REVISE
.wales

2.18 — Symmetry & transformations

Mark schemes for the 2.18 question pack

Spec 3.8 — Unit 2

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 26 questions in the corresponding revise.wales question pack (63 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

1.(a)	Correct reflection in $y = x$		B2	B1 for a correct reflection in $y = -x$ or for sight of line $y = x$.
1. (b) (i)	Correct translation.		B1	
1. (b) (ii)	$\begin{pmatrix} 5 \\ 4 \end{pmatrix}$		B1	B0 for 5 4 (missing brackets) OR (5,4) B0 for $\frac{5}{4}$ with or without brackets.

	Autumn 2016			
10.	Correct enlargement		B3	Otherwise B2 for 2 correct vertices within a triangle. OR for 3 correct vertices in the correct location not joined to form the triangle OR inverted triangle of correct size in incorrect position OR consistent correct use of an incorrect negative scale factor B1 for 1 or 2 correct points OR consistent use of scale factor +2 (in correct position) OR consistent use of an incorrect negative scale factor in incorrect position

11.(a) (Length of arc) $\frac{50}{360} \times 2 \times \pi \times 5$ = 4·3(611…) to 4·4 (cm) OR 500π/360 (cm) Perimeter = 14·3(611…) to 14·4 (cm)	M1 A1 B1	 Or 25π/18. May be implied by B1 FT for adding 10 providing M1 awarded
11.(b) (Area ¼ circle =) 7·065 to 7·1 (cm^2) OR 9π/4 (Area sector =) $\frac{50}{360} \times \pi \times 5^2$ = 10·9(027…) to 10·91 OR 125π/36 (cm^2) (Surface area of badge =) $7 \cdot 06 \ldots + 10 \cdot 91 \ldots - \frac{50}{360} \times \pi \times 3^2$ (3·925 to 3·9275) = 14·0(427…) to 14·1 OR 161π/36 (cm^2)	B1 M1 A1 M1 A1	May be implied in further working May be implied in further working FT 'their 7·06…' and 'their 10·91…' provided previous M1 awarded Needs to come from values that are correct to at least 1 decimal place *Alternative method:* *B1 for* ($\frac{20}{360} \times \pi \times 3^2$) *1·57 to 1·571 or* π*/2 (cm*^{2}*)* *(may be implied in further working)* *M1 for* $\frac{50}{360} \times \pi \times 5^2$ *A1 for 10·9(027…) to 10·91* OR 125π/36 *(cm*^{2}*)* *M1 for* $10 \cdot 9 \ldots + (2 \times \frac{20}{360} \times \pi \times 3^2)$ *FT 'their 10·9' and 'their 1·57' provided previous M1 awarded* *A1 for 14·0(427…) to 14·1* OR 161π/36 *(cm*^{2}*)*

15. Enlargement with scale factor -½ and centre (7, 4)		B3	*Penalise -1 for further incorrect steps.* Award B2 for reference to any two of 'Enlargement', '-½' and 'centre (7, 4)' either identified by coordinates or joining corresponding vertices on the grid. Award B1 for reference to any one of 'Enlargement', '-½' and 'centre (7, 4)' either identified by coordinates or joining corresponding vertices on the grid. SC2 awarded for the correct two step transformation from shape A to B, e.g. enlargement SF ½ centre origin, rotation 180° about (5.25, 3) or enlargement SF ½ and 180° rotation, (both) with centre (7.4).

Final Marking Scheme			
1.(a)	Kite	B1	
1.(b)	Trapezium	B1	
1.(c)	Rhombus	B1	

3.(a) Correct rotation.	B2	Allow B1 for two correct vertices. B1 for a 90° clockwise rotation about (−2, 3) OR B1 for a 90° anticlockwise rotation about (3, −2).
3.(b) Correct enlargement.	B2	Allow B1 for two correct vertices. B1 for an enlargement of scale factor ½ but not centred at (0,0). Must be in the correct orientation. SC1 for a correct enlargement using a scale factor of −1/2 centred at (0,0).

10. Correct enlargement	B2	B1 for triangle enlarged with scale factor -2 in incorrect position (within correct quadrant) OR correct enlargement with scale factor 2 (using correct centre) OR consistent use of an incorrect **negative** scale factor (using correct centre) OR two (or three) correct vertices (not necessarily joined) B0 for using scale factor +1/2.

10. Enlargement with scale factor -2 and centre (4, 6)	B3	Accept candidate's appropriate terminology for 'scale factor' or 'centre'. If B3 not awarded: Award B2 for reference to any two of 'Enlargement', '-2' or 'centre (4, 6)' (in a **single** transformation). Award B1 for reference to any one of 'Enlargement', '-2' or 'centre (4, 6) (in a **single** transformation). The centre may be identified by rays or by a point **with** coordinates stated. A multi-stage transformation gains a maximum of 1 mark.

8. One correct evaluation $1 \le x \le 2$ 2 correct evaluations $1{\cdot}55 \le x \le 1{\cdot}75$, one < 0, one > 0. 2 correct evaluations $1{\cdot}55 \le x \le 1{\cdot}65$, one < 0, one > 0. $x = 1{\cdot}6$	 B1 B1 M1 A1	*Correct evaluation regarded as enough to identify if 'too high' or 'too low'. If evaluations not seen accept 'too high' or 'too low'.* x $2x^3 + x - 10$ (or check $2x^3 + x = 10$) 1 −7 1·1 −6·238 1·2 −5·344 1·3 −4·306 1·4 −3·112 1·45 − 2·452... 1·5 −1·75 1·55 − 1·002... **1·6 −0·208 1·65 0·634...** **1·7 1·526** 1·75 2·468... 1·8 3·464 (1·62 0·123..) 1·9 5·618 (1·63 0·291..) 2 8 (1·64 0·461..)
9. 85% ≡ 6154 $\frac{6154}{85} \times 100$ OR $\frac{6154}{0{\cdot}85}$ = 7240	B1 M1 A1	Accept any indication. Implies the B1.
10. x = 54(°) Opposite angles (of a) cyclic quad. (add up to 180°). y = 108(°) Angle at the centre (is twice the angle at the circumference).	B1 E1 B1 E1	 Dependent on an attempt at 180 – 126. FT 2 × 'their 54' only if less than 360° Dependent on an attempt at 2 × 'their 54'.
11. Correct enlargement	B2	Otherwise B1 for 2 correct vertices within a triangle. OR for 3 correct vertices in the correct location not joined to form the triangle OR triangle of correct shape, size and orientation in incorrect position OR consistent correct use of an incorrect negative scale factor.
12(a). $(9p+1)(9p-1)$	B2	B1 for $(9p \ldots 1)(9p \ldots 1)$
12(b). $(7t-2)(t+3)$	B2	B1 for $(7t \ldots 2)(t \ldots 3)$
13. Sight of 297.5 AND 6.5 297.5 ÷ 6.5 = 45.77(km/h)	B1 M1 A1	Accept 6 hours 30 minutes, but not 6.3 hours. If other calculations shown, then the relevant calculation must be identified. Award M1 for their values provided 295≤d<300 AND 6<t≤7 (but not 6 hours 30 minutes). CAO. Correct answer must be clearly identified.
14. sin BAD = (2×70)/(8×19) or equivalent (BAD=) 67(.08…°) (Area of sector ABD=) 67(.08…)/360×π×8^2 Accept answers in the range 37.4(cm^2) to 37.5(cm^2) OR 37(cm^2)	M2 A1 M1 A1	Allow any unambiguous indication of angle BAD. M1 for the correct use of the formula when sinBAD is not the subject, for example: 70 = 1/2×8×19×sinBAD. Allow any answer that rounds to 67(°). Accept 292.9(…)/360×π×8^2 OR 293/360×π×8^2 for the area of the major sector ABD. FT their derived or stated value of angle BAD. Accept an answer in the range 163.5(cm^2) to 163.7(cm^2) OR 164(cm^2) for the area of the major sector ABD.

WJEC GCSE MATHEMATICS

AUTUMN 2019 MARK SCHEME

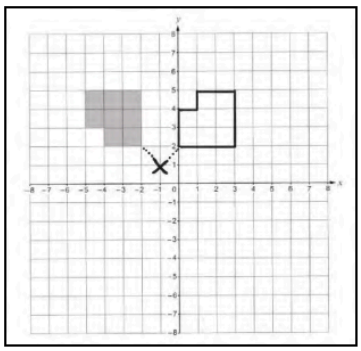
GCSE MATHEMATICS Unit 1: Higher Tier	Mark	Comments
1.(a) (Number of sides =) $\frac{360}{36}$ = 10	M1 A1	
1.(b) (180 – 36) × 10 or equivalent = 1440(°)	M1 A1	F.T. 'their number of sides' if >2.
Alternative method. *(10 – 2) × 180 or equivalent* *= 1440(°)*	*M1* *A1*	*F.T. 'their number of sides' if >2.*
2.(a) Reflection in (the line) x = −2	B2	B1 for 'reflection' or 'reflected'. B1 for sight of 'x = −2' or equivalent e.g. x + 2 =0 (**written**, not simply drawn).
2.(b) (i) Correct translation.	B2	B1 for translation '5 right'. B1 for translation '6 down'. SC1 for 2 correct vertices.
2.(b) (ii) $\begin{pmatrix}-5\\6\end{pmatrix}$	B1	B0 for $\begin{matrix}-5\\6\end{matrix}$ (missing brackets) OR (−5,6) B0 for $-\frac{5}{6}$ with or without brackets. No FT from part (b)(i).
3.(a) −5 −2 3	B2	B1 for two correct (in correct position) OR B1 for −6, −5, −2
3.(b) 6n – 1 or equivalent	B2	B1 for sight of 6n. Mark final answer.
4.(a) 3^4	B1	
4.(b) 40·84101	B1	
4.(c) 3·6	B1	
5.(a) Correct construction of PQR = 60°. Correct triangle PQR drawn.	M1 A1	Correct construction arcs must be seen and angle drawn. PQ = 7 cm (±2mm) and triangle drawn. Allow non labelling of point P (unless position contradicted). Ignore extension of line QP if correct triangle drawn.
5.(b) Arc, centre A, intersecting LM at two points AND Intersecting arcs (equal radii) using the above two points as centres. Line drawn	M1 A1	[Note to markers: These arcs may be identified by the fact that they will 'cross the line LM at an acute angle'. Arcs 'crossing the line at 90°' is evidence of an inappropriate method.]
Alternative method. *Using the properties of a kite.* *Intersecting arcs whose centres are any two points on the line LM and respective radii equal in length to the distance from the points to the point A.* *Line drawn.*	*M1* *A1*	*[Note to markers: The arcs will always intersect at a point that is a 'reflection of point A' in the line LM.]*

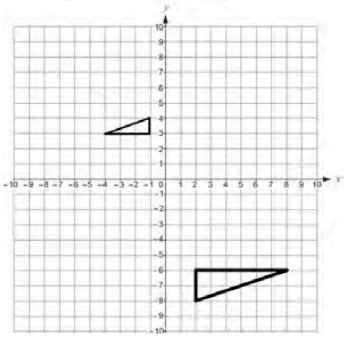
11(a)(i). $\frac{x+1+x+2}{2} \times x \quad (= 25)$	M1	Missing brackets in the expression $\frac{x(x+1+x+2)}{2}$ may be implied later from correct working.
$x^2 + x + x^2 + 2x = 50$ OR $x(2x + 3) = 50$ OR $\frac{2x^2+3x}{2} = 25$ OR $x^2 + 1.5x = 25$	m1	
$2x^2 + 3x - 50 = 0$	A1	Must be convincing. If m1 awarded for $\frac{2x^2+3x}{2} = 25$, a further rearrangement, e.g. $2x^2 + 3x = 50$, must be seen before A1 is awarded.
11(a)(ii). $x = \frac{-(3)\pm\sqrt{(3)^2-4\times2\times(-50)}}{2\times2}$	M1	Maybe seen in a(i). Allow one slip in substitution **for M1 only**, but must be correct formula.
$= \frac{-3\pm\sqrt{409}}{4}$	A1	
$x = 4.3(059\ldots), (x = -5.8(059\ldots))$	A1	CAO.
(AB=) 5.3(cm) AND (DC=) 6.3(cm)	B1	Answers must be to 1 d.p. FT 'their positive x' provided M1 awarded.
11.(b) $7^2 \times 36{\cdot}8$ OR $(7 \times \sqrt{36.8})^2$	M1	
= 1803·2 (cm^2)	A1	Allow 1803 (cm^2)

13. Enlargement with scale factor -2 and centre (4, 4)	B3	Penalise -1 for further incorrect steps. Award B2 for reference to any two of 'Enlargement', scale factor '-2' and 'centre (4, 4)'. Award B1 for reference to any one of 'Enlargement', scale factor '-2' and 'centre (4, 4)'. SC2 awarded for the correct two step transformation from shape A to B, e.g. enlargement SF 2 centre (4, 4), rotation 180° about

10.(a)(i) Correct reason given. e.g. 'An angle at the circumference subtended by a diameter is a right angle'. ' line AC is a diameter'	E1	Accept any correct unambiguous wording. The key word is 'diameter'. Allow eg 'angle in a semicircle is 90°', 'line AC goes through the centre'. 'opposite a diameter' Do not accept 'because it's a right angle'.
10.(a)(ii) $\tan x = \frac{7{\cdot}5}{4{\cdot}7}$ $x = \tan^{-1}(7{\cdot}5 / 4{\cdot}7)$ or $\tan^{-1} 1.6$ or $\tan^{-1} 1.59(\ldots)$ $= 57{\cdot}9(\ldots)(°)$ or $57{\cdot}8(\ldots)(°)$ or $58(°)$	M1 m1 A1	 Implies M1. C.A.O. *Alternative method to find x* *A correct and complete method (using Pythagoras's theorem and a trigonometric relationship). M2* *x = 57·9(…)(°) or 57·8(…)(°) or 58(°) CAO A1*
10.(b) (y =) 58(°) Correct circle theorem given. e.g. 'angles (at the circumference) subtended by the same chord (or arc) are equal', 'angles in the same segment (are equal)'.	B1 E1	Strict FT of 'their x'. Accept any correct unambiguous wording. Allow eg 'angles on the same chord (are equal)' Do not accept e.g. 'they are equal' on its own.
11. 2^{400}	B2	B1 for $(2^{100})^4$ OR sight of 2^4
12. (Height =) $\frac{3\times5533}{825}$ OR $\frac{5533}{\frac{1}{3}\times825}$ = 20·1(2 cm)	M2 A1	M1 for $5533 = 1/3 \times$ height $\times 825$ or equivalent. Allow an answer of 20(cm) from correct working.
Alternative method (finding the radius first): *Use A = π r² to evaluate r or r².* *(Height =)* $\frac{3\times5533}{\pi\times16.2(05\ldots)^2}$ *OR* $\frac{5533}{\frac{1}{3}\times\pi\times16.2(05\ldots)^2}$ *OR* $\frac{3\times5533}{\pi\times262.6(\ldots)}$ *OR* $\frac{5533}{\frac{1}{3}\times\pi\times262.6(\ldots)}$ *= 20·1(2… cm)*	 *M2* *A1*	*Allow use of π = 3·14, 3·142 or 3·14(59…).* *When using the π button on the calculator,* *r = 16·2(05…) OR r² = 262·6(…).* *There will be no FT for any radius other than r = 16cm, from working seen.* *M1 for* $5533 = 1/3 \times$ *height* $\times \pi \times 16.2(05\ldots)^2$ *or equivalent.* *Allow M1 for use of r = 16 (cm)* Allow an answer of 20(cm) from correct working. *Accept an answer in the range 20·10 to 20·143(cm)* *FT base radius = 16 cm: Allow an answer in the range 20·6(cm) to 20·65(cm) OR 21(cm) from correct working.*
13.(a) $(2x+9)(2x-9)$	B2	B1 for $(2x \ldots 9)(2x \ldots 9)$
13.(b) $(7x-4)(x+2)$	B2	B1 for $(7x \ldots 4)(x \ldots 2)$
13.(c) $(x+2)^2(x+7)$ OR $(x+2)(x+2)(x+7)$	B2	B1 for $(x+2)^2(x+2+5)$ OR $(x+2)[(x+2)^2+5(x+2)]$ OR $(x+7)(x^2+4x+4)$ OR $(x+2)(x^2+9x+14)$. Allow B1 for $(x+2)^2(x+k)$ where $k \neq 0$, 2 or 7.
14. $-½$ or equivalent	B2	B1 for -2 or ½.
15. $2n^2+1$ or equivalent = 20 001	B2 B1	B1 for sight of $2n^2$ OR for sight of consistent 2nd difference 4. FT from their $2n^2 \pm k$, where $k \neq 0$ OR from their $2n^2 \pm an$, where $a \neq 0$ OR from their $2n^2 \pm an \pm k$, where $a \neq 0, k \neq 0$. An unsupported answer of 20 001 gains all 3 marks. If no marks, award SC1 for an unsupported answer of 20 000.

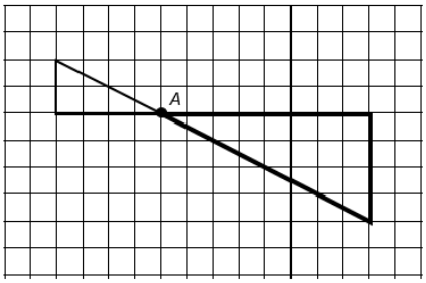
8. Showing 4x + 3y = 19 or equivalent. Showing 6x − y = 12 or equivalent. A correct method to eliminate one variable e.g. 'equal coefficients AND appropriate addition or subtraction'. OR ' method of substitution'. First variable found , x = 2½ or y = 3. Second variable found	B1 B1 M1 A1 A1	2x + 2x + 3y = 19 is an equivalent answer. *Workings must be shown for M1A1A1.* FT to solve for simultaneous equations if of equivalent difficulty. Allow one error in one term (not the term with equal coefficients.) C.A.O. for 'their equations'. FT substitution of their '1st variable' if M1 gained. If NO (i.e. none of the five) marks gained, allow SC1 for <u>both</u> answers of x = 2½ AND y = 3
9. <u>Enlargement</u> with scale factor $-\frac{1}{2}$ and centre (<u>1, 0</u>)	B3	Award B2 for reference to any two of 'enlargement', '$-\frac{1}{2}$' and 'centre (1, 0)'. Award B1 for reference to any one of 'enlargement', '$-\frac{1}{2}$' and 'centre (1, 0)'. If B0, award 1 mark for reference to 'enlargement' within a multi-stage transformation.
10. Sight of $20x^2 + 15x - 8x^2 + 4x$ or equivalent. Sight of denominator of $(2x - 1)(4x + 3)$ $\frac{12x^2+19x}{(2x-1)(4x+3)}$ or $\frac{12x^2+19x}{8x^2+2x-3}$	B2 B1 B1	Award B1 for sight of $5x(4x + 3) - 4x(2x - 1)$ OR three of the four terms correct. Must be seen or stated as the denominator. FT from one error in numerator. Note the numerator may be factorised as $x(12x + 19)$ Mark final answer.
11. (Area scale factor =) Sight of $(\frac{7}{5})^2$ $(=\frac{49}{25})$ OR $1{\cdot}4^2$ (= 1·96) $\frac{49}{25}$ (< 2) or 1·96 (< 2) AND 'No (Mari is not correct)'	B1 B1	Or equivalent Accept a method based on ratios e.g. $5^2 : 7^2 = 25 : 49 = 1 : \frac{49}{25}$ Accept any equivalent statement. Accept $(\frac{7}{5})^2 < 2$ or $1{\cdot}4^2 < 2$ or equivalent. B0 if evaluation of $(\frac{7}{5})^2$ or $1{\cdot}4^2$ is incorrect.
<u>Alternative method</u> (using scale factor 2) *$5^2 \times 2$ (= 50)* *(7^2 =) 49 < 50 AND 'No (Mari is not correct)'*	*B1* *B1*	*Accept a method based on ratios* *e.g. $5^2 : 7^2 = 25 : 49 = \frac{25}{49} : 1$* *Accept any equivalent statement e.g. $\sqrt{49}<\sqrt{50}$* *B0 if evaluation of 5^2 or 7^2 is incorrect.*
12. $xw + 8w = 3y - 4$ or $4 - 3y = -xw - 8w$ $w(x + 8) = 3y - 4$ or $4 - 3y = w(-x - 8)$ $w = \frac{3y-4}{x+8}$ or $w = \frac{4-3y}{-x-8}$ or equivalent	B1 B1 B1	Collecting w terms. F.T. until 2nd error provided equivalent difficulty Factorising. Accept $4 - 3y = -w(x + 8)$ Dividing. Mark final answer. $\frac{4-3y}{x+8} = -w$ only gains B1B1B0

Unit 2 Higher Tier	Mark	Comments
1. Correct rotation. 	B2	B1 for either a: • 90° anticlockwise rotation about (−1,1) • 90° clockwise rotation about (1,-1).

12. Correct enlargement 	B2	B1 for triangle enlarged with scale factor -2 (with correct orientation) in incorrect position (entirely within correct quadrant) OR consistent use of an incorrect **negative** scale factor (using correct centre) OR two (or three) correct vertices (not necessarily joined)

12. Reference to: Enlargement Scale factor –2 Centre of enlargement (–3, 1)	 B1 B1 B1	 If B3, penalise -1 for a multi-stage transformation e.g. extra 'rotation 180°'

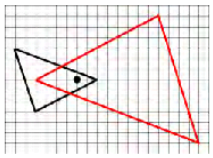
19.*(a)* (i) (-5, 8)	B1	
19.*(a)* (ii) (2, 4)	B1	
19.*(b)* $y = f(-x)$	B1	

9. 	B2	B1 for 2 correct vertices within a triangle, e.g. A and 1 other vertex OR for a triangle of correct shape, size and orientation in incorrect position OR consistent correct use of an incorrect negative scale factor OR for 3 correct vertices (A implied) in the correct location not joined to form the triangle.

1. (Number of revolutions is) $\frac{1000}{\pi \times 29 \div 12}$ or $\frac{1000 \times 12}{\pi \times 29}$ or equivalent	M3	Complete method May be seen in stages M2 for any one of the following, or equivalents: • $\pi \times 29 \div 12$ • $\frac{1000}{\pi \times 29}$ • $\frac{\pi \times 29}{1000 \times 12}$ • $\frac{1000}{\pi \times (29 \div 2) \div 12}$ • $\frac{1000}{\pi \times (2 \times 29) \div 12}$ M1 for any one of the following, that may be embedded in other working: • $29 \div 12$ (= 2.4(1666…)) • 1000×12 (= 12000) • $\pi \times 29$ (= 91.06 to 91.118) • $\frac{1000}{\pi \times n \div 12}$ where $n \neq 0$, e.g. $1000 \times 12 \div (\pi \times 29^2)$ • $\frac{1000}{29 \div 12}$ (= 413.79…) • $1000 \times 12 \div 29$ (= 413.79…)
Answer in the inclusive range 131 to 132 (revolutions)	A1	CAO

Unit 1: Higher Tier	Mark	Comments
9(a) Use of Volume = $\frac{\text{Mass}}{\text{Density}}$ (Maximum possible volume =) $\frac{155}{2.5}$ $= 62\ (\text{cm}^3)$	B1 M1 A1	FT 'their 155' provided $150 < \text{mass} \leq 160$ AND 'their 2.5' provided $2 \leq \text{density} < 3$ CAO If no marks awarded, SC1 for use of 155 AND 2.5
9(b)(i) Identification of correct right-angled triangle $(AD^2 =) 40^2 - (12-2)^2$ or $(AD^2 =) 40^2 - 10^2$ $AD^2 = 1500$ OR $(AD =) \sqrt{1500}$ AND $(AD =)\ 10\sqrt{15}$ (cm)	B1 M1 A1	May be implied by sight of 40 AND (12 – 2) or 10 in working Sight of $AD^2 = 1500$ OR $(AD =)\sqrt{1500}$ AND $10\sqrt{15}$ need to be seen
9(b)(ii) (Total arc length =) $\frac{150}{360} \times 2 \times \pi \times 2$ (= $5\pi/3$ or $1^2/_3\pi$) + $\frac{210}{360} \times 2 \times \pi \times 12$ (= 14π or $42\pi/3$) $= 15\frac{2}{3}\pi$ or $\frac{5640\pi}{360}$ or $\frac{47\pi}{3}$ (cm) or equivalent (Total length of chain =) $20\sqrt{15} + \frac{5640\pi}{360}$ (cm) or equivalent	M2 A2 B1	Allow values of π from 3.14 to 3.142 for M marks only Or equivalent M1 for $\frac{150}{360} \times 2 \times \pi \times 2$ OR $\frac{210}{360} \times 2 \times \pi \times 12$ or equivalents CAO. Allow 15.66π, 15.67π or 15.7π A1 for any one of the following: • AB = $600\pi/360$ or equivalent (= $5\pi/3$ or $1^2/_3\pi$), allowing 1.66π, 1.67π or 1.7π • CD = $5040\pi/360$ or equivalent (=14π or $42\pi/3$) • On FT from M1 for a correct evaluation of 'their $\frac{150}{360}\times2\times\pi\times2$ + $\frac{210}{360}\times2\times\pi\times12$' with 1 correct term, accepting similar notation possibilities as A2 ISW Accept use of $15\frac{2}{3}\pi$ Allow use of 15.66π, 15.67π or 15.7π FT 'their $5640\pi/360$' provided at least 2 marks previously awarded If no marks awarded, and from using $\pi \times$ radius in their calculations, i.e. using the method $2\times10\sqrt{15} + \frac{150}{360}\times\pi\times2 + \frac{210}{360}\times\pi\times12$ SC3 for an answer of $20\sqrt{15} + \frac{5640\pi}{720}$ (cm) or equivalent, allowing use of $7.83(\ldots)\pi$ OR SC2 for … + $\frac{5640\pi}{720}$ (cm) or equivalent, allowing use of $7.83(\ldots)\pi$ OR SC1 for use of $2\times10\sqrt{15} + \frac{150}{360}\times\pi\times2 + \frac{210}{360}\times\pi\times12$

11. Reference to: Enlargement Scale factor –3 Centre of enlargement (–2, 4)	 B1 B1 B1	Check diagram. If B3, penalise –1 for a multi-stage transformation e.g. extra 'rotation 180°'.

10. 	B2	B1 for any one of the following: • 2 correct vertices within a triangle • 3 correct vertices in the correct location not joined to form the triangle • triangle of correct shape, size and orientation in incorrect position • consistent correct use of an incorrect negative scale factor.

3. Premature Approximation
A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

UNIT 1: NON-CALCULATOR, HIGHER TIER

GCSE Mathematics Unit 1: Higher Tier	Mark	Comments

9.	Correct enlargement	B3 3	B2 for scale factor of ½ with centre A. B1 for scale factor of ±½ anywhere.

14.(a)	Concave down curve with y-coordinate of maximum = 4 x-coordinate of maximum = -3 Points $(-7,0)$ AND $(1, 0)$ shown.	 B1 B1 B1	*Allow appropriate marking of axes if coordinates not given.*
(b)	Concave **down** curve that is symmetrical about the y-axis. (0, 3) indicated.	B1 B1	
(c)	A comment regarding no scale or coordinates shown.	B1	
		6	

End of solutions