100 or $\frac{"5.52"}{24} \times 100$ A1for answer in range 23 – 23.01
7		Correct region	3	B1 for perpendicular bisector of the line *AB* B1 for arc of circle centre *B* radius 4 cm B1 for shading correct region

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
8 (a)		$6ab - 7g$	2	M1 for $6ab$ or $-7g$ A1 cao
(b)		$3(2m - 3)$	1	B1 cao
(c)		t^5	1	B1 cao
(d)		$2xy(x + 2y)$	2	B2 cao (B1 for $xy(2x + 4y)$ or $2x(xy + 2y^2)$ or $2y(x^2 + 2xy)$ or $2xy(\ldots)$ where $(\ldots)$ has two terms one of which is correct)
(e)	$w^2 - 5w - 5w + 25$	$w^2 - 10w + 25$	2	M1 for all 4 terms (and no additional terms) correct with or without signs or 3 out of no more than 4 terms correct with signs A1 cao
9		Correct position of C	3	M1 for line drawn or point marked on a bearing of 130° from A M1 for line drawn or point marked on a bearing of 245° from B A1 for correct position of C
10		72	4	M1 for "x" + 24 or "x" – 24 or for "g" and 5"g" M1 for forming an appropriate equation eg $x + 24 = 5(x - 24)$ or for $(5g - g) \div 2 = 24$ or $g = 12$ M1 for correct operations to isolate x terms and non-x terms in an equation of the form $ax + b = cx + d$ or $ax + b = c(x + d)$ or $x = 36$ or for $6 \times$ "12" oe A1 cao

Paper: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*11			No (supported)	5	M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 (dep M1) for method to find number of rolls required for their perimeter, eg "their total perimeter" ÷ 2.4 eg 25.99..÷2.4 (=10.8), "47.97.."÷2.4 (=19.9) or "43.47.." ÷2.4 (=18.3) M1 for method to work out cost eg 3×10 + 2×3.99 (= 37.98) or 11 × 3.99 (=43.89), 20 →67.98, 19→63.00 or for method to find how many rolls can be bought for £35 (= 10) C1 for a conclusion supported by fully correct answers eg 37.98 (for comparing with 35) e.g 10.8 and 10 OR M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 for a method to find how many rolls can be bought for £35 (=10) M1 for a method to work out the coverage of 10 rolls e.g. 10 × 2.4 (=24) C1 for a conclusion supported by fully correct answers eg 25.9(...) and 24
12	(a)		$1.40 \leq h < 1.50$	1	B1 any unambiguous description of the correct interval
	(b)	1.35 × 11 = 14.85 1.45 × 9 = 13.05 1.55 × 7 = 10.85 1.65 × 6 = 9.9 1.75 × 2 = 3.5	1.49	4	M1 for fx consistently within interval including ends (allow 1 error) M1 consistently using appropriate midpoints M1 (dep on first M1) for $\Sigma fx \div \Sigma f$ eg 52.15 ÷ 35 A1 cao

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
13	$x = 2$ gives 10 $x = 3$ gives 30 $x = 2.1$ gives 11.(361) $x = 2.2$ gives 12.(848) $x = 2.3$ gives 14.(467) $x = 2.4$ gives 16.(224) $x = 2.5$ gives 18.(125) $x = 2.6$ gives 20.(176) $x = 2.7$ gives 22.(383) $x = 2.8$ gives 24.(752) $x = 2.9$ gives 27.(289) $x = 2.61$ gives 20.3(89..) $x = 2.62$ gives 20.6(04..) $x = 2.63$ gives 20.8(21..) $x = 2.64$ gives 21(.039..) $x = 2.65$ gives 21.2(59..)	2.6	4	B2 for a trial $2.6 \leq x \leq 2.7$ evaluated (B1 for a trial $2 \leq x \leq 3$ evaluated) B1 for a different trial $2.6 < x \leq 2.65$ evaluated B1 (dep on at least one previous B1) for 2.6 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but correct to 1dp (rounded or truncated) if the value of x is to 2 dp. NB: no working scores no marks even if the answer is correct.
*14		Simple with correct comparable values	4	M1 for a method to calculate 2.15% or 2.3% or 102.15% or 102.3% of 15000 M1 for a complete method to calculate using a compound interest rate of 2.15% for 3 years eg 1.0215^3 (=1.065(89…)) or $1.0215^3 \times 15000$ (=15988.45) M1 for a complete method to calculate using a simple interest rate of 2.3% for 3 years e.g $1+0.023 \times 3$(=1.069) or $15000 + 0.069 \times 15000$ (=16035) or 0.023×3 C1 for a correct decision in a statement based on their two accurate comparable values eg 16035, 15988 to 15988.50 or 1035, 988 to 988.50 or 1.065(89...), 1.069 or 6.6%, 6.9 %

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
15		100	4	M1 for 360 ÷ 9 (= 40) or (9 – 2) × 180 (= 1260) M1 (dep) for 180 – "40" or "1260" ÷ 9 (= 140) oe M1 (dep M2) for a complete method to find the required angle, eg "140" – (360 – "140" – "140") ÷ 2 or ("140" ÷ 7) × 5 A1 for 100 supported by working
*16		No with correct calculations	5	M1 for splitting the cross section into separate areas and a method to find the area of one part OR for splitting up the pool into smaller prisms and a method to find the volume of one prism, e.g. a cuboid M1 (dep) for a complete method to find the cross-sectional area OR for a method to find the volume of more than on prism M1 (dep) for a complete method to find the vol of the pool (= 70 (m^3) OR for a complete method to find the depth of 60000L of water M1 for method to find figure for comparison, eg distance between surface and top of pool ("70" – "60") ÷ (5 × 10) C1 No, with correct calculations, eg water level is 20cm below top of pool

Paper: 1MA0/2H				
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 $m = \frac{2E}{v^2}$
18		8.4	3	M1 for using $d = m/v$ e.g. $11.34 = 74 / V$ or vol. of lead (= 6.5(25...) or vol. of tin (= 17.2(3...) M1 (dep) for a complete method using 200 ÷ "total volume" A1 for answer in range 8.4 to 8.44
19 (a)		0.98 0.95, 0.05, 0.95	2	B1 for 0.98 oe for machine A B1 for 0.95, 0.05, 0.95 in correct positions for machine B
(b)		0.069	3	M1 for 0.02 × 0.05 or 0.02 × "0.95" or "0.98" × "0.05" or "0.98" × "0.95" M1 for 0.02 × 0.05 + 0.02 × "0.95" + "0.98" × "0.05" or 1 – "0.98" × "0.95" A1 for 0.069 oe

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
20		3072	3	M1 for $12 = \frac{k}{8^2}$ or 12×8^2 (= 768) oe or $(8\div 0.5)^2$ (= 256) M1 (dep) for substituting into $T = \frac{k}{d^2}$ e.g $(T =)\frac{"768"}{0.5^2}$ oe eg $12\times 8^2 \div 0.5^2$ oe A1 cao
21	$\frac{-3\pm\sqrt{3^2-4\times 2\times -7}}{2\times 2}$	1.27, −2.77	3	M1 for substitution of $a = 2$, $b = 3$, $c = -7$ (condone one sign error) M1 for $\frac{-3\pm\sqrt{65}}{4}$ A1 for solutions in range 1.26 to 1.27 **and** –2.76 to –2.77
22		$\frac{528}{167}$	3	B1 for 37.55 or 37.65 or 11.25 or 11.35 or 8.35 or 8.45 M1 for $\frac{37.65-11.25}{8.35}$ for $\frac{v_{ub}-u_{lb}}{t_{lb}}$ where $37.6 < v_{ub} \leq 37.65$ and $11.25 \leq u_{lb} < 11.3$ and $8.35 \leq t_{ub} < 8.4$ A1 for answer in range 3.16 to 3.162 from correct working
23		0.94 or 94% or $\frac{76}{81}$	3	M1 for method to work out total area eg 1.3×10 + 3.2×5 + 3.6×5 + 2.4×10 + 0.5×20 (=81) or area up to 100 grams eg 1.3×10 + 3.2×5 + 3.6×5 + 2.4×10 + 0.5×10 (=76) (In either case allow one error in reading a bar height) M1 for 1 – ((0.5×10)/"81") oe or for method to work out the total area and the area up to 100 grams (In both cases allow one error in reading a bar height) A1 for answer in range 0.938 to 0.94 or 93.8% to 94% or $\frac{76}{81}$ oe

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
24		$y = \frac{1}{4}x + 5$	4	B1 for $m = -4$ M1 (indep) for gradient of perpendicular $= -\frac{1}{"-4"}$ or $\frac{1}{4}$ M1 (dep on previous M1) for substituting $x = -8$, $y = 3$ into $y =$ "$\frac{1}{4}$"$x + c$ A1 for $y = \frac{1}{4}x + 5$ oe SC If M0 is scored then B2 for $y = -\frac{1}{4}x + 1$

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25		41.6	6	M1 for $0.5 \times 5.4 \times 7.3 \times \sin B = 19$ M1 for $(B =) \sin^{-1}\left(\frac{19}{0.5\times5.4\times7.3}\right)$ oe $(= 74.6)$ M1 for $(AC^2 =) 5.4^2 + 7.3^2 - 2\times5.4\times7.3\times\cos$ "74.6" M1 (dep) for correct order of evaluation or 61.(479…) M1 for $\frac{\sin C}{5.4} = \frac{\sin "74.6"}{"7.84"}$ oe or $0.5\times7.3\times$ "7.84" $\times \sin C = 19$ A1 for answer in the range 41.55 to 41.65 from correct working OR (with perpendicular from C meeting AB at a point X) M1 for $0.5 \times 5.4 \times CX = 19$ M1 for $(CX =) \frac{19}{0.5\times5.4} (= 7.037...)$ M1 for $BCX = \cos^{-1}\frac{"7.04"}{7.3} (= 15.425…)$ M1 for $(BX =) \sqrt{7.3^2 - "7.04"^2}$ $(= 1.94…)$ M1 for $ACX = \tan^{-1}\frac{5.4-"1.94"'}{"7.04"} (= 26.17…)$ A1 for answer in the range 41.55 to 41.65 from correct working

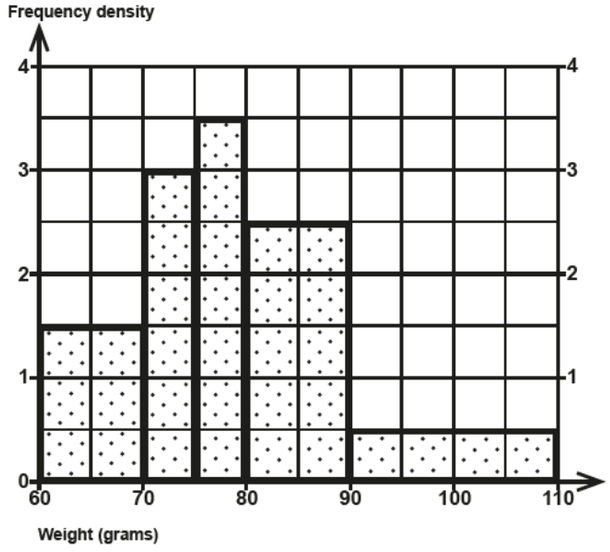
Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25 cont.				OR (with perpendicular from A meeting BC at a point Y) M1 for $AY = \frac{19}{7.3 \div 2} = 5.20547..$ M1 for $BY = \sqrt{5.4^2 - "5.20547"^2}$ $(= 1.43630..)$ M1 for $CY = 7.3 - "1.43630.."$ $(= 5.86369...)$ M1 for $\tan C = \frac{"5.20547.."}{"5.86369"..}$ $(= 0.8877..)$ M1 for $C = \tan^{-1} "0.8877.."$ A1 for answer in the range 41.55 to 41.65 from correct working

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**	**Mark scheme notes**
4		Diagram enlarged. Axes labels moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Crosses have been changed to solid dots. In (b) the number 21 cm has been changed to 20 cm.	Standard mark scheme but in (b) the range used should be 20 - 24
5		Diagram enlarged. Angle sizes have been moved outside of the angle arcs and the arcs have been made smaller.	Standard mark scheme
7		Point B has been moved so the distance between A and B is 8 cm. Points A and B have been joined with a line. 40 km changed to 60 km. The scale has been moved above and to the left of the diagram.	The standard mark scheme can be applied in principle, with some adjustment. eg the use of a circle centre B which now has a radius of 6 cm instead of 4 cm.
8	(a)	MLP and Braille: *a* changed to *p*, *b* changed to *q* and *g* changed to *n*.	M1 for $6pq$ or $-7n$ A1 for $6pq - 7n$
9		North lines extended to 9 cm to allow for use of specialist equipment. Wording 'with a cross (x)' removed.	Standard mark scheme.
10		Diagram enlarged. Braille only: will add information about the diagram into the question wording.	Standard mark scheme
11		Diagram enlarged. Arrows removed from 2 m. Open headed arrows for 5 m. Dot has been made bigger. Information removed from the box and written as a sentence in the question wording.	Standard mark scheme
12		Frequency column has been widened to allow for working.	Standard mark scheme.
13		MLP only: *x* changed to *y*.	Standard mark scheme but *x* changed to *y*
15		Diagram enlarged.	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Mark scheme notes**
16		Model provided for all candidates. Diagram enlarged and also provided for MLP.	Standard mark scheme
17		MLP only: *x* changed to *y*.	Standard mark scheme but *x* changed to *y*
19		Diagram enlarged. Wording added 'There are four spaces to fill.' Braille only: answer lines labelled from (i) to (iv).	Standard mark scheme
23		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Points on the histogram moved: 60-70 has moved up to 1.5 70-75 has moved down to 3 75-80 has moved down to 3.5 80-90 has moved up to 2.5 90-110 has stayed the same (0.5)  	M1 for method to work out total area, eg 1.5×10 + 3×5 + 3.5×5 + 2.5×10 + 0.5×20 (=82.5) M1 for 1 – ((0.5×10)/"82.5") oe A1 for answer in range 0.939 to 0.94 or 93.9% to 94% or $\frac{31}{33}$ oe
25		Diagram enlarged. Wording added 'BA = 5.4 cm, BC = 7.3 cm'.	Standard mark scheme

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Question 19

3D trigonometry always poses a problem for all but the most able students, but again, it was good to see the majority of students attempting the problem, with most able to score at least one mark for either splitting DA in the correct ratio, or for using tan correctly to find BE. However, it is apparent that many students did not even know which angle they were trying to calculate. Also, several found AE which is not in the required triangle and so, on its own, was not enough for a mark. An impressive number of students were able to take the next step and have a correct process to find either MB or ME and gain two marks. It was at this stage that the vast majority of students struggled to get further, with many pupils incorrectly identifying and finding EMA. The final process mark was for a correct trigonometric statement involving angle EMB, which could be gained from numerous routes through the diagram.

Question 5

180 – 75 – 51 = 54 was the common first step seen but many saw this as a method to find the required angle *BDC* incorrectly using 'angles on a straight line'. Some correctly found angle *ACB* = 54° but could go no further and for those that did arithmetic errors were often seen preventing a complete and correct solution. Some students were unable to deal with the ratio and often 54 was simply halved. Others assumed that angle ADC or BDC was 90 degrees.

Question 8

The modal score for this question was full marks. When full marks was not obtained most students were able to obtain the first mark, but fewer could correctly identify the value of the interior or exterior angle of a pentagon without contradiction or error. Many either didn't know how to find the interior or exterior angle or divided 360 by the number of sides but thought that gave them the size of an interior angle, this was often shown by incorrect placement on the diagram.

A common incorrect response was $72 - 63 = 9^{o}$ Some students gave reasons for their calculations, even though not asked for. Students are reminded to carefully read the question being asked.

Question 6

In this question the use of 3 letter angle notation was generally very good and many students also wrote the sizes of angles on the diagram. For the first method mark it was necessary to use parallel lines to find an angle, e.g. angle *AEB* = 63º or angle *BCD* = 32º. Students that did use angles on parallel lines correctly were often able to show a complete method to find the size of angle *EAB*. Some solutions, though, were spoilt by arithmetic errors. Students who made a start by using angles on a straight line to find that angle *ABE* = 32º and then failed to make any further correct progress got no marks. Many students made incorrect assumptions about other angles, e.g. angle *AEB* = 32º or angle *BCD* = 63º. This question required students to give reasons for each stage of their working. It was encouraging to see responses with all the appropriate reasons but unfortunately many students were not able to give all the necessary correctly worded reasons. Reasons given must include the key words underlined in the mark scheme so a statement such as "There's 180º in a triangle" is not acceptable because it does not include a reference to angles. Many students were not able to give a correct reason relating to parallel lines. Corresponding angles or co-interior angles were often incorrectly named and statements such as "Parallel so angles are the same" were often seen. Some students gave no reasons at all.

Question 5

It was pleasing that many students gained full marks for finding the value of x, often making use of the diagram as part of their working. The first step for many was to use $(n – 2) \times 180°$ to find the sum of the interior angles of the hexagon or the pentagon and then divide by the number of sides to find the size of an interior angle. Students who used this approach to find the interior angles often went on to show a complete method. Arithmetic errors, particularly when dividing 540 by 5, were quite common. However, these students were still credited with the methods marks. The division of 540 by 5 sometimes resulted in 18 or 180 yet neither of these values is a sensible size for the interior angle of the pentagon and should have alerted students to a problem. Alternatively, some students started by working out $360 \div 6 = 60$ and $360 \div 5 = 72$. Those who realised that these calculations give the sizes of the exterior angles usually went on to get full marks but a significant number of students used them as interior angles and gained no marks. Contradictions on the diagram were common.

Question 20

Three dimensional Pythagoras and Trigonometry is always a challenging subject for candidates, and so it proved again. However, it was good to see many make a start and gain some credit. A decent number of candidates were able to complete a process to find *AF* using Pythagoras. It is worth noting, that at this grade a full process was required for a single mark, whereas at a lower level we may see 2 marks for Pythagoras. The step that troubled many was knowing to, and how to, find *FH*. Many took the base to be square and incorrectly used Pythagoras rather than Trigonometry. Of those who recognised the need to use trigonometry, far too many chose the wrong ratio, and were unable to gain further credit. The final step was for a correct trigonometry statement involving angle *FAH*. This was however, dependent on the processes for any values used in this step being correct, which was normally not the case.

Question 26

This question, not surprisingly attracted only a small proportion of fully correct answers. However, it is encouraging to report that a much higher proportion of candidates scored some credit for their attempts. Many candidates identified the need to use the angles of the heptagon and scored a mark for a correct process to find the size of each interior angle or the size of each exterior angle. A small number of candidates worked out the size of an angle but wrongly assigned it, for example marking 51.4° on the diagram as an interior angle. A good number of candidates also realised that they needed to form an equation by using the area of the triangle, given as 30 cm^2 in order to make progress towards finding the length of GB. Some candidates did this successfully but few candidates were able to get any further.

Summary

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

- carry out a common sense check on the answers to calculations
- read questions where a written explanation is expected very carefully and check your answer matches the question asked
- practise less straightforward problems which involve working with a combination of algebra or geometry or probability with ratio
- improve your skills in dealing with the conversion of units
- ensure you know how to write down an error interval when a number has been truncated
- practice writing proofs of congruence in geometry

Question 10

It was pleasing that many students gained full marks for finding the size of angle *AED*. Those who gained the first mark for using $(n – 2) \times 180$ to find the sum of the interior angles of the pentagon or for stating that the sum of the interior angles is 540 usually went on to make further progress. After subtracting 365 from 540 to find the sum of the two unknown angles some students divided the result by 4 instead of by 5. Some who did divide by 5 then decided that angle *AED* = 35 and lost the final mark. Arithmetic errors, particularly when subtracting 365 from 540 or dividing 175 by 5, were quite common. However, students making these errors could still be credited with the process marks if their intended calculations were shown. Some students relied on memory to give the sum of the interior angles of a pentagon and stated an incorrect figure such as 520, 560, 580 without working and gained no marks. A small number of students used an exterior angle approach and subtracted the three exterior angles from 360 to leave 185 to gain two marks but very few went beyond that.

Question 22

Many students drew the lines *FC* and *AC* on the diagram and identified *ACF* as the angle they were attempting to find. Those who drew only the line *FC* often failed to identify angle *ACF*. After identifying the correct angle some students made no further progress and attempts at using Pythagoras were quite common. About half of those who got the first mark, often for a statement such as $\sin x = \frac{6.8}{13.6}$ or $x = \sin^{-1}\left(\frac{6.8}{13.6}\right)$, were then able to give a correct answer. Some students evaluated 6.8 ÷ 13.6 incorrectly, obtaining 2 for example, but many did not attempt to simplify $\frac{6.8}{13.6}$. Had students recognised that 6.8 is half of 13.6 more might have gained the second mark. Some that did get to $\sin x = \frac{1}{2}$ then gave an answer such as 45 or 60. Students who gained the first mark for a correct sine rule statement were often unable to rearrange this correctly to find the value of *x*. Some students presented the exact trig values in tabular form but were unable to apply them to the question.

Question 24

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

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

Summary

Based on the performance on this paper, students should:

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

Question 3

This question proved to be a good discriminator of attainment at the lower grades awarded in this paper. It provided the opportunity for students to choose one of several routes to find the size of the angles in triangle *ADC* and hence show the triangle was isosceles. There were many clear and complete answers comprising of accurate working, the marking of angles on the diagram and well expressed reasons. Some students were less successful in giving a reason linked to parallel lines. The majority of students used a chain of reasoning which included finding angles *CFG*, *ACD*, and *ADC* before using "Angles in a triangle add up to 180" to show angle *CAD* was equal to angle *ACD* and hence the triangle was isosceles. Sometimes a single letter was used to describe an angle. Students should avoid this as it can be ambiguous. Similarly, reasons were not always linked clearly to working seen or to the size of angle found. Common errors made included showing that triangle *AFG* (not *ACD*) was isosceles, assuming that angles *ACD* and *ADC* must be equal and assuming that the triangle *ACD* was isosceles in order to find the size of angle *CAD*.

Question 24

This question discriminated well between students working towards the higher grades. Many students were able to use the given ratio in order to work out the length of AP and so gain the first mark. Only a handful of students awarded one mark out of four were awarded this mark for identifying the angle between TP and the base of the prism on the diagram. Significantly fewer students than those who gained one mark showed a correct method to find either the length MP or the length TP so that they could use trigonometry to find angle TPM. Those students who did get that far usually completed the question successfully. Many students mistakenly worked towards finding the size of angle TPA and so usually restricted the marks they could be given to 1 mark.

Summary

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

- practice working with time conversions, particularly converting a number of hours expressed in decimal form to hours and minutes
- improve your skills in dealing with the conversion of units in the context of area problems
- ensure you take into consideration whether the gradient of a straight line is negative or positive when you are finding its equation
- practice using the quadratic formula to solve a quadratic equation, particularly when you are asked to give your solution to a certain degree of accuracy.
- remember that when you multiply through an equation or a formula by a constant you must multiply every term by that constant

Question 7

There were three main ways of completing this problem. The first, and most common, was to form an equation by summing all angles to 360°. The second was to assume it was a trapezium and set one pair of co-interior angles to 180°, and the third was to set both pairs of co-interior angles equal to each other. An equation to equate one of these was needed to score any marks.

In the case of the first two approaches, to gain the final mark, substitution to show the angles were co-interior was required, as was some form of explanation. In the third approach an explanation was enough for the final mark.

Many students gained 3 marks by forming a suitable equation and solving to get $x = 25$. However, the final mark was often harder to come by, with the most common approach showing that if $x = 25$ the angle sum is 360° and hence it is a trapezium. Obviously, the angles summing to 360° is not sufficient to show it is a trapezium.

A notable amount of students added opposite angles equal to 180 to try to solve for x, showing they are unclear of the properties of a trapezium.

Question 4

This question was not answered as well as might have been expected for an early question on the paper. It is a little different to the usual type of question assessing angles on parallel lines because the sizes of the angles are given with letters rather than numbers. Those learners that earned the method mark usually did so for indicating that angle $ACD = e$, which was often marked on the diagram. Stating that angle ADC + angle $BAD = 180$ was seen less often.

Relatively few learners managed to find an expression, in terms of e, for the size of angle CAD. Some got as far as $4e + x = 180$ but gave this as their final answer or rearranged it incorrectly. The C mark was awarded for an appropriate reason relating to parallel lines and most commonly this was 'alternate angles' to explain why angle $ACD = e$. For this angle, 'corresponding angles' was a common incorrect reason given. A large number of learners failed to gain any marks at all. Some marked angle ABC as $3e$ on the diagram but made no correct progress using angles on parallel lines. Many seemed to think that they needed to find a value for e.

Question 6

It was pleasing that many learners gained full marks for finding the size of angle a. Those that gained the first mark for using $(n - 2) \times 180$ to find the sum of the interior angles of the pentagon or for stating that the sum of the interior angles is 540 often went on to make further progress. Starting a process to give each angle in a common form earned the second mark and many did this by writing $d = 3c$ or $e = 2c$. Some wrote the angles in terms of a different variable such as x. This was often followed by an equation, e.g. $c + c + 3c + 2c + 155 = 540$, which earned the third mark. Common errors at this stage were to omit one 'c' or two 'c's from the equation or failing to change the given 'a' to 'c' thereby keeping two variables in the equation and not earning the third mark. Many of those with a correct equation went on to give a correct final answer but arithmetic errors, particularly when subtracting 155 from 540 or dividing 385 by 7, were quite common. Learners making these errors could still be credited with the process marks if their intended calculations were shown. After gaining the first mark some learners did not show a process to write each angle in a common form but resorted to a trial and improvement approach and gained no more marks. Those who relied on memory for the sum of the interior angles of a pentagon and stated an incorrect figure were still able to earn the second and third marks.

Question 6

Many responses were able to make a good start by finding the interior angle of the regular polygon. This was often marked on the diagram. The next step for many was to work with the sum of the interior angles. Some responses used $(n – 2) \times 180°$ to form an equation, which gained the second mark, and those who did often went on to solve the equation and find the value of n. Those who didn't form an equation often used $(n – 2) \times 180°$ to trial different angle sums and were often successful in finding $n = 12$. This question instructs candidates to show all their working so, to score full marks, an answer of $n = 12$ had to be supported by the award of the first two marks or by $1800 \div 150 = 12$ or equivalent. Some responses with the correct final answer of 12 obtained only one mark or no marks because they did not contain sufficient supportive working. Those responses that worked with the exterior angle had a much quicker route to the solution, $180 – 150 = 30$ and $360 \div 30 = 12$. In many weaker responses, angles of 60 and 90 were often marked on the diagram but not added to give the interior angle of the polygon and these responses gained no marks.

Question 19

This 3D geometry problem was challenging and those learners that gained full marks should be congratulated.
One thing that affected learners and caused them to potentially lose marks was, like with question 7, the use of inefficient methods. It sometimes meant learners carried out 5 or more calculations when only 3 were needed. Again, like with question 7, these approaches, normally with an initial step of Pythagoras, are perfectly acceptable, but give further opportunities for arithmetic or calculative errors, and often premature rounding causing a lack of accuracy.
The question carried 3 process marks, and the first two could be awarded in either order. The first was to use cos to find the length GE. The second was to use tan to find the length of BG.
The final process was to combine these two lengths with tan to find the desired angle.

Question 23

The final question was a 5-mark question requiring learners to use the cosine rule to find a diagonal that splits the quadrilateral in half, followed by 2 steps of the sine rule to find the desired angle.
The mark scheme progressed thus: the first 2 marks for correctly using the cosine rule to find BD. Once BD was found, this length, along with those lengths and angles given on the diagram, could be used to find angles ABD and DBC which together make ABC.
Firstly, it was pleasing to see so many learners attempting this question, with much fewer blank responses as we often see on the last question.
Those who knew to find BD, often gained both the first 2 marks for being able to correctly use the cosine rule, although we did see some calculative errors.
Even if it was incorrectly found, a value clearly believed to be BD, could be used in the two sine rule calculations and gain those marks.
The less successful responses made the incorrect assumption that angle ADC was $90°$, and used Pythagoras with the lengths of 6 and 9 to find the length AC. Making this assumption actually led to a length of $\sqrt{117}$ which was exactly the value for BD. However, since this method is incorrect it gained no marks.

Summary

Based on the performance on this paper, learners should:

- Remember not to round prematurely, and only do so once they reach their final answer
- When using trigonometry try to use the most efficient methods to not waste time and lesson opportunities for errors
- Gain more exposure to reverse % calculations including when expressed as a fractional change
- Check work for obvious errors and copy answers carefully within the stages of working, and to the answer line
- Gain an appreciation of the nature of an answer required ‘in exact form’ ie including surd or index form, and not a rounded value
- Use diagrams and explanation in their method to exemplify their work
- Note the definition of a C (communication mark): it is awarded for a fully correct answer/statement given with no contradiction or ambiguity; a correct answer/statement given with an incorrect statement will be awarded C0, so take care in succinctly writing their correct response to these questions.
- Appreciate the use of a box plot to split data into quartiles
- Recognise the use of a factorised expression for solving equations and inequalities



Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 3H

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GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Higher Paper 3

Introduction

Most students entered for this examination presented their working in a clear and logical way and worked accurately to demonstrate a good performance overall. Questions where this was not quite so evident included Q6 (surface area) and Q20 (simultaneous equations). Only a small proportion of students presented weak scripts, suggesting that most students who sat this paper were entered appropriately for the higher tier.

The paper gave the opportunity for students of all abilities to demonstrate positive achievement. All questions were accessible to some students but as you would expect there were relatively few students able to work confidently on all questions.
In particular, Q1 (Venn diagram), Q7 (use of a calculator), Q8a (Pythagoras's Theorem), Q11 (speed, distance, time) and Q18a (cubic expansion) were answered well by a large majority of students whereas Q14 (using areas and ratio), Q18b (solution of a quadratic inequality), Q20 (simultaneous equations), Q22 (circle problem) and
Q23 (trigonometry) proved more of a challenge to students.

The time allowed for the examination appears to have been sufficient for most students to complete the paper.

Report on Individual Questions.

Question 1

This question provided a good start to the paper. Nearly all students gained some credit for their answers with most students scoring at least four of the five marks available. Part (a) of this question requiring students to complete the Venn diagram was generally well done though some students did make careless errors when placing the numbers within set A and/or set B. A significant number of students wrote all of the numbers 1
to 9 in the region $(A \cup B)'$.
Part (b) of the question was answered quite well and many students benefited from the mark scheme which allowed a follow through from part (a). It was not unusual for students to gain part marks in part (a) followed by full marks in part (b). Some students reverted to using the sets listed rather than their Venn diagram to answer part (b). A common error was for students to give $\frac{6}{9}$ as their answer to this part presumably because students had confused intersection with union.

Question 2

This question was a good discriminator. About one third of students entered for the examination scored full marks for their responses to this question testing compound interest. Students generally used a multiplier approach though students frequently used an incorrect multiplier, for example 1.15 A very common error was for students to give 212272.71 as their answer, the total value of the savings after 4 years and not the interest earned over the period. This answer was awarded two of the three marks available. A great majority of students got at least one mark for

the interest earned in the first year. Very few students lost the accuracy mark for not using correct money notation, that is for giving an answer to more than 2 decimal places.

Question 3

A majority of students scored full marks on this question. The most common error seen in part (a) was to give $30 < h \leq 40$ as the class in which the median lies. Common errors in drawing the frequency polygon included plotting points at the upper or lower boundary of each interval instead of the midpoint and joining the points with a curve, not straight lines. Points were generally carefully plotted at the correct heights.

Question 4

This question was quite well answered and descriptions of the things wrong with the time series graph were generally well described. There were a variety of possible acceptable answers but students needed to state them clearly and unambiguously. For example, “the axis does not start at 0” would not be worthy of any credit but “the y axis does not start at 0” would score a mark. Similarly, “the scale on the x axis” would not be enough but “it is not clear what the 2, 3, 4 on the x axis means” would get a mark. A number of students stated there should be a line of best fit drawn. This was not an acceptable response.

Question5

A good discriminator, this question attracted many concise and fully correct solutions. Despite there being a number of possible routes that students could take, there were also many incorrect or incomplete solutions. The most common approach was to use the total of the angles in a hexagon together with the relationship between angles BCE and CDE to work out the size of angle AFE. The most commonly seen alternative route was to use the symmetry of the hexagon to form two pentagons and work from there. A minority of students joined the points F and C and found the size of angle BCE. These students did not usually make significant further progress beyond labelling angles BCD and CDE as $2x$ and x respectively. A surprising number of students marked angles BCD and CDE as x and $2x$ respectively. In most cases, however, labelling of the diagram proved to be a help to students and is to be encouraged. About two in every five of students obtained full marks for their solution to this question.

Question 6

This question was also a good discrminator. Unfortunately, a significant proportion of students calculated the volume of the cylinder rather than the surface area and so could not be awarded much credit for their responses. However, there were many fully correct and complete solutions usually comparing the total surface area of the 3 tanks with the total surface area which could be covered with 7 tins of paint but sometimes comparing the number of tins of paint needed to paint the three tanks with the 7 tins of paint available to Jeremy. A good proprtion of students calculated the surface area of only one end of the cylinder or tried to combine the area of one or two ends with a volume or with an incorrect “area” found by calculating 1.6 by 1.8. It was pleasing to see that students often worked with exact expressions in terms of π, thus avoiding the need to round values in intermediate working and minimizing the risk of errors when calculating and writing down decimal values from calculators.

Question 7

This question was done well by the great majority of students who were awarded both marks. Some students gave an answer of 0.32 believing this was correct to 3 significant figures. These students were given full marks provided they had shown a more accurate version of the answer in the working space. The request to give the answer correct to 3 significant figures served as a guide to students and correct answers given to more than 3 significant figures gained full credit. Students are therefore advised to write down their full calculator display before rounding.

Question 8

A large proportion of students were able to score at least one mark for their responses to this question. Responses were usually clearly expressed.
Part (a) was answered well. The most common description of the mistake that Sarah made was to state that the first line should read $BC^2 = AC^2 - AB^2$ or equivalent, for example that she should be subtracting not adding the numbers. A common but unacceptable response was that the mistake was not to show the square root sign over the 100.
Part (b) was also answered well with most students stating that the scale factor is 2.5 and not 1.5 as required and many other students who explained that the length of one side of the enlarged triangle was incorrect together with a statement of what the length should be. The most common unacceptable response referred to C being the wrong centre of enlargement.

Question 9

This question was not well answered in general though there were many clear and concise responses which earned full marks. Many students were able to make a start by stating that 54 (6×9) machine days were needed to make all the boxes. A much smaller proportion of students could make further progress. The most common strategy used by students who successfully solved the problem was to identify that 42 machine days were needed in addition to the first 3 days and then that 42 machine days is equivalent to 7 days with all the machines working. A small number of students who used this approach gave 7 as their final answer instead of the correct 10 days (3 + 7). The most able students were able to identify that 6 machine days were lost in the first 3 days so one extra day in addition to the 9 days would be needed to make all the boxes.

Question 10

Examiners were able to award full marks to about a half of students for their answer to this question involving percentages. Most students showed a good understanding of the problem and calculated that the total interest added to Marie's account was £144. Not all of these students could express this as a percentage interest rate. The most common error was for students to express £144 as a percentage of £8144 instead of £8000. It was noticeable that a large number of students used a multiplier approach, interpreting 0.018 or 1.018 as a 1.8% increase. The most common errors seen were working out 20% of 8000, or using an incorrect reverse percentage process.

Question 11

Questions involving standard form are often well answered and this question was no exception. Students usually expressed their answer to part (a) as an ordinary number (130) with a small minority of students giving their answer in standard form (1.3×10^2). Most students worked in standard form and did not convert the distance and speed to ordinary numbers before dividing one by the other. The most common error seen in the method was for students to multiply the distance by the speed but this was not commonplace. However, there were a significant number of students who identified the correct calculation $(3.9 \times 10^7) \div (1.3 \times 10^5)$ but who expressed it without the brackets. This usually led to the incorrect answer 1.3×10^{12} because students were not careful about the order of operations when they used their calculator to evaluate their answer. These students could usually be awarded one of the two marks available.

Most students were able to gain the mark in part (b) for stating that their answer to part (a) would be increased or equivalent, for example that the signal will take longer to get to Mars.

Question 12

About two thirds of students were able to give an acceptable reason why $64^{\frac{1}{4}}$ is not equal to $\frac{1}{4}$ of 64, usually by explaining that $64^{\frac{1}{4}}$ can be interpreted as the fourth root of 64 or $\sqrt[4]{64}$ or by evaluating the value of $\sqrt[4]{64}$ as 2.828. The reason "$\frac{1}{4}$ of 64 is not the same as 64 to the power $\frac{1}{4}$" was not deemed sufficient to score the mark because it is the same as merely rephrasing the statement in the question.

Question 13

This question was successfully answered by about a half of all students. About two thirds of all students realised the need to multiply the measures of density and volume of both ethanol and propylene and so accessed the first two marks for these processes. Some students changed litres to millilitres before doing this. About a half of all students were able to move on from there to complete the calculation of the density of the antifreeze. The most common error seen by examiners was for students to use division rather than multiplication to work out $188 \div \left(\frac{60}{1.09} + \frac{128}{0.97}\right)$ or equivalent. The answer given, 1.005, was in the range of acceptable values but could not be awarded any credit.

Question 14

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

Question15

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

Question 16

This question discriminated well with many students being awarded each of the 0, 1, 2 or 3 marks available. Most students followed the strategy of finding second differences to help them find the term in n^2 and realised that the common differences of 4 meant they should write an expression for the nth term which included the term $2n^2$. Many students went on to give a fully correct expression but a significant minority of students gave $2n^2 - 3n$ as their answer. Students would be wise to check their answers to questions of this type by substitution.

Question 17

Matching the functions to the graphs in this question produced a good spread of marks with about a third of all students scoring each of the marks available. The graph of a trigonometrical function was identified correctly more frequently than the other graphs and the graphs showing one form of proportionality or another were the least well known.

Question 18

Students usually scored well on part (a) of this question requiring the expansion of a product of three linear expressions to give a fully simplified cubic expression. Errors were usually restricted to incorrect terms rather than a flawed strategy although some students omitted terms from their expansion. It was usual for students to earn two or three of the available marks. Less able students lacked a clear strategy and sometimes tried the multiply all three brackets together at once.

Part (b) of the question proved to be more challenging than part (a) and it was relatively rare for examiners to award full marks. Credit awarded to students was often restricted to the mark gained for taking the square root of each side of the inequality or, in the case of students who started by expanding the left hand side, for getting a quadratic equation or inequality with all the terms on one side. Very few students used the expected method of taking the square root of both sides, taking into account both square roots of $\frac{9}{25}$. Students who expanded $(1 - x)^2$ were more likely to gain two or three marks for their responses but only about a third of all students earned one or more marks. The best answers demonstrated a very good understanding of the topic together with the good practice of including a graph sketch with the rest of their working.

Question 19

Part (a) of this question discriminated well between more able students sitting this paper. Some students did not attempt the question and many weaker students restricted their answer to working out the value of D by substituting $u = 26.2$ and $a = 4.3$ This gained no credit. Of those students who did score marks, many of them scored just one mark for writing down at least one of the bounds for u or a. Students who substituted bounds for u and a into the expression for D were split between those who calculated [UB of u]^2 ÷ [2 × LB of a], the correct expression, those who calculated
[UB of u]^2 ÷ [LB of a] and those who calculated [UB of u]^2 ÷ [2 × UB of a].

Part (b) was not answered well and only a small proportion of students gave the correct answer of 80. Even fewer students were able to say why. The most common incorrect approach by far was to add their answer to part (a) to 78.6003 and then divide by 2, accompanied by an explanation of this being the mid-point or the average. Centres may wish to highlight this misconception.

Question20

This question also proved to be a good discriminator between the most able students. Many of the more able students were able to make a good start, realizing the need to make a substitution, usually using $x = \frac{7-4y}{3}$ from the second equation, to eliminate x from the first equation. Fewer students could carry out the substitution and expand $\left(\frac{7-4y}{3}\right)^2$ correctly to score the second method mark. Often the denominator of the fraction was ignored in this process. Students who rearranged $3x + 4y = 7$ often stopped at $4y = 7 – 3x$, then substituted this into $x^2 – 4y^2 = 9$ to give the incorrect equation
$x^2 – (7 – 3x)(7 – 3x) = 9$. A further error seen quite commonly occurred when students multiplied through their equation by 9 but forgot to multiply all the terms by 9.
Only the most able students could obtain a correct quadratic equation in the form
$ay^2 + by + c = 0$ (or $ax^2 + bx + c = 0$ in the cases where y had been eliminated). Some students who did not get a correct quadratic equation were able to score a further mark which was given independently for solving a three term quadratic equation. Full marks were scored in this question by only a very small proportion of all students who were entered for the examination. Some students who arrived at the correct 4 values were not awarded the final accuracy mark as the values were not clearly paired.

Question 21

Though a significant number of students did not attempt this question, a good proportion of those students who did attempt it scored full marks for a complete and correct solution. The most common errors made by those students who followed a correct method, that of finding the total number of onions weighing less than 60g or more than 120g, usually involved obtaining an incorrect frequency for the number of onions weighing between 120g and 135g or for the number of onions weighing between 135g and 180g, or both. This usually arose because of using an incorrect class interval . Students who used the strategy of finding that there were 420 onions weighing between 60g and 120g were generally more successful. Some students opted to work with percentages, either giving their final answer as a percentage, or rounding a recurring decimal to 1decimal place and hence introducing a rounding error. In these cases the final accuracy mark was usually lost. There were a significant number of students who used the heights of the bars to represent frequencies. This approach could not be awarded any credit.

Question 22

Fully correct answers to this question were seen only rarely. It was found to be the most challenging question on the paper. Having said that, a significant proportion of students were able to score at least one mark for a successful start by identifying that angle OAB is a right angle or for a correct process to find the radius of the circle. Few students could see how to use the coordinates of P in order to derive an equation by either using the equation of the circle or by using Pythagoras's Theorem. The evidence from students' scripts showed that more students took the former approach, quoting $x^2 + y^2 = r^2$ and then substituting $x = 3p$, $y = p$, $r = 8$ to get an equation in p. Unfortunately, the lack of of use of correct notation, that is a pair of brackets, meant that many students wrote $3p^2 + p^2 = 8^2$ instead of $(3p)^2 + p^2 = 8^2$. These students usually went on to simplify their equation to $4p^2 = 8^2$.

Question 23

This question was accessible to and discriminated well between the most able students sitting this paper. Students who had a good understanding of bearings together with applications of the sine rule and cosine rule were able to produce an accurate and concise solution to the problem. Of those students who gained partial credit for their attempts, many were only able to score either one mark for a correct process to find the size of angle ABC or two marks for getting as far as finding the length of AC. Some students who got as far as finding the size of angle BAC successfully gave this as their final answer. Finding the bearing of A from C instead of the bearing from C from A was also seen quite frequently.

Summary

Based on their performance on this paper, students should:

- check working for careless errors and to see that the answer given was specifically required by the question.
- practise problems involving the surface areas of solids.
- practise expanding brackets and collecting terms especially with quadratic functions involving fractions.
- ensure a good understanding of multipliers in problems concerning percentages
- practise solving quadratic inequalities.

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