REVISE
.wales

F1.16 — Perimeter, area & composite 2-D shapes

Mark schemes for the F1.16 question pack

Spec 3.6.1 — Unit 1

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 59 questions in the corresponding revise.wales question pack (61 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

6.(b)	32.36	B2	B1 for 32.35(889....) OR B1 for 32.4

				Mark final answer.
7.(a)	0·26		B1	B0 for 13/50, 26/100 etc.
7.(b)	$\frac{7}{50} \times 3000$ or equivalent = 420		M1 A1	Only allow misread if 300 or 30000 used. 420/3000 gains M1A0. Mark final answer.
7.(c)	$\frac{1}{6} \times 3000$ or equivalent = 500		M1 A1	Only allow misread if 300 or 30000 used. 500/3000 gains M1A0. Mark final answer. Allow M1A0 for 480 or 510 or 498 as implying 1/6 to be 0·16 or 0·17 or 0·166.

10.(a)	$1 - (0{\cdot}4 + 0{\cdot}25 + 0{\cdot}2)$ $= 0{\cdot}15$ or equivalent.		M1 A1	
10.(b)	$0{\cdot}25 + 0{\cdot}2$ $= 0{\cdot}45$ or equivalent.		M1 A1	
10.(c)	$0{\cdot}4 \times 0{\cdot}4$		M1	

10. (Width of square = 56 ÷ 4 =) 14 (cm)	B1	
(Area of square =) 14^2	M1	F.T. 'their width', provided ≠ 56.
= 196 (cm^2)	A1	
Organisation and Communication	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical
Accuracy of writing.	W1	For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working

		1/6 to be 0·16 or 0·17 or 0·166.
19. (Angle DOC or exterior angle =) $\frac{360}{5}$(°) = 72(°) (x =) $\frac{180 - 72}{2}$ = 54(°)	M1 A1 M1 A1	*Answers/working may be seen on diagram.* Sight of 72 (even x = 72) gains M1A1. FT 'their 72' (but not 60°). *Alternative method* *(Sum of interior angles =)* *(5 – 2)×180° or equivalent* *M1* *= 540(°)* *A1* *FT 'their interior angle sum' (≠ 900)* *(x =) ½ × (540 ÷ 5)* *M1*

4.(a) (i) 22 (cm)	B1	
4.(a) (ii) 18 cm^2	B1 U1	
4.(b) Rectangle 3 × 6	B1	Accept any rectangle with an area of 18 cm^2 which fits on the grid e.g. 4 × 4.5 FT 'their (a)(ii)'

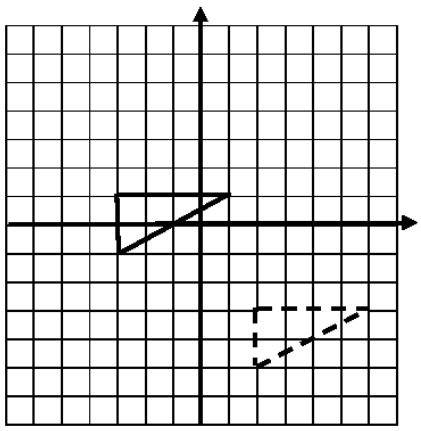
		• use appropriate terminology, units, etc.
9.(a) Correct reflection in y = 1.	B2	B1 for correct reflection in x = 1 OR B1 for sight of line y = 1
9.(b) Clockwise rotation of 90(°) about the origin.	B3	For all **four** components. Accept anticlockwise rotation of 270° about the origin. B2 for any three. B1 for any two. 'Origin' may be stated as e.g. (0,0) or 0 or O. Do not accept 'turn' for rotation. Allow for 'about the origin' any reference to the origin. e.g. 'in the origin', 'around the origin', 'from (0,0)' etc. If not a single transformation (e.g. 'clockwise rotation of 90 and then .....) penalise −1 mark from any marks

			• use appropriate terminology, units, etc
9.	3(4x – 7) = 27 or equivalent 4x = 16 or 12x = 48 or equivalent x = 4	M1 A1 A1	M1 for 4x – 7 = 27/3 FT from ax = b. Allow 3 marks for embedded answer BUT Only two marks if contradicted by 'x ≠ 4'. Unsupported answer of x =4 gains all three marks. If no marks gained allow SC1 for eight of 9

10.(a) **Both** 13 AND 19	B2	Accept in any order. B1 for 17 AND 15. If B2 not awarded, B1 for any TWO of 11, 13, 17 and 19.
10.(b) 12	B2	B1 for 16 or 18 or 20. B1 for 12 AND any multiple of 12 (not in the list).
10.(c) 17	B1	

17.		*Lengths may be seen on the diagram.*
(EC = Side of the square =) $\frac{28}{4}$	M1	
$= 7(\text{cm})$	A1	Any side of square shown as 7(cm) is M1A1.
(Area of triangle CDE =) $\frac{7 \times DE}{2} = 35(\text{cm}^2)$	M1	FT 'their stated or shown length for EC'.
$(DE =) 10(\text{cm})$	A1	

	= 64(%)	A1	
19.	3(4x – 7) = 27 or equivalent 4x = 16 or 12x = 48 or equivalent x = 4	M1 A1 A1	M1 for 4x – 7 = 27/3 FT from ax = b. Allow 3 marks for embedded answer BUT Only two marks if contradicted by 'x ≠ 4'. Unsupported answer of x =4 gains all three marks. If no marks gained, allow SC1 for eight of 9

9.(a) 	B2	If B2 not awarded B1 for reflection in x-axis. B0 if choice of reflections. OR B1 for a correct translation of 'their drawn reflection'.
9.(b) (−3, 5)	B1	

9.	0·57 × 83·5 or equivalent. 47·6	M1 A2	 A1 for sight of 47·5(….) or sight of 47·60. A1 for 47·6%. Mark final answer.

9. (Area of square =) $40{\cdot}96(cm^2)$	B1	
(Perp. height of triangle =) $4{\cdot}3(cm)$	B1	May be seen on the diagram. Do not accept 4·3 as a 'slant height' unless used correctly for M1.
(Area of triangle =) $\frac{6{\cdot}4 \times 4{\cdot}3}{2}$	M1	F.T. 'their unambiguously stated 4·3'. (Not 10·7).
$= 13{\cdot}76(cm^2)$	A1	
(Area of ABCDE = 40·96 + 13·76 =) $54{\cdot}72(cm^2)$	B1	F.T. from two derived or stated areas. Allow 54·7 only if 54·72 seen. *Otherwise penalise **pre**-approximation −1 once only.*

11. Sight of 60(°) or 90(°) 180(°) – [60(°) + 90(°)] OR 90(°) – 60(°) 30(°)	 B1 M1 A1	Answers may be seen on the diagram. Not as final answer for x or incorrectly labelled on diagram. FT 'their derived 60(°) or 90(°)' if B1 awarded CAO Answer of x = 30(°) with no working gets 3 marks.

8. P(Alison chooses letter R) = 2/10 or equivalent. P(Sarfraz chooses letter R) = ¼ or equivalent. Use of 2/10 × 100 OR ¼ × 100 20 AND 25 clearly implying that Sarfraz is the most likely to choose letter R	B1 B1 M1 A1	B1 for sight of 2/10 if unambiguously for Alison. B1 for sight of 1/4 if unambiguously for Sarfraz. As probability not asked for, allow e.g. '2 chances in 10' and 'one chance in four'. B1 marks may be implied in subsequent work. Calculation may be done in stages. There is no requirement to tick the box as long as there is no contradiction. Do not accept, on its own, e.g. 'Sarfraz has less letters to choose from' for the A1.
8. Alternative method *P(Alison chooses letter R) = 2/10* or equivalent. *P(Sarfraz chooses letter R) = ¼* or equivalent. *Attempting to give probabilities in a common format.* *Correct common format* *e.g. 4/20 AND 5/20 or 0·2 AND 0·25* *clearly implying that Sarfraz is the most likely to choose letter R*	*B1* *B1* *M1* *A1*	*B1 for sight of 2/10 if unambiguously for Alison.* *B1 for sight of 1/4 if unambiguously for Sarfraz.* *As probability not asked for, allow* *e.g. '2 chances in 10' and 'one chance in four'* *There is no requirement to tick the box as long as there is no contradiction.* *Do not accept, on its own, e.g.* *'Sarfraz has less letters to choose from' for the A1.*

8. (Area of the triangle CDE =) $14 = \frac{4 \times CE}{2}$	M1	*Lengths may be shown on the diagram.* Accept equivalent e.g. $28 = 4 \times CE$.
(CE =) 7 (cm)	A1	
(Area ABCE = 7 × 7 =) 49 (cm^2)	B1	FT 'their stated or shown length CE'.
(Area of whole shape = 49 + 14 =) 63 (cm^2)	B1	FT 'their stated or shown area of square' + 14.
8. *Alternative method* *(Area of the triangle CDE =)* $14 = \frac{4 \times CE}{2}$	*M1*	*Lengths may be shown on the diagram.*
(CE =) 7 (cm)	*A1*	
(Area Trapezium ABCD =) $\frac{[(7 + 4) + 7] \times 7}{2}$	*M1*	*FT 'their stated or shown length CE (=CB)' consistently as 'their 7'.*
= 63 (cm^2)	*A1*	
8.OCW Organisation and Communication.	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Accuracy of writing.	W1	For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc
9. (a =) $\frac{180 - 110}{2}$ or equivalent.	M1	
= 35(°)	A1	
b (= 180 – 90 – 35) = 55(°)	B1	OR FT 90 − 'their a'.
c (= 90 + 55) 145(°) OR c (= 180 − 35) 145(°)	B1	OR FT 90 + 'their b'. OR FT 180 − 'their a'

9. Length of sides in Cuboid B = 5 (cm), 3(cm), 6 (cm) Volume of Cuboid B = 5 x 3 x 6 = 90 (cm^3)	B1 M1 A1	Award B1 for (height =) 6 (cm), provided length and width aren't also multiplied by 3. F.T. 'their height' x 5 x 3
Alternative method *(Volume of Cuboid A =) 5 x 3 x 2* *= 30 (cm^3)* *(Volume of Cuboid B =) 90 (cm^3)*	*M1* *A1* *B1*	 *F.T. for their stated or derived volume for Cuboid A'*
Organisation and Communication. Accuracy of writing.	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc
10.(a)(i) Subtract six (from the previous term)	B1	Accept 'take away 6' or '(goes) down in 6s'. Allow -6. B0 for n-6
10.(a)(ii) Double (the previous term)	B1	Accept 'multiply by 2' or 'times by 2'. Allow ×2. B0 for n×2
10.(b)(i) x + 3	B1	Mark final answer.
10.(b)(ii) (£)15g	B1	Mark final answer. Accept 15 × g
11.(a) 28·34 or 1417/50 or $28^{17}/_{50}$ ISW	B2	B1 for sight of 23·04 OR sight of 5·3. If B0 allow SC1 for 28 or 28·3
11.(b) 34·8 or 174/5 or $34^{4}/_{5}$ ISW	B1	
12.(a) (19 − 18·2 =) 0·8	B2	B1 for sight of 19 OR sight of −18·2. BUT B0 for 19f − 18·2g. Mark final answer.
12.(b) 7x = 16 (x =) 16/7 (x=) 2·3 (to 1dp)	B1 B1 B1	 FT from 7x = k. Allow 16 ÷ 7 FT from any fraction that requires rounding. Mark final answer. (x =) 2·2…. implies B1B1B0. Allow an embedded 2·3, B1B1B0
13.(a) 4 hours 45 min	B1	
13.(b) 2·4 km	B1	
13.(c) 7km less than 5 miles: TRUE 1kg less than 2lb: FALSE 1 litre less than 1 pint: FALSE 8 litres less than 900cm^3: FALSE	B2	For all 4 correct. B1 for 3 correct.

9.(a) $3n + 5$ or equivalent	B2	B1 for sight of $3n$. B0 for $-3n$ Mark final answer.
9.(b) $3t = r + 8$ or $r + 8 = 3t$ or $-3t = -r - 8$ $t = \frac{r+8}{3}$ or $\frac{r+8}{3} = t$ or $t = \frac{-r-8}{-3}$	B1 B1	F.T. only from $3t = \pm r \pm 8$, stated or implied. ($3t = r + 8$ will have already gained the previous B1.) B1B0 for $-t = \frac{-r-8}{3}$ or equivalent. Mark final answer. *Note* *Allow B1B0 for $t = (r + 8) \div 3$ with or without brackets.* *Allow B1B0 for $\frac{r+8}{3}$ ('t' missing)*
9.(c) $6x + 4 = 46$ OR $3x + 2 = 23$ $6x = 42$ OR $3x = 21$ $(x =) 7$	B2 B1 B1	B1 for $(x + 5) + (2x - 3) + (x + 5) + (2x - 3) = 46$ or equivalent e.g. $(x + 5) + (2x - 3) = 23$ FT collection of 'their terms' if of equivalent difficulty. (linear equation only.) FT only from $ax = b$. Allow a fraction from a FT value unless x is a whole number. $(x =) 7$ gains all four marks. Each B mark implies all previous B marks. Mark final answer.
9.(c) Alternative method *A trial showing correct values and understanding of perimeter. (e.g. $2(4 + 5) + 2(2\times4 - 3) = 28$)* *An improved trial.* *$(x =) 7$*	*B1* *B1* *B2*	*Consistent use of x AND correct evaluation.* *Dependent on first B1.* *If 1st trial is using '7' award B1B1 followed by B1 if left embedded but B2 if shown as $x = 7$.* *B1 for an implied / embedded '$x = 7$' but not shown as $x = 7$.* *$(x =) 7$ gains all four marks.* *Mark final answer.*

9.	a = 123(°) b = 57(°) c = 74(°)	B1 B1 B1	 OR F.T. 180 – a.

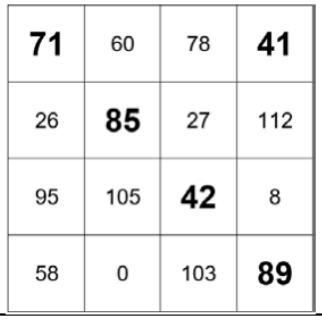
20.(a)	1 – (0·2 + 0·3 + 0·25 + 0·15) or equivalent = 0·1	M1 A1	
20.(b)	0·3 × 200 or equivalent = 60	M1 A1	A final answer of 60/200 implies M1 A0.

5.(b) Reflection (in the line) x = 5	B2	B1 for stating 'Reflection'. Ignore extra wording once 'reflection' (or 'reflected') seen. B1 for stating x = 5 (simply drawing the line is B0)
6.(a) 10x + 15 = 20 OR 2x + 3 = 4 10x = 5 OR 2x = 1 x = $\frac{5}{10}$ OR x = $\frac{1}{2}$ or equivalent	B1 B1 B1	FT until 2nd error. Mark final answer. Allow an embedded answer but penalise −1 if contradicted by x ≠ ½ or 0·5.
6.(b) 7(a + 3)	B1	Allow 7(1a + 3) Mark final answer.
6.(c) $5(n - 3)$ or $5\times(n - 3)$ or $(n - 3)5$ or $(n - 3) \times 5$ or $5n - 15$	B2	B1 for sight of $n - 3 \times 5$ OR sight of $5 \times n - 3$. B0 for unsupported $n - 15$ OR unsupported $5n - 3$. Allow 'n = 5(n – 3)' etc Mark final answer.
7.(a) YES AND a valid explanation. e.g. ' the other two angles would be (both) 20(°)' e.g. diagram showing (isosceles) triangle with angles of 140°, 20° and 20°.	E1	A valid explanation implies YES circled if not otherwise contradicted (by circling NO). Explanations must engage with the specific triangle given (with an angle of 140°) and not isosceles triangles in general.
7.(b) NO AND a valid explanation. e.g. '120(°) + 30(°) ≠ 180(°)' 'the two angles add to 150(°), not 180(°) '120(°) + 30(°) + 120(°) + 30(°) ≠ 360(°)' 'the four angles add to 300(°), not 360(°)	E1	Allow 'the two angles must equal 180°'. Do not accept 'the four angles must equal 360°' unless it is made clear that the rhombus has two pairs of equal angles. A valid explanation implies NO circled if not otherwise contradicted (by circling YES).
7.(c) a + b = 150	B1	
8. [n(G ∩ S) =] 10 [n(S) =] 13	 B1 B1	Entries must be a whole numbers. [n(ℰ)] must be 30 (i.e. no additional 'non-Spanish'). Any blank space to be taken as 0.
9. (Length of AD or BC =) 10 (cm) (Area of ABCD = 5 × 10 =) 50 (cm^2) (Area APB =) $\frac{\pi \times 5^2}{4}$ = 19·6(.....)(cm^2) (Shaded area = 50 − 19·6 =) 30·3(...) or 30·4(cm^2)	B1 B1 M1 A1 B1	May be seen on the diagram or implied in later work. FT 5 × 'their AD (or BC)'. The 50(cm^2) may be shown as two areas of 25(cm^2) for B1 B1. SC1 for sight of $\pi \times 5^2$ or equivalent (78·5....) FT 'their stated area ABCD' – 'their stated area APB' *Note: Sight of (25 – 'area of APB') + 25 implies the first two B marks. [rectangle divided in half]*
9. OCW Organisation and Communication. Accuracy of writing.	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc

19.(a) Correct <u>construction</u> method. e.g. (i) intersecting arcs of radii 6cm and 9cm with centres A and C respectively. OR (ii) copying the angle at B at the point A (will require AB or BA to be extended). Completed parallelogram.	M1 A1	Relevant construction arcs must be seen.
19.(b) 'measured length' × 200 = 1520 (cm) = 15·2 metres	M1 A1 B1	Allow for error in measuring line XY. Accept only in range 1480 to 1560 inclusive. FT 'their 1520' ÷ 100. Unsupported 14·8 to 15·6 inclusive gains all 3 marks.
<u>Alternative method</u> *Sight of scale is 1cm represents 2m* *'measured length' × 2* *= 15·2 metres*	*B1* *M1* *A1*	*Allow for error in measuring line XY.* *Accept only in range 14.8 to 15.6 inclusive.*
20.(a) 9·231	B1	
20.(b) 170	B1	
20.(c) 10	B1	

WJEC GCSE MATHEMATICS

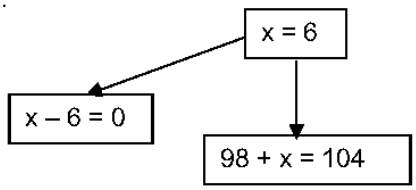
AUTUMN 2021 MARK SCHEME

Unit 2: Foundation Tier		Mark	Comments
1.(a)	5169	B1	
1.(b)	6502	B1	
1.(c)	186	B1	
1.(d)	45	B1	
2.(a)	5, 5, 5, 5	B1	
2.(b)	Exactly two 3s and any other two numbers	B1	Accept in any order.
2.(c)	Exactly one 2 and any other three numbers	B1	Accept in any order.
3.(a)	40 065	B1	
3.(b)	5400	B1	
4.(a)	rhombus	B1	
4.(b)	equilateral triangle	B1	
5.		B3	B2 for 3 rows or 3 columns with a total of 250. B1 for 1 or 2 rows or 1 or 2 columns with a total of 250.
6.(a)	98	B1	
6.(b)	Subtract 13 (from the previous term)	B1	Accept -13, goes down in 13s, etc.
6.(c)	x-2 (years old)	B1	Mark final answer.
7.(a)	Sum of numbers (262) Sum of numbers ÷ 4 65.5 or equivalent	M1 m1 A1	Allow for an unsupported value between 173 and 351. Award this m1 for 'their sum' ÷ 4 CAO. Allow 131/2. If no marks awarded, allow SC1 for (64 + 89 + 83 + 26 ÷ 4 =) 242.5 or equivalent.
7.(b)	(65.5 + 1 =) 66.5	B1	F.T. 'their mean' from (a). Allow 133/2.
8.(a)	23.04	B1	Accept $23\ ^{1}/_{25}$ or equivalent e.g. 576/25
8.(b)	7.9	B1	Accept $7\ ^{9}/_{10}$ or equivalent e.g. 79/10
8.(c)	0.04 × 325 or equivalent = 13 ISW	M1 A1	
9.	(Oliver's number is) 90	B3	B2 for a final answer between 40 and 95 satisfying 2 of the 3 conditions. (45, 54, 60, 72) B1 for a final answer between 40 and 95 satisfying only 1 of the 3 conditions. (40, 42, 44, 46, 48, 50, 52, 56, 58, 62, 63, 64, 66, 68, 70, 74, 75, 76, 78, 80, 81, 82, 84, 86, 88, 92, 94)
OC	Organisation and Communication.	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means

71	60	78	**41**
26	**85**	27	112
95	105	**42**	8
58	0	103	**89**

Alternative method 2 *. Indicates 2 (letters out of 6 gain points)* *(Expected number of wins =) $\frac{2}{6} \times 24$ or equivalent* *= 8* *(Number of wins required =) $\frac{100}{10}$* *= 10 (wins) AND* *'No' (Leah is not expected score 100 points)*	*B1* *M1* *A1* *M1* *A1*	*Any unambiguous indication.* *FT 'their stated number of '10 point' letters'.* *Award M1A1 for 8/24 suggesting '8 wins out of 24'* *FT their derived number of expected wins.* *Note for Alternative method 2* *If 'number of wins required' is calculated before calculating 'number of expected wins' then the conclusion ('AND') will be attached to the 8 rather than the 10.*
OCW Organisation and Communication. Accuracy of writing.	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc
7. $4x + 5 = 57$ or equivalent $4x = 52$ $x = 13$	M1 A1 A1	 FT from $4x = k$. Accept $x = k/4$ (but, if on FT k is a multiple of 4, final answer must be given as a whole number.) M1A1A0 for '$x = 52/4$' Mark final answer. Allow (M1)A1A1 for a correct embedded answer BUT only (M1)A1A0 if contradicted by $x \neq 13$.
8. 3, 4, 4, 9 OR 3, 3, 5, 9.	B3	B1 for a range = 6. B1 for a total = 20. B1 for a median = 4. Penalise use of negative or non-integer values −1. FOUR numbers must be shown, otherwise B0.
9.(a) $\frac{54}{300} \times 100$ or equivalent = 18(%)	M1 A1	Allow sight of 18/100 or 0·18 for M1. M0 for 54/300 alone.
9.(b) Use of Distance / Time $\frac{100}{2{\cdot}5}$ or equivalent = 40 (mph)	M1 M1 A1	Allow M1 even for e.g. 100 / 2·3(0) or 100/150. C.A.O.
10. (a + b = 180 – 25) = 155 (a =) $\frac{155}{5} \times 2$ OR (b =) $\frac{155}{5} \times 3$ or equivalent a = 62(°) AND b = 93(°)	B1 M1 A1	B1 for sight of 155 FT 'their stated 155'. Allow M1A0 if the angles are reversed and not corrected.

5.(a) (0)7:45 23 (March)	B2	B1 for each. B0 for (0)7:45 p.m.
5.(b) Sight of 5 miles ≡ 8 km or equivalent. Shows 15 miles to be 24 km AND a valid statement e.g. 'yes (it's nearly 25 km'), 'no (it's only 24 km').	B1 B1	Allow a more accurate conversion (5 miles ≡ 8 to 8·05 km). Do not accept 3 miles ≡ 5 km '15 miles is 24 km' with no statement is B1B0. Accept a one word decision of 'Yes' or 'No' as a statement.
Alternative method *Sight of 8 km ≡ 5 miles or equivalent.* *Shows 25 km to be 15·625 miles AND a valid statement e.g.* *'yes (it's just over 15 miles'), 'no (it's over 15 miles)'.*	*B1* *B1*	*Allow a more accurate conversion* *(8 km ≡ 4·97 to 5 miles).* *Do not accept 5 km ≡ 3 miles* *'25 km is 15·625 miles' with no statement is B1B0.* *Accept a one word decision of 'Yes' or 'No' as a statement.*
6. Correct strategy of √(Area ABCD – 32) (Area ABCD =) 81 (cm^2) (Area PQRS = 81 – 32 =) 49 (cm^2) (PQ = √49 =) 7 (cm)	S1 B1 B1 B1	FT 'their stated area of ABCD' – 32. FT √'their stated area of PQRS' but not √32 or √9 A final answer of 7(cm) gains all four marks. May be seen on the diagram. (FT answers must be rounded or truncated to 1dp or more)
7.(a) 1·442	B2	B1 for sight of 1·44(1……) or 1·44(2……)
7.(b) 191	B3	B2 for sight of 190(·5…..) or 190·6 B1 for sight of 280.
8. (P(Gold) =) 1 – 0·68 – 0·22 = 0·1 22 people choose silver AND 10 people choose gold (Profit =) 100 × (£)2 – 22 × (£)3 – 10 × (£)8 = (£)54	M1 A1 B1 M1 A1	 May be seen in the table. FT 100 × 'their 0·1'. The 10 implies previous M1A1. The 22 and 10 may be seen in further work. FT 'their stated number of winners (silver and gold)'.
Alternative method1 *(P(Gold) =) 1 – 0·68 – 0·22* *= 0·1* *22 people choose silver AND 10 people choose gold* *(Profit =) 68 × (£)2 – 22 × (£)1 – 10 × (£)6* *= (£)54*	*M1* *A1* *B1* *M1* *A1*	 *May be seen in the table.* *FT 100 × 'their 0·1'. The 10 implies previous M1A1.* *The 22 and 10 may be seen in further work.* *FT 'their stated number of winners (silver and gold)'.*
Alternative method 2. *(P(Gold) =) 1 – 0·68 – 0·22* *= 0·1* *(Profit per game =)(£)2 – 0·22 × (£)3 – 0·1 × (£)8* *= (£)0·54* *(Total profit = £0·54 × 100 =) (£)54*	*M1* *A1* *M1* *A1* *B1*	 *May be seen in the table.* *FT 'their 0·1.* *FT 'their derived £0·54'.*
Alternative method 3. *(P(Gold) =) 1 – 0·68 – 0·22* *= 0·1* *(Profit per game =)0·68×(£)2 – 0·22×(£)1 – 0·1×(£)6* *= (£)0·54* *(Total profit = £0·54 × 100 =) (£)54*	*M1* *A1* *M1* *A1* *B1*	 *May be seen in the table.* *FT 'their 0·1.* *FT 'their derived £0·54'.*
9.(a) −1·3 0·4 2·1	B2	B1 for two correct in the correct position. OR for −3, −1·3, 0·4.
9.(b) 10(th term)	B1	Allow B1 for 10(th) and 14. B0 if only 14 given in answer space. NOTE: If answer to 9(a) is −3, −1·3, 0·4 then allow an answer of 11(th term)

7. 	B2	B1 for 2 correct answers and 1 incorrect answer B1 for 1 correct answer and 1 incorrect answer B1 for 1 correct answer and 0 incorrect answer
8. **Use** of 360(°), e.g. 8x = 360(°) (x =) 360/8(°) (x =) 45(°)	B1 M1 A1	M1 implies B1 If B0 M0 A0, award SC1 for x = 22.5(°) from accurate working from 8x = 180(°)
9. (Perimeter of rectangle =) 15+15+7+7 = 44 (cm) (Length of side of square =) 44 ÷ 4 (cm) 11 (cm)	M1 A1 M1 A1	FT 'their stated 44', but not 15 or 7.
9. OCW Organisation and Communication Accuracy of Writing	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc
10.(a) (x =) 180 – 90 – 37 or equivalent. = 53(°)	M1 A1	
10.(b) (a =) 51(°) (b =) 360 – (51 + 82 + 153) or equivalent. = 74(°)	B1 M1 A1	FT 'their 51', i.e. 125 – 'their 51' provided 'their 51' < 125.
11.(a) $\frac{1}{9}$	B1	
11.(b) 0·016	B1	
11.(c) 0·015	B1	
12.(a) $\frac{1}{10}$ or 0·1	B1	Mark final answer.
12.(b) Sight of 27 AND 4 (27 ÷ 4 =) 6·75	B1 B1	FT if at least 27 or 4 correct and of equivalent difficulty (i.e. <u>not</u> leading to a whole number answer). Answer must be a decimal
13. (Volume =) 5 × 3 × 2 = 30 (cm^3)	M1 A1	Any additional calculation e.g. 30 ÷ 2 = 15 is M0.

9.	Use of 129·5 / time	M1	Allow M1 even for e.g. 129·5/3 hours 30 mins or 129·5/3·3(0) or 129·5/210.
	129·5 ÷ 3·5 or equivalent	M1	Must be a complete and correct method e.g. 129·5/210 × 60.
	37 (miles per hour)	A1	CAO. Award M1M0A0 for sight of unsupported 0·61(6666….) (use of 129·5/210) OR 39·24(2424…) (use of 129·5/3·3).

10. (BC =) 56 (km) ÷ (3 + 4) × 4 or equivalent 32 (km) (BC =) 32 (km) ÷ 8 × 5 or equivalent 20 (miles)	M1 A1 M1 A1	M1 awarded for **complete** method. FT 'their derived 32' ÷ 8 × 5. If a candidate works with AB instead of BC, then treat as a misread -1 (from A mark). Example 1 56 (km) ÷ (3 + 4) × 3 = 24 (km) M1A1 (-1) 24 (km) ÷ 8 × 5 = 15 (miles) M1 A1 (Total = 3 marks) Example 2 e.g. 56 (km) ÷ (3 + 4) × 3 = 16 (km) M1A0 16 (km) ÷ 8 × 5 = 10 (miles) M1 A1 (-1) (Total = 2 marks)
10. Alternative Method (AC =) *56 (km) ÷ 8 × 5 or equivalent* *35 (miles)* (BC =) *35 (miles) ÷ (3 + 4) × 4 or equivalent* *20 (miles)*	*M1* *A1* *M1* *A1*	*M1 awarded for **complete** method* *FT 'their derived 35' ÷ (3 + 4) × 4* If a candidate works with AB instead of BC, then treat as a misread -1 (from second A mark). *56 (km) ÷ 8 × 5 = 35 (miles) M1 A1* *35 (miles) ÷ (3 + 4) × 3 = 15 (miles) M1A1(-1)* (Total = 3 marks)

11. $(BC^2 =)\ 9{\cdot}6^2 + 12{\cdot}8^2$ or equivalent	M1	note: $(BC^2 =)\ 92{\cdot}16 + 163{\cdot}84$ (ignore place values for M1) *Award M1 for the correct values substituted into the Cosine rule.*
$(BC^2 =)\ 256$ or $(BC =)\ \sqrt{256}$	A1	
$(BC =)\ 16$ (cm)	A1	Allow $(BC =)\ \pm 16$ (cm). FT from M1 for the correctly evaluated square root of 'their 256' provided their answer > 12·8.
$CD = 2 \times 60 \div 16$ or equivalent	M2	FT 'their derived BC' **OR** 'their stated 16' (not derived) provided 12·8 < 'their stated 16' < 22·4. Award M1 for $60 = ½ \times 16 \times CD$ or equivalent.
(CD =) 7·5 (cm)	A1	Allow M2A1 for a correct embedded answer BUT M2A0 if contradicted by CD ≠ 7·5 (cm).
*11. <u>Alternative method:</u> **Correct** use of 'two-step' method*	*M2*	*A partial trigonometric method is M0.*
(BC =) 16 (cm)	*A1*	
$CD = 2 \times 60 \div 16$ or equivalent	*M2*	*FT 'their derived BC' **OR** 'their stated 16' (not derived) provided 12·8 < 'their stated 16' < 22·4. Award M1 for $60 = ½ \times 16 \times CD$ or equivalent.*
(CD =) 7·5 (cm)	*A1*	*Allow M2A1 for a correct embedded answer BUT M2A0 if contradicted by CD ≠ 7·5 (cm).*

15.

length = 2 × width	B1	**Answer lines take precedence** Note: correct answer 5·47… (cm) ≤ width ≤ 6·66…. (cm) Must be in the correct order for B1.
Area = width × length	M1	M1 for **using** the correct method (not for stating the formula). FT 'their width' × 'their length'
Area correctly evaluated AND > 60(cm^2)	A1	
Perimeter = 2 × (width + length) or equivalent	M1	M1 for **using** the correct method (not for stating the formula) FT 2 × ('their width' + 'their length')
Perimeter correctly evaluated AND < 40(cm)	A1	If answer space is left blank: • award full marks if correct length, width, area and perimeter clearly identified in working space or • penalise -1 if correct length, width, area and perimeter not clearly identified in working space. Penalise -1 if area and perimeter are reversed on the answer line but correct area and perimeter clearly identified in working space. Note: (W and L need not be whole numbers)

W	L	Area	Perimeter
6	12	72	36

5	5		
9. (Shelley's number =) 46 × 5	or equivalent	M1	
= 230		A1	

		Mark final answer.
13. (Area of square =) $184 - [15 \times 9] =$ $49\ (cm^2)$	M2 A1	Award M1 for sight of 15×9 or $135\ (cm^2)$.
(Length of side of square =) $7\ (cm)$	A1	FT from M2 only, $\sqrt{}$'their 49'. May be embedded or written on diagram.
(Perimeter of square = $4 \times \sqrt{49} =$) $28\ (cm)$	B1	FT 'their derived 7'. May be written on diagram.

		2 10
13. (Length of AB) $18^2 = AB^2 + 10^2$ OR $(AB^2 =)$ $18^2 - 10^2$ or equivalent	M1	note: $(AB^2 =)$ $324 - 100$
$(AB^2 =)$ 224	A1	
$(AB =)$ 14·9(66…) or 15 or $4\sqrt{14}$ or $\sqrt{224}$ (cm)	A1	FT √'their 224' provided M1 gained for M1A0A1. *Alternative method to find AB* *A correct and complete method that would lead to a correct answer (using trigonometric relationships).* *M2* *(AB =) 14·9(66…) or 15 or $4\sqrt{14}$ or $\sqrt{224}$ (cm) A1*
(Area of the circle =) $\pi \times 9^2$	M1	
(Area of the triangle =) ½ × 10 × 14·9(66…) or equivalent	M1	Award M1 for sight of 75 or $20\sqrt{14}$. FT ½ × 10 × 'their *AB*', provided not 18 or 10. Accept any valid method that leads to a correct answer.
254.4(69…) (cm²) or 81π **AND** 74·8(33..) or $20\sqrt{14}$ (cm²)	A1	An answer between 254·3 and 254·51 (cm²). Allow 254. Allow 75.
(Area of the shaded region = 254.4(69) – 74·8(33..) =) 179 to 180 (cm²)	B1	Allow rounded or truncated answers. FT 'their area of a circle' – 'their triangle' (not 'their *AB*') provided at least one area M1 awarded previously.

		• use appropriate terminology, units, etc.
9.(a) $\frac{48}{400}$ (× 100) or equivalent = 12(%)	M1 A1	M1 for sight of 0·12. Note: other complete valid methods to look out for include: • 48 ÷ 4 • 10% + 1% + 1% (= 40 + 4 + 4) • (48 out of 400 =) 12 out of 100 = 12(%)
9.(b) Use of $\frac{45}{9}$ or equivalent (£)40 AND (£)5	M1 A1	Sight of an appropriate 5 (or 40) implies M1. Accept in either order.
9.(c) $(1 -)\ \frac{1}{8}$ $= \frac{7}{8}$	B1 B1	Award B1 for sight of $\frac{1}{8}$ or 0·125 or 1 ÷ 8. FT from $1 - \frac{m}{n}$ where $\frac{m}{n}$ clearly shown as 'their $\frac{1}{8}$' provided it is written as a fraction and not $\frac{1}{2}$ Mark final answer. A final answer of 0·875 is awarded B1B0.
9(c) Alternative method $\frac{8-1}{8}$ *or* $\frac{2^3-1}{2^3}$ $= \frac{7}{8}$	*B1* *B1*	*For consistent correct use of $2^3 = 8$* *FT for 'their consistent value of 2^3'* *e.g.* $\frac{6-1}{6} = \frac{5}{6}$ *gains B0B1.* *Mark final answer.* *A final answer of 0·875 is awarded B1B0*

9.(a)(i)	235(°)	B1	
9.(a)(ii)	055(°)	B1	B0 for 55(°).
9.(b)	P and S	B1	Ignore any sketches (correct or incorrect). Accept in any order. Allow (00)5(°) and 355(°).

4. (22.5 (cm) ÷ 2·5) 9 (inches) 9 × 3.75 + 2.25 36 **and** no indicated	 B1 M1 A1	Ignore any incorrect units given. Workings may be on the diagram. May be implied FT 'their derived 9' provided ≠ 22.5 FT appropriate response from 'their 9' Allow rounded or truncated answers on FT with the appropriate response.
4. Alternative method *((37 – 2.25) ÷ 3.75 =) 9.2(6…..)* *9.2(6..) × 2.5* *23(.16666….) **and** no indicated*	 *B1* *M1* *A1*	*Ignore any incorrect units given.* *Workings may be on the diagram.* *May be implied. Rounded or truncated* *FT 'their derived 9.2(6….).' provided ≠ 37* *Accept answers in the range 23 to 23.25*

6(a) $\frac{90}{360} \times 540$ or ¼ × 540 or 540 ÷ 4 or equivalent	M1	
135 (people)	A1	Answer space takes precedence When repeatedly halving 540, if there are errors, award M0 A0 unless indication that the intention is to divide by 2, e.g. • 540 ÷ 2 = 220 (error) , 220 ÷ 2 = 110 is M1 A0 • 540, 220, 110 is M0 A0
6(b) Angle measured 170(°) ± 2(°)	B1	May be seen on the pie chart
0.4 × 170(° ± 2°) or equivalent	M1	FT for 'their angle, provided 90° < 'their angle' < 180° Any method of repeated addition must **clearly** be addition to 40%
68(°) or angle in the range 67(°) to 69 (°)	A1	Only allow angles in this range provided not from incorrect working Answer space takes precedence Allow A1 for labelled angle on the pie chart if no **final** answer given. On FT, using 'their 170', allow angles correctly rounded or truncated to the nearest degree
6(c) $540 - \frac{7}{10} \times 540$ or $(1 - \frac{7}{10}) \times 540$ or $\frac{3}{10} \times 540$	M1	For complete method
162 (not children)	A1	Answer space takes precedence If no marks, award SC1 for sight of $(\frac{7}{10} \times 540 =)$ 378

6(a)(i) Correct statement of Pythagoras' theorem • (Height^2 =) $50^2 - (60 \div 2)^2$ • (Height^2 =) $50^2 - 30^2$ • 50^2 = height^2 + $(60 \div 2)^2$ • 50^2 = height^2 + 30^2	M1	<u>Clear indication that all measurements have been converted to 3cm, 5cm, 4cm may be awarded all marks</u>
Correct stage of evaluation • (Height^2 =) 2500 – 900 • (Height^2 =) 1600 • sight of $\sqrt{1600}$ • (Height =) $\sqrt{(50^2 - 30^2)}$	A1	Working must be seen Allow M1 A1 for a slip in the initial notation then corrected at this evaluation stage
(Height =) $\sqrt{1600}$ (Height = 40 mm) or Height^2 = 1600 (Height = 40 mm) or 1600 = 40^2 (Height = 40 mm)	A1	Mark final answer A0 for an incorrect statement, e.g. $\sqrt{1600} = 40^2$
6(a)(i) <u>Alternative method 1</u> *Identifies the relationship '3, 4, 5' and relates to the given (right-angled) triangle, e.g. sight of* • *3, 4, 5 and 30(mm), 40(mm), 50(mm)* • *3**cm**, 4**cm**, 5**cm*** • *3, 4, 5 and '× 10'* • *30, 40, 50 and '÷ 10'* ***AND** a statement or conclusion, e.g.* • *Pythagorean triple* • *Right-angled triangle* • *3, 4, 5 triangle means it would be 30, 40, 50 triangle*	*B3*	*For B3 there **must** be an accompanying statement or conclusion* *B2 for identifying the relationship '3, 4, 5' and relates to the given(right-angled) triangle* • *without a conclusion or statement, or* • *with an incorrect conclusion or statement* *B1 for sight of any one of the following:* • *'3, 4, 5'* • *30 (mm) and 40 (mm) appropriately indicated on the diagram* • *A **right-angled** triangle drawn (with or without 90° indicated) appropriately labelled 30 (mm), 40 (mm) and 50 (mm)*
6(a)(i) <u>Alternative method 2</u> *Assuming height as 40mm with use of 50mm or 30mm within a correct statement of Pythagoras' Theorem, e.g.* • *((½ base)^2 =) $50^2 - 40^2$* • *$50^2 = 40^2 + x^2$* • *((hypotenuse)^2 =) $40^2 + 30^2$*	*M1*	*<u>Clear indication that all measurements have been converted to 3cm, 5cm, 4cm may be awarded all marks</u>*
Correct stage of evaluation, e.g. • *((½ base)^2 = $50^2 - 40^2$ =) 900* • *(½ base =) $\sqrt{900}$* • *((hypotenuse)^2 = $40^2 + 30^2$ =) 2500* • *(hypotenuse =) (½ base =) $\sqrt{2500}$*	*A1*	*Working must be seen*
Appropriate full evaluation, e.g. • *(½ base =) 30 (mm)* • *(hypotenuse =) 50 (mm)*	*A1*	*Mark final answer*
6(a)(ii) (Volume) ½ × 60 × 40 × 20 or equivalent	M2	M1 for sight of area of X-section possibly in stages, ½ × 60 × 40 or ½×30×40 + ½×30×40 (= 1200 mm^2)
24000 (mm^3) (> 20000 mm^3)	A1	CAO

6(b) Sight of or implication that: 5 × number of people + 105 = 207 + 3 × number of people or 5x + 105 = 207 + 3x	M1	Implication includes attempt to balance costing for the same number of people ≥ 3 at each venue, e.g. • (10 people) 5 × 10 + 105 with 207 + 3 × 10 • (110, 115,) 120 with (210, 213,) 216
(5 – 3) × number of people = 207 – 105 or number of people = $\frac{207-105}{5-3}$ or 5x – 3x = 207 – 105 or 2x = 102	m1	Includes correctly evaluated trial to attempt to balance costing for the same number of people at each venue provided 'their trial for 30 ≤ the number of people ≤ 70', e.g. correct costing for both venues for 40 people as (FH) (£)305 and (ML) (£)327 From M1, allow 1 slip in the rearrangement of 'their equation' provided 'their equation' is then simplified to ax = b, where a ≠ 0 and b ≠ 0
51 (people)	A1	Sight of cost (£)360 for each venue implies M1 m1 CAO If no marks, award SC1 for finding the number of (whole) people for the same cost at each venue, provided the cost is > (£) 220

8. 180 (°) – 147 (°) (x =) 33 (°)	M1 A1	Allow M1A1 for a correct embedded answer BUT M1A0 if contradicted by $x \neq 33$.

8. $7y-2=4y+1+9$ or $7y-2=4y+10$ $7y-4y=10+2$ $3y=12$ $y=4$	B1 B1 B1 B1	FT until 2nd error. Allow $7y-2-9=4y+1$ or $7y-11=4y+1$ Allow $7y-4y=1+11$. Mark final answer. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction. An embedded, unsupported answer or an answer following trial and improvement of 4 without showing $7y-2=4y+1+9$ or equivalent gains B1 only. Note: $7y-2+9=4y+1$ B0 $7y-4y=1-7$ B1 $3y=-6$ B1 $y=-2$ B1 $7y-2=4y+1-9$ B0 $7y-4y=-8+2$ B1 $3y=-6$ B1 $y=-2$ B1 $7y-2=4y+1$ B0 $7y-4y=1+2$ B1 $3y=3$ B1 $y=1$ B1 If $3y=-6$ or $3y=3$ seen with no previous workings, award B0 B1 B1 with a possible final B1 if correct answer seen. **If no marks awarded**, award SC1 for sight of the following: • $7y+7=4y+1$ (adding 9 on the wrong side) • $4y+10$ • $7y-11$ (from correct working).

13.

[n(just dog) =] 18

[n(just cat) =] 14

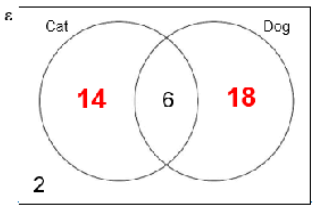


Diagram takes precedence.
Entries must be whole numbers.

B2 B1 for sight of $(\frac{3}{5} \times 40 =)$ 24 from correct working.

B1 FT 32 – 'their 18', provided all sections not blank or 0.

11.(a) 55% or 0·55 or $\frac{55}{100}$ or $\frac{11}{20}$ or equivalent	B1	Allow 55. Do not accept 0·55%.
11.(b) $\frac{1}{2}$	B1	

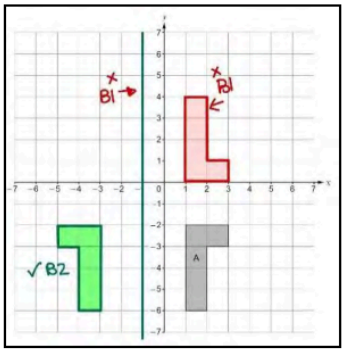
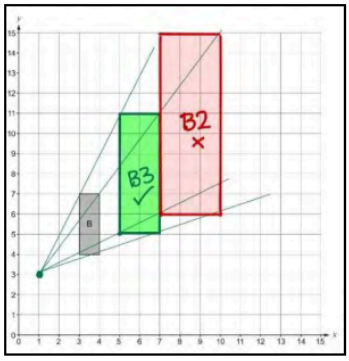
13.(a) 1 10	B2	B1 for each. Table takes precedence if conflicting values given.
13.(b) At least 4 correct plots and no incorrect plot.	P1	FT 'their (−2,1)' and 'their (1,10)' OR (−2,1) and (1,10) plotted. Allow ± '½ a small square'.
A smooth curve drawn through their plots.	C1	FT 'their 6 plots'. OR a curve through the 4 given points **AND** (−2,1) and (1,10) Allow intention to pass through their plots. (± 1 small square horizontally or vertically.)

5. Sight of 7(cm) or 70 (mm) AND 4(cm) or 40 (mm)	B1	Allow 6·8 to 7·2 (cm) and 3·8 to 4·2 (cm) OR 68 to 72 (mm) and 38 to 42 (mm). May be seen or implied in further work. B0 for opposite sides of different lengths.
(Perimeter =) 7 + 4 + 7 + 4 (cm) or equivalent	M1	FT 'their lengths' and 'their widths' for M1 and possibly A1. Units need to be consistent for M1.
22 cm OR 220 mm	A1	Correct units for their measurements are required. B1 M1 A0 for answer of 22 with no working and no correct units.
	1	

Unit 1: Intermediate Tier	Mark	Comments
5(a) 50 × 3 × 1.8(0) or 50 × 3 × 180 (£) 270 or 27000(p)	M2 A2	M1 for any of the following: • 50 × 3 • 50 × 1.8(0) • 50 × 180 • 3 × 1.8(0) • 3 × 180 For A2, if units are given, they must be correct, otherwise A1 for 270p or £27000 Ignoring units, A1 for any of the following: • (50 × 3 =) 150 • (50 × 1.8(0) =) 90 • (50 × 180 =) 9000 • (3 × 1.8(0) =) 5.4(0) • (3 × 180 =) 540
5(b)(i) (Mean of 8 temperatures is -56 ÷ 8 =) -7 (°C)	B3	Must not be from incorrect working, other than allowing from 56 ÷ 8 B2 for any one of the following: • -56 ÷ 8 • 56 ÷ 8 = 7 B1 for any one of the following: • (sum of temperatures) -56 • (sum of temperatures) 56 • sight of 'their sum of temperatures' ÷ 8, provided the summation is not from a sum involving all positive integers or all negative integers, with or without a negative sign inserted. If '÷ 8' is not seen, it may be implied from 'their sum' and 'their mean' (rounded or truncated)
5(b)(ii) (-56 + -16) ÷ 9 or -72 ÷ 9 -8 (°C)	M1 A1	FT 'their -56' from (b)(i) On FT allow a rounded or truncated answer Allow a correctly rounded or truncated answer, to 1d.p. for '('their -56' + -16) ÷ 9' to imply M1 A1
5(c)(i) 20 × (8.6 (± 0.2)) 172 (± 4 m)	M1 A1	Do not award from sight of an incorrect evaluation of 'their 8.6' × 20
5(c)(ii) 232° ± 2°	B1	

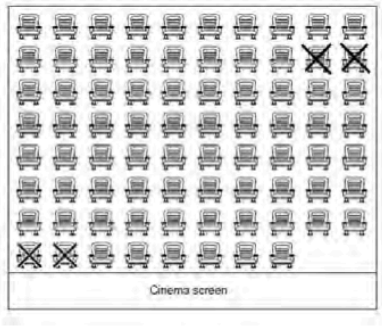
Unit 2: Intermediate Tier	Mark	Comments
7(a) Method **not directly** working with a stated or omitted number of hours difference		Methods may be shown in stages or be embedded Use this method if 2 separate numbers of hours are used, which may not be correct, i.e. ≠12 and ≠10, with or without indication of subtraction Penalise every additional **spurious** term by reducing the count of correct terms by 1*
0.324 × 8 × **(10 or 12)** × 7 × 80 ÷ 1000	M3	Allow '× 32.4' for '× 0.324' M2 for any 4 or 5 correct terms* M1 for any 3 correct terms*
0.324 × 8 × **(12 or 10)** × 7 × 80 ÷ 1000 **with** the intention to subtract	m1	Must be an indication of the intention to subtract, in either order **FT from 5 (or 6) consistent correct terms** for use of • the other value 10 or 12 respectively • 'their number of hours' are 13 **and** 11 (incorrect) Award m0 if inconsistent, i.e. not an equal number of **consistent correct terms*** between the expressions. Mark 'their better stated calculation' first if both are given
(Saving is 17.418… – 14.515…=) (£) 2.90	A1	CAO All working must be checked, do not award 5 marks for £2.90 from incorrect working.
Alternative method: *Method **directly** working with a stated or omitted number of hours difference*		*Methods may be shown in stages or be embedded* *Use this method if a single number of hours is used, which may not be correct, i.e. ≠2, or if the number of hours is omitted* *Do not allow 2 hours as a correct term from incorrect working, e.g. 13 – 11 = 2* *Penalise every additional **spurious** term by reducing the count of correct terms by 1**
0.324 × 8 × 2 × 7 × 80 ÷ 1000	*M4*	*Allow '× 32.4' for '× 0.324'* *M3 for any 5 correct terms** *M2 for any 4 correct terms** *M1 for any 3 correct terms**
(Saving is) *(£) 2.90*	*A1*	*CAO* *All working must be checked, do not award 5 marks for £2.90 from incorrect working.*

Unit 2: Intermediate Tier	Mark	Comments
7(b) Height = $\tan 68° \times 3.3$ or height = $\frac{\sin 68° \times 3.3}{\sin(90-68)°}$	M2	Or alternative correct full method, isolating height M1 for $\tan 68° = \text{height} / 3.3$ or $\frac{\text{height}}{\sin 68°} = \frac{3.3}{\sin(90-68)°}$ or equivalent
8.167… (m) or 8.17 (m) or 8.2 (m)	A1	Allow 8(m), 8.1(m) 8.16(m) from correct working

9.(a) Correct reflection.  	B2	**Overlay** Award B1 for one of the following: • line $x=-1$ drawn • correct reflection in line $y=-1$ • a correct reflection with only one other incorrect reflection seen.
9.(b) Correct enlargement.  	B3	**Overlay** Award B2 for one of the following: • an enlargement of scale factor 2 with correct orientation but not from centre (1,3) • an enlargement of scale factor 3 from centre (1,3) • 4 correct vertices plotted but not joined. Award B1 for one of the following: • an enlargement of scale factor 2 with incorrect orientation • sight of appropriate 4 'rays' from point (1,3) • an enlargement of scale factor 3 with correct orientation but not from centre (1,3) • an enlargement of scale factor 2 of one of the sides, with correct orientation, from centre (1,3). (The side must be part of a rectangle).

10(a) $\frac{247}{400}$	B2	Mark final answer B1 for sight of $\frac{988}{1600}$ or $\frac{494}{800}$ If no marks, award SC1 for a final answer of $\frac{153}{400}$
10(b) 18000 × 8 ÷ 5 or 18000 × 1.6 or equivalent 28 800 (km)	M1 A1	Accept use of × 1.6 to × 1.613 or ÷ 0.62 to ÷ 0.625 Also accept answers in the range 28960 (km) to 28980 (km)
10(c) (Cost of tarmac) 1600 × 23 × 0.035 × 250 (£) 322000	M2 A1	M1 for a product including any 3 of these 4 values Allow M1 for • (1600 × 0.035 × 250 =) 14000 • (1600 × 23 × 250 =) 9 200 000 • (1600 × 23 × 0.035 =) 1288 • (23 × 0.035 × 250 =) 201.25 CAO If no marks, award SC1 for an unsupported answer with leading digits 322 and all other digits zero e.g. 32200 or 3 220 000 If no marks, award either • SC2 for (988 × 23 × 0.035 × 250 =) (£)198 835 or • SC1 for (988 × 23 × 0.035 =) 795(.34 m^3)

2(a) (Amount of discount for 1 ticket =) (£)0.45 or 45(p) OR (Amount of discount for 2 tickets =) (£)0.9(0) or 90(p) (Cost of tickets =) 2 × (£)4.50 – 2 × (£)0.45 + (£)1.40 (9 – 0.90 + 1.40) Or 2 × (£)4.50 – 2 × 0.1 × (£)4.50 + (£)1.40 Or equivalent = (£)9.50	 B1 M2 A1	If units are given, they must be correct Workings may be seen in stages Award B1 for (£)0.9(0) or 90(p) seen as the **total discount** FT 'their **derived or stated** (£)0.45 or (£)0.9(0)' Award M1 for: • 2 × (£)4.50 – 2 × (£)0.45 (£9 – 90p) • 2 × (£)4.50 – 1 × (£)0.45 + (£)1.40 (£9 – 45p + £1.40) • 1 × (£)4.50 – 2 × (£)0.45 + (£)1.40 (£4.50 – 90p + £1.40) • 1 × (£)4.50 – 1 × (£)0.45 + (£)1.40 (£4.50 – 45p + £1.40) • 2 × (£)4.50 – 2 × (£)0.45 + 2 × (£)1.40 (£9 – 90p + £2.80) • 2 × (£)4.50 + (£)1.40 (£)9 + (£)1.40 FT from M2 or M1 (Answers from M1: (£)8.10, (£)9.95, (£)5, (£)5.45 (£)10.90, (£)10.40) <u>If the discount is applied at the end:</u> Award M1 for 2 x £4.50 + £1.40 Award A1 for £10.40 Award SC1 for an answer of £9.36 (from £10.40 – 0.1 x £10.40 = £10.40 – £1.04) FT for SC1 for 0.9 × 'their 10.40' correctly evaluated provided M1 awarded <u>If the booking fee is added to the cost of each ticket and the discount is applied at the end:</u> Award M1 for: 2 x (£4.50 + £1.40) – 0.1 x (£4.50 + £1.40) Or £11.80 - £1.18 Award A1 for £10.62 If no marks awarded, award SC1 for (£)9 seen
Organisation and communication Writing	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc.

2(b) Seats G9 **and** G10 indicated on diagram 	B1	
2(c) (£)3.59 + (£)5.45 (£)9.04 (£)9.04 – (£)7.60 (£)1.44	M1 A1 M1 A1	No misread allowed CAO FT 'their derived or stated 9.04' provided 'their 9.04' > 7.60

2(a) (Total of items 55 + 18 + 12 =) (£) 85 OR (Individual discounts) (£) 8.25, (£) 2.7(0), (£) 1.8(0) OR (Discounted costs) (£) 46.75, (£) 15.3(0), (£) 10.2(0)	B1	All 3 discounts are required, not necessarily in a sum OR Allow 2 of the 3 individual discounts correct in a sum All discounted costs required, not necessarily in a sum OR Allow 2 of the 3 discounted costs correct in a sum
(Total Discount 0.15 × 85 =) (£) 12.75 OR (Total discounted cost 0.85 × 85 =) (£) 72.25	B1	FT from 'their 55 + 18 + 12' incorrectly evaluated May imply previous B1 Allow an embedded £12.75 from sight of 22.70 (= 12.75 + 9.95) or 85 – 82.20 (= 2.80) Allow an embedded £72.25 from sight of 62.30 (= 72.25 – 9.95) or 82.20 (= 94.95 – 12.75)
(Overall saving) (12.75 – 9.95 or 85 – 9.95 – 72.25 =) (£) 2.8(0)	B2	CAO provided not from incorrect working If units are given they must be correct B1 for any one of the following: • 12.75 – 9.95 • 85 – 9.95 – 72.25 • an answer of (£)82.2(0) • 85 – 12.75 + 9.95 • 94.95 – 12.75 • 72.25 + 9.95 OR FT for possible B1, provided 'their overall saving' > 0: • 'their 55 + 18 + 12' incorrectly evaluated • 'their total discount' • 'their discounted costs' for a correctly evaluated answer equivalent to 'their total discount' – 9.95, or 'their 55 + 18 + 12' – 9.95 – 'their total discounted costs' If no marks, award SC1 for sight of (£)94.95 (= 85 + 9.95) or (£)75.05 (= 85 – 9.95)

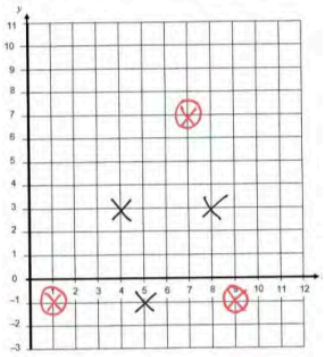
2(b) $\frac{1}{2} \times (1 - \frac{1}{6})$ or $\frac{1}{2} \times \frac{5}{6}$ or equivalent	M1	Allow 0.5 × 0.833(.....) Do not accept 0.5 × 0.83
$\frac{5}{12}$ or equivalent fraction	A1	An answer of $\frac{2.5}{6}$ is awarded M1 A0 If no marks, award SC1 for an answer of (½ × ⅙ =) $\frac{1}{12}$
2(b) Alternative method *Correctly evaluated* $\frac{1}{2} \times \frac{5}{6}$ *× an amount*	*B1*	*May be seen in stages* *Must be an exact amount calculated, not rounded or truncated, e.g. £60 as 'their amount' to give £25*
$\frac{5}{12}$ *or equivalent*	*B1*	*An answer of* $\frac{2.5}{6}$ *is awarded B1 B0*

4(a) 19.4 × 10.6 – 3.5 × 6 (205.64 – 21) 184.64 m^2 or metres^2	M2 A1 U1	May be seen in stages Award M1 for either • 19.4 × 10.6 (=205.64) • 3.5 × 6 (=21) CAO but allow 184.6 or 185 from correct working This is independent of previous marks
4(b) 19.4 + 10.6 + 19.4 + 10.6 or equivalent 60 (m) (19.4 + 10.6 + 19.4 + 10.6) × (£)2.95 (£)177 or 17700(p)	M1 A1 M1 A1	 FT 'their perimeter' provided 'their perimeter' comes from using <u>at least 2</u> of the measurements (e.g. using 19.4 & 19.4 or 19.4 & 10.6 or 10.6 &10.6) Award A0 if incorrect units used i.e. £17700 or 177p If no marks awarded, award SC1 for any one of the following: • answer of (£)57.23 from 19·4 × £2.95 • answer of (£)31.27 from 10·6 × £2.95.
4(b) <u>Alternative method where the perimeter is not found 1st</u>. *19.4 × (£)2.95 + 19.4 × (£)2.95 + 10.6 × (£)2.95 + 10.6 × (£)2.95* *(57.23 + 57.23 + 31.27 + 31.27)* *Or* *(19.4 + 19.4 + 10.6 + 10.6) × (£)2.95 or equivalent* *(£)177 or 17700(p)*	*M2* *A2*	*Award M1 for* • *19·4 × £2.95 + 10·6 × £2.95 (=88.50)* • *2 × 19·4 × £2.95 + 10·6 × £2.95 (=145.73)* • *19·4 × £2.95 + 2 × 10·6 × £2.95 (=119.77)* • *2 × 19·4 × £2.95 (=114.46)* • *2 × 10·6 × £2.95 (=62.54)* *Allow 19.4 + 19.4 + 10.6 + 10.6 × (£)2.95 for M2* *CAO* *Award A1 if incorrect units used i.e. £17700 or 177p* *If M2 awarded, award A1 for any one of the following:* *(If answers listed below are seen without a method, award M2A1)* • *(£)80.67 (from 19.4 + 19.4 + 10.6 + 10.6 × (£)2.95)* • *(£)97.83 (from 10.6 + 10.6 + 19.4 + 19.4 × (£)2.95)* • *(£)101.34 (from 2 ×19.4 + 2 ×10.6 × (£)2.95)* • *(£)135.66 (from 2 ×10.6 + 2 × 19.4 × (£)2.95)* *FT from M1 for A1 only for a correct evaluation of their costs* • *(£)88.5(0)* • *(£)145.73* • *(£)119.77* • *(£)114.46* • *(£)62.54* *If no marks awarded, award SC1 for any one of the following:* • *answer of (£)57.23 from 19·4 × £2.95* • *answer of (£)31.27 from 10·6 × £2.95.*

5. **Complete** method to find the volume For example: **Square and rectangle** (allow any equivalent valid method) • 2 × (12 × 12 + 5 × (16 – 12)) • 2 × (12 × 12 + 5 × 4) • 2 × (144 + 20) • 288 + 40 • 2 × 164 **Two rectangles** (allow any equivalent valid method) • 2 × (5 × 16 + 12 × (12 – 5)) • 2 × (5 × 16 + 12 × 7) • 2 × (80 + 84) • 160 + 168 • 2 × 164 **Three rectangles** (allow any equivalent valid method) • 2 × (12 × (12 – 5) + 5 × 12 + 5 × 4)) • 2 × (12 × 7 + 5 × 12 + 5 × 4) • 2 × (84 + 60 + 20) • 168 + 120 + 40 • 2 × 164 **Larger rectangle – smaller rectangle** (allow any equivalent valid method) • 2 × (16 × 12 – (16 – 12) × (12 – 5)) • 2 × (16 × 12 – 4 × 7) • 2 × (192 – 28) • 2 × 164 • 384 – 56 (Volume =) 328 (cm^3)	M3 A1	*Note: check diagram for the area and missing lengths* If not M3 award M2 or M1 depending on the entries in the table. Calculations such as 12 × 12 × 5 × 16 × 2 are awarded M0. For M2 and M1, FT 'their (16 – 12)' or 'their (12 – 5)' where appropriate. CAO

Award M2 for **one** of the following: *(summing two areas/subtracting two areas/finding **one** volume)*	Award M1 for **one** of the following: *(calculating one area)*
Square and rectangle	
• 12 × 12 + 5 × (16 – 12) • 12 × 12 + 5 × 4 • 144 + 20 • **164** • 2 × 12 × 12 • 2 × 144 • **288** • 2 × 5 × (16 – 12) • 2 × 5 × 4 • 2 × 20 • **40**	• 12 × 12 • **144** • 5 × (16 – 12) • 5 × 4 • **20**
Two rectangles	
• 5 × 16 + 12 × (12 – 5) • 5 × 16 + 12 × 7 • 80 + 84 • **164** • 2 × (5 × 16) • 2 × 80 • **160** • 2 × 12 × (12 – 5) • 2 × 12 × 7 • 2 × 84 • **168**	• 5 × 16 • **80** • • 12 × (12 – 5) • 12 × 7 • **84**
Three rectangles	
• 12×(12–5)+ 5 ×12+5×4 • 12 × 7 + 5 × 12 + 5 × 4 • 84 + 60 + 20 • **164** • 2 × 12 × (12 – 5) • 2 × 12 × 7 • 2 × 84 • **168** • 2 × 5 × 12 • 2 × 60 • **120** • 2 × 5 × 4 • 2 × 20 • **40**	• 12 × (12 – 5) • 12 × 7 • **84** • 5 × 12 • **60** • 5 × 4 • **20**
Larger rectangle – smaller rectangle	
• 16 ×12–(16 –12)×(12–5) • 16 × 12 – 4 × 7 • 192 – 28 • **164** • 2 × 16 × 12 • 2 × 192 • **384** • 2 × (16 – 12) × (12 – 5) • 2 × 4 × 7 • 2 × 28 • **56**	• 16 × 12 • **192** • (16 –12)×(12 – 5) • 4 × 7 • **28**

6. (Shape A's perimeter =) 6 × 5 (cm) or equivalent	M1	
(Shape B's perimeter =) 4 × 7·5 (cm) or equivalent	M1	
Both perimeters = 30 (cm)	A1	Award M1M1A1 for an unsupported Shape A's perimeter = 30 cm AND Shape B's perimeter = 30cm

6. Plotting the three given points (black crosses below). Three correct possible points for the 4th vertex plotted (red crosses below) AND correct coordinates given. (7, 7) (9, -1) (1, –1) 	P1 B3	Answer lines take precedence. For P1 B3 only 6 points should be plotted on grid. Award B2 for one of the following: • correct coordinates of at least two possible points for the 4th vertex • 3 possible points for the 4th vertex are indicated on the grid but coordinates not given or given incorrectly with no more than 6 points on the grid. Award B1 for one of the following: • correct coordinates of one possible point for the 4th vertex • 2 possible points for the 4th vertex are indicated on the grid but coordinates not given or given incorrectly with no more than 6 points on the grid.

9. Complete method to calculate the area of cross-section, e.g. • 160 × 100 – 60 × (160 – 2 × 15) • 160 × 100 – 60 × 130 • 15 × 100 + (160 – 2 × 15) × (100 – 60) + 15 ×100 • 15 × 100 + 130 × 40 + 15 × 100 • 15 × 60 + 160 × (100 – 60) + 15 × 60 • 15 × 60 + 160 × 40 + 15 × 60 • 15 × 60 + (160 – 15) × (100 – 60) + 15 ×100 • 15 × 60 + 145 × 40 + 15 ×100	M2	Cross-section working may be embedded within working to find the depth (= 16000 – 7800) (= 1500 + 5200 + 1500) (= 900 + 6400 + 900) (= 900 + 5800 + 1500) M1 for the sight of **2** dimensionally correct **products** (a pair of numbers) that must include at least 1 of the following evaluated products: • 15 × 60 = 900 • 15 × 100 = 1500 • 130 × 40 = 5200 • 145 × 40 = 5800 • 160 × 40 = 6400 • 60 × 130 = 7800 • 160 × 100 = 16000
(Area cross-section) 8200 (cm^2)	A1	CAO
(Depth = Volume ÷ area X-section) 164000 ÷ 8200	M1	FT 164000 ÷ 'their **area**', provided 'their area' is dimensionally correct (e.g. not a length or a volume)
20 (cm)	A1	On FT ignore any decimal part in their evaluation (accepting also if decimal parts have led to rounding or truncation) Answer space takes precedence

10. A correct explanation, e.g. • 'She has divided by 4, not a quarter'. • 'She has worked out a quarter of 8 (not divided by a quarter)'.	E1	Allow • 'the answer should be bigger than 8' • 'the answer should be 32'. • 'this is how many 4s in 8, not how many 1/4s in 8' • 'she needs to multiply by 4 not divide by 4'. Do not allow 'she wasn't meant to divide (by 4)'. Do not ignore contradictory or incorrect comments.

10. (Number of 50p coins =) (£)19.20 ÷ (£)0.20 ÷ 8 × 5 or equivalent	M2	May be seen in stages. May be seen in any order. Award M1 for one of the following: • (£)19.20 ÷ 8 × 5 (=(£)12) • 96 (number of 20p coins (£)19.20 ÷ (£)0.20 or 19.20 × 5) • (£)19.20 ÷ (£)0.20 ÷ 8 (=12) • 'their derived number of 20p coins' ÷ 8 • 12 • (£)19.20 ÷ 8 • (£)2.4(0)
(Number of 50p coins =) 60	A1	CAO. May be implied in further working.
(Value of 50p coins = 60 × (£)0.5(0)=) (£)30(.00)	A1	FT 'their 60' × (£)0.5(0) **provided M2 awarded** and 'their 60' is rounded or truncated if required to a whole number of coins. May be implied in later working.
(Total value of coins = (£)19.20 + (£)30 =) (£)49.2(0)	A1	FT provided M2 or M1 awarded (£)19.2(0) + 'their 60' × (£)0.5(0). If no marks, award SC1 for sight of (8 × (£)0.2(0)=) (£)1.60 **and** (5 × (£)0.5(0)=) (£)2.50 or equivalent.

10. (Area of floor) ½ × 4.3 × 2.7 5.8 (m^2) or 5.805 (m^2) or 5.81 (m^2)	M1 A1	Accept 6 (m^2) provided correct working seen
(3 tins covers) 3 × 1.6 (= 4.8) OR (Number of tins of varnish) 5.805 ÷ 1.6 (= 3.628…) OR (Area per tin if only 3 tins) 5.805 ÷ 3 (= 1.935)	M1	Use of information given in the question OR FT 'their derived area of floor', including if not dimensionally correct, e.g. allow FT if 'their derived area' = 2.7 + 4.3 = 7 or 4.3 × 2.7 = 11.61 or $\sqrt{4.3^2 + 2.7^2}$ = 5.077… or $\sqrt{4.3^2 + 2.7^2}$ + 2.7 + 4.3 = 12.077…
States or unambiguously implies 'No' AND a suitable correctly evaluated calculation, e.g. • (3 × 1.6 =) 4.8 (m^2) • (5.805 ÷ 1.6 =) 3.6(28…) or 4 (tins) • (5.805 ÷ 3 =) 1.935 (m^2)	A1	FT 'their derived area of floor', provided their area calculation involves 4.3 × 2.7 and is dimensionally correct Ignore additional spurious statements or calculations provided a correct comparison with 'their number of tins' with 3, or 'their area' with 4.8(m^2) is given

= 83(°)	A1	
12. One example of a **pair** of relevant rectangles or squares considered with the longer side correctly doubled and the shorter side correctly halved.	S1	Sketch shown or lengths clearly stated.
Correct method of finding the perimeter of either rectangle/square.	M1	FT one of 'their rectangles/squares' if lengths/width explicitly stated or shown on diagram. If only one rectangle or square is considered, award S0M1 if the correct perimeter or method of finding the perimeter is shown.
Correct perimeters found for **both** rectangles/squares **AND** statement that Owen is incorrect (or a statement that the perimeters aren't the same).	A2	Award A1 for one of the following: • one correct perimeter and a correct statement for 'their rectangles/squares' • both perimeters correctly evaluated for both 'their rectangles/squares' without a statement. Ignore additional comments about area. If area is used instead of perimeter: **S1** can be awarded for one example of a pair of relevant rectangles or squares considered and an additional **SC1** could be awarded for their two (clearly identified) correct areas **AND** statement that Owen is correct.