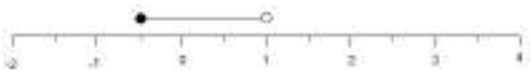
GEEDUQAS GCSE MATHEMATICS

SUMMER 2025 MARK SCHEME

GCSE (9-1) Mathematics Component 2: Higher Tier S25	Mark	
1.(a) $12x - 6 = 7 - 8x$ $20x = 13$ $x = 0.65$ or $\frac{13}{20}$ oe	B1 B1 B1	 FT from $12x - a$ or $bx - 6$ FT from $ax = 13$. $a \neq 1$ or $20x = b$ Mark final answer. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction or a decimal rounded or truncated to at least 1 decimal place.
Alternative - division by 3 first *$4x - 2 = \frac{7}{3} - \frac{8x}{3}$ or $4x - 2 = \frac{7-8x}{3}$ oe* *$\frac{20}{3}x = \frac{13}{3}$* *$x = 0.65$ or $\frac{13}{20}$ oe*	*B1* *B1* *B1*	*Allow 2.33(..) for $\frac{7}{3}$ and 2.66(...) or 2.67 for $\frac{8}{3}$* *FT from $2.3 - 2.6x$ or $2.3 - 2.7x$ or better* *If B1 B1 previously awarded final answer must be $x = 0.65$ or $\frac{13}{20}$ oe* *Mark final answer.* *FT from $6.7x = 4.3$ or $6.6x = 4.3$ or better* *If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction or a decimal rounded or truncated to at least 1 decimal place.*
1.(b) 	B2	Penalise –1 for incorrect notation e.g. use of arrows or loops joining the circles. B1 for $-0.5 \leq n < 1$ seen in working. Allow B1 for the correct representation of $-0.5 \leq n \leq 1$, $-0.5 < n < 1$ or $-0.5 < n \leq 1$ If no marks, award SC1 for a correct representation of $-2 \leq n < 4$ or $-1 \leq n < 2$ on the number line
1.(c) $2x(x - 7)$	B2	Allow B2 for $(2x + 0)(x - 7)$ B1 for one of the following • $2(x^2 - 7x)$ • $x(2x - 14)$ • $2x(x \pm \ldots)$ • $2x(\ldots - 7)$ • $(x + 0)(2x - 14)$
	(7)	

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2.(a)* A correct description e.g. 'The further the apartment is from the city centre the less it costs (per square metre).' 'The closer the apartment is to the city centre the more it costs (per square metre).'	E1	For any **one** of these, or equivalent statement. Ignore additional comments. Allow e.g. 'negative correlation'. '(Inversely proportional,) as the distance increases the price decreases'. 'As one goes up the other goes down.' 'Further from the centre you get more square metres for your money'. Do not accept e.g. 'negative' 'Inversely proportional'(and no other statement)
2.(b)* (£) 5400	B1	Mark final answer
2.(c)* 'No' selected or implied with a valid reason e.g. 'Other factors affect the cost as well as distance from the city centre'. 'The selling price will depend on the apartment' 'It is the value from the line of best fit, (but this is not necessarily true for all apartments.)' 'Not all points are on the line of best fit, it is an estimate.' 'The value is an estimate (from 12 apartments).'	E1	For any **one** of these, or equivalent statement. Ignore additional comments. Allow 'No' selected or implied with a valid reason e.g. 'Not enough data (as only 12 apartments).' 'It is not showing all the apartments.' 'The line of best fit only displays an average, not exact values.' 'It's just an average cost for apartments.' 'There is no data for 6 miles (from the centre).' Do not accept e.g. 'The line of best fit is not 100% accurate.' 'Because 8 miles is cheaper.' 'Because at 7 miles the apartment is £5200'. 'The graph shows there can be lots of different values.'
2.(d)* Midpoints: 125, 175, 225, 275, 325 125×8 + 175×12 + 225×9 + 275×5 + 325×1 ÷ 35 195 thousand pounds or (£)195 000	B1 M1 m1 A1	May be implied from correct totals, see below. FT 'their midpoints' provided at least 4 of these are at the bounds or within the groups 1000 + 2100 + 2025 + 1375 + 325 (= 6825) If mid-points are **not** given, then no marks except for the following cases: • B1 M0 for five correct products not added • B1 M1 for five correct products in an addition • B0 M1 for four correct products in an addition • B0 M1 for consistent use of upper or lower bounds FT provided M1 m1 awarded for the correct evaluation using their midpoints. Allow truncated or rounded decimal FT answers. Allow an answer of (£)195.
	(7)	

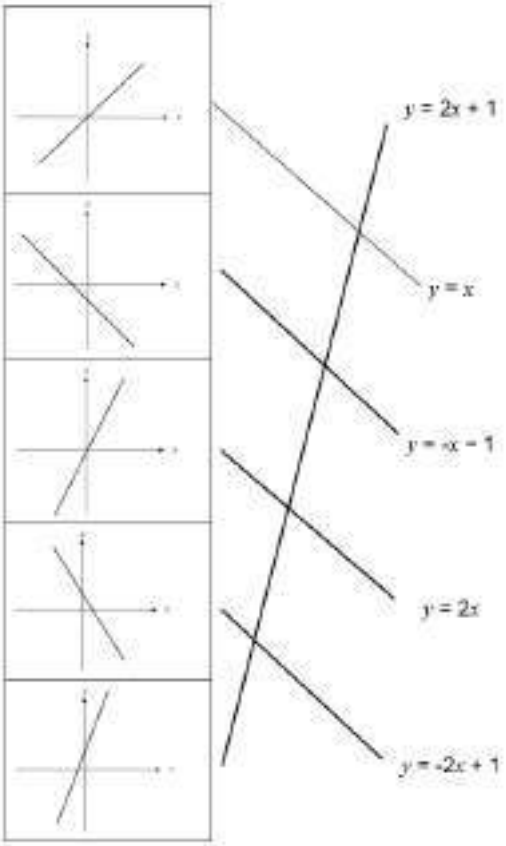
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3.*		Answer line takes precedence. Working may be seen in stages.
Correct method to calculate diameter (d =) $\sqrt{13^2 + 13^2}$ or $\sqrt{338}$ OR (d =) $\frac{13}{\sin(45)}$ or (d =) $\frac{13}{\cos(45)}$	M2	May be implied by $\sqrt{338}$, $13\sqrt{2}$, 18.3(84..) or 18.4 M1 for one of the following: (d^2 =) $13^2 + 13^2$ or (d^2 =) 338 sin(45) = $\frac{13}{d}$ or cos(45) = $\frac{13}{d}$
÷ 2 (to find radius)	m1	FT from M2 only May be implied by a radius of $\frac{13\sqrt{2}}{2}$ *or* $\sqrt{84.5}$ *or 9.1(9..) or 9.2*
(Area =) π × (9.19..)^2 oe	m1	FT 'their radius' provided M2 m1 or M3 previously awarded.
= 265.5 (cm^2)	A1	CAO Allow answers in the range 265.3 to 265.5 inclusive from correct working. Accept answers correct to 1 d.p. from correct working e.g. 265.9 (from $\pi \times 9.2^2$) 265.2 (from 3.14×9.19^2) 265.8 (from 3.14×9.2^2) Mark final answer Note: Award A0 if answer given in terms of π e.g. 84.5π If no marks, award SC1 for appropriate sight of $13^2 + 13^2$ or 338 incorrectly labelled or for r = $\sqrt{13^2 + 13^2}$
Alternative method for first 3 marks *Correct method to calculate radius* *(r =)* $\sqrt{6.5^2 + 6.5^2}$ *or* $\sqrt{84.5}$ *OR* *(r =) 13sin(45) or (r =) 13cos(45)* *If a correct method for r seen but then spoiled e.g. (r =)* $\sqrt{6.5^2 + 6.5^2} \div 2$ *award M2 only*	*M3*	*Working may be seen in stages.* *May be implied by a radius of* $\frac{13\sqrt{2}}{2}$ *or* $\sqrt{84.5}$ *or 9.1(9..) or 9.2 or* $\sqrt{\frac{13^2}{2}}$ *Allow M3 for* $r^2 = 84.5$ *or* $\frac{13^2}{2}$ *if used in area* $= \pi \times r^2$ *M2 for one of the following:* (r^2 =) $6.5^2 + 6.5^2$ *or* (r^2 =) = 84.5 *or* (r^2 =) $\frac{13^2}{2}$ *sin(45)* = $\frac{r}{13}$ *or cos(45)* = $\frac{r}{13}$ *M1 for* $r^2 + r^2 = 13^2$ *or* $2r^2 = 13^2$
	(5)	

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4(a)* Bag A branches completed correctly $\frac{2}{5}$ and $\frac{3}{5}$ oe or 0.4 and 0.6 Both pairs of Bag B branches completed correctly $\frac{3}{4}$ and $\frac{1}{4}$ AND $\frac{3}{4}$ and $\frac{1}{4}$ oe or 0.75 and 0.25 AND 0.75 and 0.25	 B1 B2	Allow the use of percentages B1 for one of the following: • $\frac{3}{4}$ and $\frac{1}{4}$ oe in the correct place on one pair of Bag B branches • Both pairs of Bag B branches completed with $\frac{3}{4}$ and $\frac{1}{4}$ oe the wrong way around
4(b)* (P(RB) + P(BR) + P(BB) =) $\frac{2}{5} \times \frac{1}{4} + \frac{3}{5} \times \frac{3}{4} + \frac{3}{5} \times \frac{1}{4}$ oe ($\frac{2}{20} + \frac{9}{20} + \frac{3}{20}$ or 0.1 + 0.45 + 0.15) or (1 – P(RR) =) $1 - \frac{2}{5} \times \frac{3}{4}$ oe (1 - $\frac{6}{20}$ or 1 – 0.3) or (P(RB) + P(B) =) $\frac{2}{5} \times \frac{1}{4} + \frac{3}{5}$ oe ($\frac{2}{20} + \frac{3}{5}$ or 0.1 + 0.6) = $\frac{14}{20}$ oe or 0.7 ISW	 M2 A1	Allow a restart in (b) FT from (a) provided at least B1 awarded and the values on every pair of branches add to 1. M1 for any one of the following: • $\frac{2}{5} \times \frac{3}{4}$ oe (=$\frac{6}{20}$ or 0.3)1 • $\frac{2}{5} \times \frac{1}{4}$ oe (=$\frac{2}{20}$ or 0.1) • $\frac{3}{5} \times \frac{3}{4}$ oe (=$\frac{9}{20}$ or 0.45) • $\frac{3}{5} \times \frac{1}{4}$ oe (=$\frac{3}{20}$ or 0.15) • a stated correct FT probability from (a) FT from M2 only provided a numeric value given
	(6)	

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5.(a)* All four equations correctly matched.  	B2	B1 for two or three equations correctly matched not including y = x
5.(b)* Correct equation circled or clearly indicated. $2y = 6x + 8$	B1	
5.(c)* $y = a(x - b)$ or $a(x - b) = y$ or $y = -a(-x + b)$ or y = ax – ab *oe*	B2	Allow B2 for $y = (x - b) \times a$ or $y = a \times (x - b)$ Mark final answer. B1 for one of the following as the first step • $\frac{y}{a} = x - b$ or $x - b = \frac{y}{a}$ • $-\frac{y}{a} = -x + b$ • $y + ab = ax$ Allow B1 if 'y =' missing e.g. $a(x - b)$ or $a \times (x - b)$ or ax - ab OR an answer of y = a(x + b) or y = ax + ab oe (from $\frac{y}{a} = x + b$) B0 for an unsupported answer of y = ax – b or y = a × x – b
	(5)	

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<table>
<tr><td>6.(a)*

15 × cos(38) or 15 × sin(90 – 38)

= 11.8(2…) (cm)</td><td>

M2

A1</td><td>

Allow M2 for equivalent complete methods
If not M2 award M1 for one of the following:
• $\cos(38) = \frac{AB}{15}$ oe
• $\sin(90 - 38) = \frac{AB}{15}$ oe

Allow 12 from correct working.

<table><tr><td></td><td>Radians</td><td>Grads</td></tr><tr><td>15cos(38)</td><td>14.326..</td><td>12.406…</td></tr><tr><td>15 sin(52)</td><td>14.799..</td><td>10.93..</td></tr></table></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>6.(b)*

$\tan^{-1}(\frac{19}{17})$

= 48.1(798…)(°) rounded or truncated</td><td>

M2

A1</td><td>

Allow M2 for equivalent complete methods
M1 for $\tan(D\hat{E}F) = \frac{19}{17}$

Allow A1 for 48(°) from correct working

<table><tr><td></td><td>Radians</td><td>Grads</td></tr><tr><td>$\tan^{-1}(\frac{19}{17})$</td><td>0.84(08..)</td><td>53.5(3.….) or 54</td></tr></table></td></tr>
<tr><td></td><td>(6)</td><td></td></tr>
</table>

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7.*		Allow the marks for the equivalent in pence.
(Total value of 20p's) = (£)8.4(0)	B2	B1 for one of the following • 3.60 ÷ 3 × 7 oe • 3.60 ÷ 3 × 4 + 3.6(0) oe • (Jamie's 20p coins total) (£)4.8(0)
(No of 20p coins (£)8.4(0) ÷ (£)0.2(0) =) 42 (20p coins)	B1	FT 'their derived 8.4(0)' Accept FT answers rounded or truncated to the nearest whole number
(No of 10p coins) 42 ÷ 7 × 2 oe	M1	FT 'their 42' coins
= 12 (10p coins)	A1	Accept FT answers rounded or truncated to the nearest whole number
(12 × £0.10 + 42 × £0.2(0) =) (£)9.6(0) or 960(p)	B1	FT provided M1 awarded If M0, award a further SC1 for the correct evaluation of 'their derived 8.4(0)' ÷ 7 × 9 (£10.8(0) if 8.4(0(used) Award SC3 if (£)9.6(0) or 960(p) is unsupported
<u>Alternative method for the first 3 marks</u> (No of 20p coins Rona has = 3.60 ÷ 0.2(0) =) 18	B1	
(Total no. of 20p coins =) 42	B2	B1 for one of the following • 18 ÷ 3 × 7 oe • 18 ÷ 3 × 4 + 18 oe • (No of 20p coins Jamie has =) 24
<u>Alternative method from total value of 20p's for the final 4 marks</u> Must be unambiguously obtaining the total value of the 10p coins *(Total in Greg's jar =)* *8.4(0) + 8.4(0) ÷ 7 (× 2 ÷ 2)*	*M3*	*FT 'their derived 8.40'*
(= 8.4(0) + 1.2(0) =) (£)9.6(0) or 960(p)	*A1*	*Accept FT answers rounded or truncated to the nearest 10p*
	(6)	

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8.(a) (Volume of original block =) 5.4 × 1000 ÷ 0.75 ÷ 3 × 10 or ÷ 0.3 = 24000 (cm^3)	 M1 M1 M1 A2	 May be seen in any order and may follow an incorrect stage or equivalent e.g. ÷30 × 100 A1 for correct evaluation for two of the three calculations starting with 5.4. • (5.4 ÷ 0.3 × 1000 =) 18000(g) • (5.4 × 1000 ÷ 0.75 =) 7200 (cm^3) • (5.4 ÷ 0.75 ÷ 0.3 =) 24 • FT from an incorrect division or multiplication provided two correct calculations used and correctly evaluated e.g. 5.4 × 1000 × 0.75 ÷ 0.3 = 13500
8.(b) A valid explanation e.g. 'He should have divided by 2.5^3.' 'He should have divided by 15.625.' 'He should have cubed the 2.5.' 'He should have divided by 2.5 three times.'	E1	Allow e.g. 'He should have cubed it.' '2.5^3' 'Because they are cubed units, (and not linear)' 'You have to divide by the cube.' 'He has used the length scale factor and not the volume scale factor.' Do not accept e.g. 'Because it is a cubic number' 'He needs to know how many cm^3 make an in^3.' 'Because they are volumes.'
	(6)	
9.(a) $\frac{b}{c} \times 10^{x+y}$	B1	
9.(b) $a^2\sqrt{a}$	B1	
9.(c) $\sqrt[3]{\frac{g}{f}}$	B1	
	(3)	
10. $23.8 \times \frac{2}{7}$ or $23.8 \div \frac{7}{2}$ = 6.8 (cm)	M1 A1	May be seen in stages Award A0 if this is given as DB in the working or on the diagram.
	(2)	

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11. $n^2 + 8n + 16 – n^2 + 2n - 1$ or better (= 10n + 15) 5(2n + 3) (therefore always a multiple of 5) OR 10n + 15 AND (both 10 and 15) are multiples of five	 B2 B1	 B1 for one of the following • $n^2 + 8n + 16$ • $n^2 - 2n + 1$ • $– n^2 + 2n - 1$ • $n^2 + 4n + 4n + 16$ • $n^2 – n – n + 1$ • $(n^2 + 8n + 16) – (n^2 – 2n + 1)$ • $n^2 + 8n + 16 – n^2 – 2n + 1$ unless corrected to 10n + 15 Allow B1 for either • $n^2 + kn + m – n^2 – 2n + 1$ • 10n + 15 unsupported or obtained as nth term from the sequence 25, 35, 45 B0 for 10n + 15 used to obtain 25, 35, 45 etc
<u>Alternative method</u> *(difference of two squares)* *(n + 4 + n – 1)(n + 4 – (n – 1)) or better* *(= (2n + 3)(5))* *5(2n + 3) (therefore always a multiple of 5)* *OR 10n + 15 AND (both 10 and 15) are multiples of five*	 *B2* *B1*	 *B1 for (n + 4 + n – 1)(n + 4 – n – 1) unless corrected to (2n + 3)(5)*
	(3)	

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12.(a) Saturday	B1	
12.(b) 5.8 (hours) or 5 hours 48 mins	B1	Allow B1 if 5.8 seen but incorrectly converted to hours and mins
12.(c) 7 (hours) 24 (minutes)	B1	
12.(d) 0.75 × 52 = 39	M1 A1	
12.(e) Tuesday AND an appropriate reason e.g. 'The range and inter-quartile range were at their lowest.' 'The range was the smallest on this day.' 'The inter-quartile range was the smallest on this day.'	E1	Allow e.g. Tuesday AND 'There was less spread (on Tuesday).' 'The upper and lower quartiles are closest on Tuesday.' Do not accept Tuesday and e.g. Incorrect values used in their reason 'Median in the middle.' 'Equal times above and below the median.'
	(6)	
13. (Curved surface area =) $\frac{1}{20} \times \pi \times 4 \times 9^2$ oe (Area of sides =) (2 ×) $\frac{1}{4} \times \pi \times 9^2$ oe (Area of base =) $\frac{1}{10} \times \pi \times 9^2$ oe = 203.5(7….) or 203.6 (cm^2) or $\frac{324}{5}\pi$ oe	 M2 M1 M1 A1	Allow M marks if r is not substituted. May be seen in stages. (= 16.2 π or $\frac{81\pi}{5}$ or 50.89….) M1 for k × π × 4 × 9^2 where k = $\frac{1}{2}$ or $\frac{1}{10}$ (= 162 π or 508.9…. OR 32.4 π or 101.78…) (= 40.5 π or 127.23…. OR 20.25 π or 63.617…) (= 8.1 π or 25.44…) CAO. Accept answers in the range 203.3 to 203.6 inclusive. Allow 204 from correct working
	(5)	

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14. (Numerator factorised) (x + 4)(x – 3) (Denominator factorised) 3(x + 4) (Simplified fraction) $\frac{x-3}{3}$ or $\frac{1}{3}(x-3)$ or $\frac{x}{3}-1$	 B2 B1 B1	 B1 for a pair of brackets that expands to give $x^2 + x + a$ or $x^2 + bx - 12$ where a ≠ 0 and b ≠ 0. Mark final answer. Allow B1 for $0.\dot{3}(x-3)$
	(4)	
15. 1510 ÷ 9.95 = 151 (tins)	 M2 A2	Allow 1509.999.. for 1510, must clearly be a recurring 9. The calculation must be unambiguously selected for the award of M2. M1 for 'their 1510' ÷ 'their 9.95' provided 1500 < 'their 1510' ≤ 1520 AND 9.9 ≤ 'their 9.95' < 10 or 'their 9.95' = 9.5 From M2 award for A1 for 151.7(5….) or 151.76 or 151.8 or on FT from M1 award A1 for their correctly evaluated answer rounded down to the nearest integer.
	(4)	

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16. Method using angles $B\hat{A}C$ and $O\hat{A}B$ $B\hat{A}C = ½\ x$ (Angle at circumference = half angle at centre) $O\hat{A}C$ (= 90 – 65) = 25(°) OR $O\hat{A}B = 90 – (115 – ½x)$ (Tangent perpendicular to radius) $B\hat{A}O = ½x – 25$ AND a statement that $A\hat{B}O = O\hat{A}B$ (Base angles of an isosceles triangle are equal) Reasons must include at least two of the three reasons • Angle at circumference = half angle at centre oe • Tangent perpendicular to radius • Base angles of an isosceles triangle are equal	B1 B1 B1 E1	Angles may be seen on the diagram Award E1 for the reasons provided at least B1 B1 awarded.
Alternative method 1 using angles in the alternate segment. *$A\hat{B}C = 65(°)$* *(Alternate segment theorem)* *$O\hat{B}C$ or $O\hat{C}B = \frac{180 - x}{2}$ or 90 – ½x* *(Base angles of an isosceles triangle are equal)* *$A\hat{B}O = 65 – (\frac{180 - x}{2})$ or 65 – (90 – ½x)* *convincingly leading to ½x – 25* *Reasons must include alternate segment theorem AND isosceles triangle*	*B1* *B1* *B1* *E1*	*Angles may be seen on the diagram* *Must be correctly placed on the diagram or appropriately labelled* *Award E1 for the reasons provided at least B1 B1 awarded.*

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Alternative method 2 using triangle AOC O$\hat{A}$C (= 90 – 65) = 25(°) *(Tangent perpendicular to radius)* *A$\hat{O}$B (= 360 – (180 – 2 × 25) – x) = 230 – x* *(Isosceles triangle and angles at a point)* *A$\hat{B}$O* = $\frac{180-(230-x)}{2}$ = ½x – 25 *(Base angles of an isosceles triangle are equal)* *Reasons must include at least* • *Tangent perpendicular to radius* • *Base angles of an isosceles triangle are equal*	*B1* *B1* *B1* *E1*	*Angles may be seen on the diagram* *Award E1 for the reasons provided at least B1 B1 awarded.*
Alternative method 3 starting with given answer and using the 65(°) *A$\hat{B}$C = 65(°)* *(Alternate segment theorem)* *O$\hat{B}$C = 65 – (½x – 25) = 90 – ½x* *O$\hat{B}$C = O$\hat{C}$B so* *B$\hat{O}$C = 180 – 2 × (90 – ½x) = x* *(Isosceles triangle and angles in a triangle)* *Reasons must include alternate segment theorem AND isosceles triangle*	*B1* *B1* *B1* *E1*	*Award E1 for the reasons provided at least B1 B1 awarded.*
Alternative method 4 starting with given answer and using B$\hat{A}$C = ½ x *B$\hat{A}$C = ½ x* *(Angle at circumference = half angle at centre)* *B$\hat{A}$O = A$\hat{B}$O = ½x – 25 AND* *O$\hat{A}$C = ½x – (½x – 25) = 25(°)* *(Isosceles triangle)* *E$\hat{A}$C = 90 – 25 = 65(°) OR* O$\hat{A}$C = 90 – 65 = 25(°) *(Tangent perpendicular to radius)* *Reasons must include at least two of the three reasons* • *Angle at circumference = half angle at centre oe* • *Tangent perpendicular to radius* • *Base angles of an isosceles triangle are equal*	*B1* *B1* *B1* *E1*	*Award E1 for the reasons provided at least B1 B1 awarded.*
	(4)	

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17. Obtuse angle in a shaded triangle =152 (°) From a valid method e.g. (360 – 2 × 104) OR (180 – 2 × 14) = (Area of a shaded triangle =) 0.5 × 11 × 11 × sin(152) = 28.4…(mm^2) (Area of a shaded region = 8 × 28.4…) = 227.2(2…) (mm^2)	 B3 M1 A1 B1	Note: Do not penalise incorrect units. If not B3 then B2 for either of the following • (Equal angle of kite =) 104 (°) (360 – 107 – 45) ÷ 2) oe • (Acute angle of a shaded triangle =) 14 (°) (180 – 107 – 45) ÷ 2) oe OR B1 for either of the following • (Angle at centre or exterior angle =) 45 (°) (360 ÷ 8) • (Interior angle of an octagon =) 135 (°) ($\frac{6\times180}{8}$ or 180 − $\frac{360}{8}$) Allow equivalent full methods to find the area of the shaded region for the final M1 A1 B1 FT May be seen in stages FT 'their derived 152' provided obtuse and ≠ 107 or 135 FT May be implied by the final answer FT provided M1 is awarded Allow 227 from correct working. | | Radians | Gradians | | ½×11×11×sin(152) | 56.46 | 41.41 |
<u>Alternative method using the acute angle of a shaded triangle</u> *(Acute angle of a shaded triangle =) 14 (°)* *From a valid method e.g.* *(180 – 107 – 45) ÷ 2) oe* *(Area of half a shaded triangle =)* $\frac{11\sin(14)\times11\cos(14)}{2}$ oe *(½ × 2.66.. × 10.67…)* *= 14.2…(mm^2)* *(Area of a shaded region =* *16 × 14.2… or 8 × 28.4…)* *= 227.2(2…) (mm^2)*	 *B2* *M2* *A1* *B1*	*B1 for either of the following* • *(Angle at centre or exterior angle =) 45 (°)* *(360 ÷ 8)* • *(Interior angle of an octagon =) 135 (°)* *($\frac{6\times180}{8}$ or 180 − $\frac{360}{8}$)* Allow equivalent full methods to find the area of the shaded region for the final M2 A1 B1 FT *FT 'their derived 14' provided acute* *May be seen in stages* *FT May be seen as area of shaded triangle* *= 28.4…(mm^2)* *FT 'their 14.2' or 'their 28.4' provided M2 is awarded* *Allow 227 from correct working.* | | Radians | Gradians | | $\frac{11\sin(14)\times11\cos(14)}{2}$ | 8.1949 | 12.89798 |
	(6)	

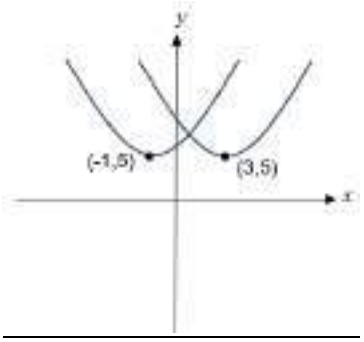
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18. $\sqrt[4]{\frac{8950.70}{7800}}$ (= $\sqrt[4]{1.1475\ldots}$)	M2	M1 for 7800 × multiplier^4 = 8950.70 or 7800 × $\left(1+\frac{r}{100}\right)^4$ = 8950.70
= 1.0350….	A1	Award M2 A1 for an answer of 3.5% per year provided not from incorrect work Allow if found from trials.
7800 × 1.0350….^{7} or 8950.70 × 1.0350….^{3} oe	M1	FT provided 1 < 'their 1.0350..' < 2 and 'their 1.0350' uses their multiplier or stated value for r. Allow M1 if 'their multiplier or stated value for r' is further rounded or truncated e.g. 1.035 used as 1.03 or 1.04
= (£) 9924	A1	FT for A1 provided their multiplier or stated value for r is correctly rounded to 3 d.p. or better. e.g. 0.0317… using a multiplier of 1.032 Answer must be rounded to the nearest pound.
Alternative method *7800 × $\left(\frac{8950.70}{7800}\right)^{\frac{7}{4}}$ = (9923.818….)*	*M4*	
= (£) 9924	*A1*	
	(5)	
19.(a) y ∝ $\sqrt{x}$ or y = k$\sqrt{x}$	B1	
0.14 = k × $\sqrt{0.49}$	M1	FT $y \propto \frac{1}{\sqrt{x}}$ or $y \propto x^2$ or $y \propto \frac{1}{x^2}$
y = 0.2$\sqrt{x}$ oe	A1	Formula must be seen for this mark. On FT their k must be a fraction or correct to at least 2 s.f.
19.(b) 0.46	B1	FT their equation formed in (a) provided • it is in the form y = k$\sqrt{x}$ OR • it includes $\sqrt{x}$ or x^2 and M1 awarded FT answer must be a correct fraction, or a decimal correct to at least 2 s.f.
	(4)	

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20. (Volume scale factor) $(\frac{16}{40})^3$ or $(\frac{40}{16})^3$ oe $(\frac{16}{40})^3 \times 100$ or $\frac{1}{(\frac{40}{16})^3} \times 100$ = 6.4 (%)	B1 M1 A1	0.4^3 or 2.5^3 (= 0.064) or (= 15.625) *Note: need to be obtaining a percentage for M1* If B1 M0 A0 is awarded, award a further SC1 for an answer of 93.6(%).
Alternative method calculating volumes *(Vol large pyramid =)* $\frac{1}{3} \times 40^2 \times h$ *AND* *(Vol small pyramid =)* $\frac{1}{3} \times 16^2 \times 0.4h$ *oe* $\frac{\frac{1}{3}\times 16^2 \times 0.4h}{\frac{1}{3}\times 40^2 \times h}$ (× 100) oe = 6.4 (%)	*B1* *M1* *A1*	*Allow* $k \times 40^2 \times h$ *AND* $k \times 16^2 \times 0.4h$ *e.g.* $k \times 40^3$ *AND* $k \times 16^3$ *Allow* $\frac{k\times 16^2 \times 0.4h}{k\times 40^2 \times h}$(× 100) *e.g.* $\frac{k\times 16^3}{k\times 40^3}$ (× 100) *If B1 M0 A0 is awarded, award a further SC1 for an answer of 93.6(%).*
	(3)	
21. (Angle ABC = 65 + 180 – 108 =) 137° (AC =) $\sqrt{30^2 + 42^2 - 2 \times 30 \times 42 \times \cos(137)}$ = 67.(13…) (km) 67.(13…) ÷ 1.75 or 67(.13…) ÷ 105 × 60 = 38.3(6…) or 38.4 (km/h)	B1 M2 A1 M1 A1	Answer line takes precedence FT 'their stated or derived 137' provided it is obtuse. M1 for (AC² =) $30^2 + 42^2 - 2 \times 30 \times 42 \times \cos(137)$ CAO FT 'their 67.(13..)' provided at least M1 awarded. FT Allow answers in the range 38.28 to 38.4 or 38 from correct working. Mark final answer Radians / Gradians AC: 42.68.. / 63.62..
	(6)	
22. $x^2 + y^2 = 14^2$ or $x^2 + y^2 = 196$	B2	B1 for $x^2 + y^2 = r^2$ and r = 14 stated If no marks, award SC1 for one of the following • $(x – 7)^2 + y^2 = 7^2$ • $x^2 + y^2 = 7^2$ • $x^2 + y^2 = 49$ • $x^2 + y^2 = 7 \times 2^2$ (brackets omitted) • $x^2 + y^2 = 28$ (brackets omitted) • $x^2 + y^2 = 2 \times 7^2$ (brackets omitted) • $x^2 + y^2 = 98$ (brackets omitted)
	(2)	

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23.  	B2	Correct translation and (-1, 5) given or shown on the axes Award B1 only if (-1, 5) is shown in the first quadrant B1 for any translation to the left If no marks, award SC1 for a translation to the right AND (7, 5) given.
	(2)	
Q24 $\frac{1\times4}{2}+\frac{(4+6)}{2}\times1+\frac{(6+6)}{2}\times1+\frac{(6+4)}{2}\times1+\frac{4\times1}{2}\times1$ (= 2 + 5 + 6 + 5 + 2) = 20 (units^2)	M3 A2	Accept equivalent as triangles and rectangles M2 for the sum of any 3 of these areas from an attempt at all 5 areas M1 for one or two of these areas from an attempt at all 5 areas A1 for a correct answer following through from an error in one or two of these areas OR for 2 + 5 + 6 + 5 + 2 with an incorrect answer If method is unclear award M0 then possible SC5 for sight of 2 + 5 + 6 + 5 + 2 = 20
Alternative method 1 $\frac{2\times4}{2}+\frac{(4+6)}{2}\times2+\frac{(6+6)}{2}\times2+\frac{(6+4)}{2}\times2+\frac{4\times1}{2}\times2$ *4 + 10 + 12 + 10 + 4 (=40)* *÷ 2* *= 20 (units^2)*	*M2* *A1* *m1* *A1*	*M1 for the sum of any 3 of these areas from an attempt at all 5 areas* *All 5 trapezia correct* *FT provided M1 previously awarded* *FT* *If method is unclear award M0 then possible SC3 for sight of 4 + 10 + 12 + 10 + 4 =40*
Alternative method 2 $\frac{(3+8)}{2}\times1+\frac{(8+11)}{2}\times1+\frac{(11+12)}{2}\times1+\frac{(12+11)}{2}\times1+\frac{(11+8)}{2}\times1$ *(=5.5 + 9.5 + 11.5 + 11.5 + 9.5)* *= 47.5* *47.5 –* $\frac{(3+8)}{2}\times5$ *= 20 (units^2)*	*M2* *A1* *M1* *A1*	*M1 for the sum of any 3 correct trapezia from an attempt at all 5 areas.* *Accept equivalent as triangles and rectangles* *FT from M1* *FT 'their 47.5' provided at least M1 awarded* *FT*

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Alternative method 3 $\frac{1}{2} \times 1$ *(3 + 8 + 2(8 + 11 + 12 + 11))* *= 47.5* *47.5* $- \frac{(3+8)}{2} \times 5$ *(= 47.5 – 27.5)* *= 20 (units²)*	 *M2* *A1* *M1* *A1*	 *Award M1 if only one value is incorrect.* *FT from M1* *FT 'their 47.5' provided at least M1 awarded* *FT*
Alternative method 4 $\frac{(3+8)}{2} \times 1 - \frac{(3+4)}{2} \times 1$ + $\frac{(8+11)}{2} \times 1 - \frac{(4+5)}{2} \times 1$ + $\frac{(11+12)}{2} \times 1 - \frac{(5+6)}{2} \times 1$ + $\frac{(12+11)}{2} \times 1 - \frac{(6+7)}{2} \times 1$ + $\frac{(11+8)}{2} \times 1 - \frac{(7+8)}{2} \times 1$ *(= 2 + 5 + 6 + 5 + 2)* *= 20 (units²)*	 *M3* *A2*	 *M2 for the sum of any 3 of these areas from an attempt at all 5 areas* *M1 for one of these areas from an attempt at all 5 areas* *A1 for a correct answer following through from an error in one or two of these areas* *OR for 2 + 5 + 6 + 5 + 2 with an incorrect answer*
	(5)	

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25.(a) $\frac{400}{x} + 17 = \frac{600}{x-26}$ oe	M2	M1 for $\frac{400}{x}$ or $\frac{600}{x-26}$
Clears both of the fractions or uses a common denominator on the left-hand side to cross multiply $17x(x - 26) + 400(x - 26) = 600x$	M1	FT 'their $\frac{400}{x}$ + 17' = 'their $\frac{600}{x-26}$' oe provided one side of the equation is correct and it is of equivalent level of difficulty to simplify
Expand the brackets $17x^2 - 442x + 400x - 10400 = 600x$	M1	FT
Collects terms and correctly simplifies to $17x^2 - 642x - 10400 = 0$	A1	CAO
25.(b)		Allow marks for (b) if seen in (a) unless contradicted.
(x =) $\frac{-(-642)\pm\sqrt{(-642)^2-4\times17\times-10400}}{2\times17}$ or $\frac{642\pm\sqrt{(642)^2-4\times17\times-10400}}{2\times17}$ or $\frac{642\pm\sqrt{642^2+4\times17\times10400}}{2\times17}$	M1	**The substitution into the formula must be seen for M1, otherwise award M0A0A0.** FT 'their $17x^2 - 642x - 10400 = 0$' for M1 and possible m1 Allow one slip in substitution **for M1 only** but must be correct formula. Allow -642^2 if corrected in working for the m1
(x =) $\frac{642\pm\sqrt{1119364}}{34}$	m1	Can be implied from at least one correct value of x evaluated.
(x =) 50 (minutes) (or -12.2(35…))	A1	CAO If negative solution not rejected then it must be correct
Alternative method *(x – 50)(17x + 208)*	*B2*	*B1 for a pair of brackets that expands to give* $17x^2 - 642x + a$ *or* $17x^2 + bx - 10400$ *where a ≠ 0 and b ≠ 0.*
(x =) 50 (minutes) (or -12.2(35…))	*B1*	*CAO. Factorisation must be seen.*
	(8)	

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