EXPERT TUITION

Maths Questions By Topic:

Geometry & Measures Mark Scheme

Edexcel GCSE (Foundation)

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Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	Trapezium	B1	for trapezium	Accept incorrect spelling provided intention is clear
(b)	Cylinder	B1	for cylinder	Accept incorrect spelling provided intention is clear
2	12	P1	for a process to find the area of cross section, eg $750 \div 25$ (= 30) oe **or** $\frac{1}{2} \times 5 \times h$ oe	May use any letter for h or may use ?
		P1	for a correct equation in h, eg $750 \div 25 = \frac{1}{2} \times 5 \times h$ oe **or** $\frac{1}{2} \times 5 \times h \times 25 = 750$ oe **or** for a complete process to find h, eg. $\frac{750}{25} \times \frac{2}{5}$ oe **or** "30" $\times 2 \div 5$	
		A1	cao SC B1 for answer of 6 if P0 scored	
3	Shown	M1	for a correct expression for the area of one face of the cube, eg. x^2 **or** a correct expression for the surface area of the cube, eg $6 \times x^2$	No marks for $x = \sqrt{6\pi}$ without any working.
		M1	for a correct expression for the surface area of the sphere, eg $4 \times \pi \times 3^2$ (= 36π)	
		M1	for forming a suitable equation, eg $6 \times x^2 = 4 \times \pi \times 3^2$ **or** $6x^2$ = "36π"	$6 \times x^2 = 4 \times \pi \times 3^2$ $x^2 = 36\pi \div 6$
		A1	for completing the method to $x = \sqrt{6}$ or $k = 6$	$x = \sqrt{6\pi}$

Question	Answer	Mark	Mark scheme	Additional guidance
4	Reflection	M1	for a correct reflection of the shape in any line **or** a correct reflection of at least 3 vertices	Allow hand-drawn
		A1	ca	
5 (a)	025	B1	for angle in the range 23 to 27	Accept without the initial 0, eg. 25
(b)	1.25	M1	for measurement of *AB* in the range 4.8 to 5.2 (cm) or 48 to 52 (mm)	Could be just seen on the diagram
		M1	for "5" × 25000 (= 125000) or "50" × 25000 (= 1250000) **or** "5" ÷ 100000 (= 0.00005) or "50" ÷ 1000000 (= 0.00005) **or** 25000 ÷ 100000 (= 0.25) or 25000 ÷ 1000000 (= 0.025)	125000 or 1250000 seen implies M1M1 For the award of this mark, "5" or "50" can be any value in the range 4 to 6 or 40 to 60
		A1	for answer in the range 1.2 to 1.3	
6	A & D	B1	cao	
7	85 with working and reasons	M1	for correct use of corresponding angles eg *AEB* = 63 **or** co-interior angles eg *BCD* = 180 – 148 (= 32) or *DEB* = 180 – 63 (= 117)	Angles must be clearly labelled on the diagram or otherwise identified. Full solution must be seen.
		M1	(dep) for a complete method to find angle *EAB* eg. 180 – "63" – (180 – 148) **or** 148 – "63" **or** "117" – (180 – 148)	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for *EAB* = 85 (identified)	
		C2	(dep on M2) all working correct with all appropriate reasons stated. Corresponding angles are equal Allied angles / Co-interior angles add up to 180 Angles on a straight line add up to 180 Angles in a triangle add up to 180 The exterior angle of a triangle is equal to the sum of the interior opposite angles.	When reasons are given the key words underlined must be present. Reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
		(C1	for **one** reason relating to parallel lines clearly used and stated **or** for any **two** reasons clearly stated for their fully correct method)	

Question	Answer	Mark	Mark scheme	Additional guidance
8	45	M1 A1	for 180 – (100 + 35) oe cao	 Answer may be written on the diagram.
9	perpendicular line constructed	C2 (C1	for a fully correct construction with all relevant arcs drawn for a perpendicular line drawn from *P* to the line *CD* or all relevant arcs drawn)	Perpendicular line segment between *P* and *CD* must be within guidelines Accept dotted lines.
10	93	M1 M1 M1 A1	for method to find angle *ACB*, eg 180 – 75 – 51 (= 54) (dep M1) for method to use the ratio, eg "54" ÷ (2 + 1) (= 18) for complete method, eg 180 – 51 – "18" × 2 or 75 + "18" oe cao	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54° shown in the wrong place
11	16	P1 P1 A1 	for process to formulate an equation or inequality, eg $2x + 3x + 10 * 90$ **or** for 90 – 10 for a process to solve the equation or inequality by isolating terms in *x*, eg $5x * 90 – 10$ **or** for (90 – 10) ÷ 5 cao SC B1 for $x = 34$ or for a value in the range $15 \leq x < 16$	*denotes an equality or inequality symbol Accept equivalent forms Award P2 for an embedded answer of 16, which could be shown on the diagram as 32, 48, (10) or written as *x* embedded in working in an equation.

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	40	M1	for using 90, eg 90 – 25 – 25	90 – 25 is enough for this mark
		A1	cao	
(b)(i)	***b*** or ***d*** with reason	B1	for ***b*** or ***d*** (or both)	A correct answer can be implied by writing 125 immediately next to ***b*** or ***d*** (or both) as long as 125 is not written next to an incorrect angle. Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
		C1	(dep) for appropriate reason(s) vertically opposite angles are equal vertically opposite angles are equal corresponding angles are equal alternate angles are equal angles on a straight line add up to 180	
(ii)	reason	C1	for correct explanation using 360 or a full explanation using angles around a point **Acceptable examples** Because 360 around a point 360 – 125 = 235 125 + 235 = 360 Because they add to 360 **Not acceptable examples** Because b is 125	Using 360 appropriately and not in an incorrect setting
13	sketch	M1	for sketch of a cylinder	Hidden edges may or may not be shown
		A1	sketch of cylinder, with dimensions shown	2 (cm) for radius or 4 (cm) for diameter and 5 (cm) for height
14	***c*** = −6 ***d*** = −1	M1	for reflection in *x*-axis shown on diagram	Vertices (3, −2), (5, −2), (3, −5)
		A1	for ***c*** = −6 or ***d*** = −1	One correct value is M1A1 regardless of second value or diagram
		A1	for both ***c*** = −6 and ***d*** = −1 SCB2 for ***c*** = −1 and ***d*** = −6	

Question	Answer	Mark	Mark scheme	Additional guidance
15	shown	M1	for method to find angle ***ADC***, eg 180 – 75 (= 105)	Must be clear link to angle ***ADC***, may be marked on diagram
		M1	for angle ***BCD*** = 50	
		M1	for method to find angle *ABC*, eg 360 – 100 – 50 – "105"	Must be clear method/explanation shown. Angle marked on diagram is not sufficient.
		C1	(dep M3) for angles ***ADC***, ***BCD*** and *ABC* correct and at least 2 appropriate reasons, eg vertically opposite angles are equal or vertically opposite angles are equal , angles on a straight line add to 180º, angles in a quadrilateral/kite add up to 360º; angles at a point add up to 360º	Underlined words need to be shown; reasons need to be linked to their method
16	Shape drawn	B2	for shape with vertices at (4, –3), (5, –4), (5, –5), (4, –5)	Shape does not have to be shaded. Allow some tolerance on vertices as long as they are nearest to the desired points.
		(B1	for rotation of 180º about wrong centre)	This is shown by the orientation of the shape.
17	shown	C1	for method to find area of semicircle, eg $\pi \times 10^2 \div 2$ (= 50π)	Can award first 3 marks if a value for π is used
		C1	for method to find area of quarter circle, for $\pi \times 20^2 \div 4$ (= 100π)	
		C1	for a complete method to find area shaded **and** area of square, eg $\pi \times 20^2 \div 4 - \pi \times 10^2 \div 2$ **and** 20×20	Working out to find the area of the shaded region must be shown
		C1	fully correct working leading to $\frac{\pi}{8}$	
18	24	P1	starts process, eg $x + 11x = 180$ **or** $180 \div 12$ (= 15) **or** interior angle + exterior angle = 180 oe	
		P1	complete process to find number of sides, eg $360 \div (180 \div 12)$	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
19 (a)	Radius	B1	cao	Accept spelling mistakes
(b)	Tangent	B1	cao	Accept spelling mistakes
20 (a)	isosceles triangle, base 6 cm, height 4 cm	M1	for drawing an isosceles triangle **or** for drawing a triangle of base 6cm and height 4cm	Accept a freehand drawing Only a single triangle is acceptable; do **not** accept any attempted nets or 3-D diagrams
		A1	for a fully correct diagram	Condone a perpendicular drawn from base to vertex
(b)	96 cm^2	M1	for a method to find the area of a triangular face eg ½ × 6 × 5 (= 15)	
		M1	(dep) for finding the total surface area eg 4 × "15" + 6 × 6	
		A1	for a numerical answer of 96	Ignore incorrect or absent units for this mark
			SC B1 for an answer of 84 if M0 scored	[The SC is from: 4 × ½ × 6 × 4 + 6 × 6]
		B1	cm^2	Ignore incorrect or absent numerical answer for this mark

Question	Answer	Mark	Mark scheme	Additional guidance
21	(22, 20)	P1	for process to find width or height of diagram eg 38 − 6 (= 32) **or** 36 – 7 (= 29)	Figures may be shown on the diagram
		P1	for process to find length of side of square eg "32" ÷ 4 (= 8) **or** process to find half width of diagram eg "32" ÷ 2 (= 16)	
		P1	for process to find x coordinate eg 6 + 2 × "8" (= 22) **or** 6 + "16" (= 22) **or** (6 + 38) ÷ 2 (= 22)	If (6 + 38) ÷ 2 leads to an answer other than 22, award P2 only
		P1	for process to find y coordinate eg 36 – 2 × "8" (= 20) **or** 36 – "16" (= 20) **or** 7 + 8 + "29"– 3 × "8" (= 20)	
		A1	cao SC: award 4 marks for (20, 22)	Award for P3 for (22, y) or (x, 20) or x = 22 or y = 20
22	$\binom{9}{11}$	M1	for $\binom{2\times5}{2\times2}$ [= $\binom{10}{4}$] or 2 × 5 – 1 (= 9) or 2 × 2 + 7 (= 11)	
		A1	cao	

Question	Working	Answer	Mark	Notes
23		343	P1	for finding area of one face eg 294 ÷ 6 (= 49)
			P1	for $\sqrt{\text{“49”}}$ (=7)
			P1	for “49” × “7” **or** for “7” × “7” × “7” oe
			A1	cao
24	*CB* extended to form *CG*	Reasoning	B1	for 35 **or** 75 **or** 145 **or** 105 **or** *DEF* = 70, marked on the diagram or 3 letter description
			M1	for 180−70−35 **or** 180−75−35 **or** a correct pair of angles that would lead to 75 or 70, eg *AFB* = 35 and *FAB* = 75 **or** *AFB* = 35 and *ABG* = 75 **or** *FBC* = 35 and *ABG* = 75 **or** *EDF* = 75 and *DEF* = 70 **or** *FDC* = 105 and *FBC* = 35 **or** *ABC* = 105 and *FBC* = 35
			C2	(dep on B1M1) All figures correct with all appropriate reasons stated. Angles must be clearly labelled or on the diagram. Full solution must be seen
			(C1	(dep on B1 or M1) for one reason clearly used and stated.) Corresponding angles are equal, alternate angles are equal, o posite angles in a parallelogram are equal, angles in a triangle sum to 180, angles on straight line sum to 180, vertically opposite angles are equal, vertically opposite angles are equal, angles in a quadrilateral sum to 360, co-interior angl s sum to 180, allied angles s m to 180, angles around a point sum to 360
25		Daisy is wrong	P1	for process to find area of any relevant circle ie $\pi\times4^2$ (=16π), $\pi\times7^2$ (=49π), $\pi\times10^2$ (=100π) **or** 7^2 and 4^2
		(supported)	P1	for completed method to find shaded area eg “$\pi\times7^2$” – “$\pi\times4^2$” (=33π) **or** use of radii eg $7^2 - 4^2$ (=33)
			A1	for 2 comparable figures, eg 33π and 100π **or** 33 and 100 **or** 103 to 103.7 and 314 to 314.2 **or** 103 to 103.7 and 104.6 to 104.8
			C1	statement eg No because it should be $\frac{33}{100}$ and their accurate figures Allow use of π = 3 or better

Question	Working	Answer	Mark	Notes
26		13.5	P1	process shown to find the area of the triangle e.g. ½ × 8 × 9 (=36)
			P1	for calculating 6 × (area) (=216)
			P1	for process shown of dividing their area of rectangle by 16 (oe)
			A1	oe
27		70.5	P1	starts process of Pythagoras e.g. $5^2 + 12^2$
			P1	complete process for Pythagoras e.g. $\sqrt{5^2 + 12^2}$ or $\sqrt{25+144}$ or $\sqrt{169}$ (=13)
			P1	(dep P1 for Pythagoras) process of adding all the lengths e.g. 5 + 5 + 12 + 12 + "13" (=47)
			P1	(indep) process of multiplying at least 2 lengths by 1.5
			A1	ca SC: any evidence of working with Pythagoras award the P1 or P2
28 (a		2**b**	B1	oe
(b)		**b** – **a**	B1	oe
(c)		– **a** – **b**	B1	ft oe

Question	Working	Answer	Notes
29		Correct diagram with layout and lengths	M1 for changing to consistent units eg. 1000 ÷ 10 or 40 × 10 M1 for interpreting information and a process to fit tiles in floor area eg. may be seen in a sketch or a calculation C1 for a diagram to communicate a correct layout with lengths clearly identified
30		152	M1 Start to method *ABD* = 38° **and** *BAD* or *DBC* or *DCB* = 38° M1 *ADB* or *BDC* = 180 – 2 × 38 (=104) A1 for 152 with working
31		Correct sketch	C1 interprets diagram eg. draw a solid shape with at least two correct dimensions C1 draws correct prism with all necessary dimensions.
32		Rotation of 90° clockwise about (0,0)	M1 For two of 'rotation' , (0,0), 90° clockwise oe A1 Correct transformation
33		$\begin{pmatrix}-2\\16\end{pmatrix}$	C1 For $\begin{pmatrix}4\\2\end{pmatrix}-2\begin{pmatrix}3\\-7\end{pmatrix}$ C1

Question	Working	Answer	Notes	
34		No (supported)	P1 starts the process to convert one dimension A1 converts at least one measurement correctly C1 conclusion eg No, since the 40 cm > 14 inches	
35		no with evidence	P1 interprets the scale for 2 dimensions on diagram or in calculations. P1 a complete process to find comparative figures. C1 "no" with correct figures.	
36		32	M1 for method to find area of any one rectangle A1 cao	
37		rotation	M1 for triangle in correct orientation or rotation 90° anticlockwise A1 cao	
38		42	P1 process to start problem solving eg forms an appropriate equation P1 complete process to solve equation A1 cao	
39		48	P1 begins to work with rectangle dimensions eg l w=7 or 2×l+w (=11) C1 shows a result for a dimension eg using l=4 or w=3 P1 begins process of finding total area eg 4 × "3" × "4" A1 cao	
40		explanation	M1 works with volume eg 240000 M1 uses conversion 1 litre = 1000 cm^3 M1 uses 8000 eg vol ÷ 8000 (=30) M1 uses "30" eg "30" × 2.50 C1 for explanation and 75 stated	begins working back eg 70÷2.50 (=28) uses conversion 1 litre = 1000 cm^3 uses 8000 eg "28"× 8000 (=224000) works with vol. eg 224000 for explanation with 240000 and 224000

Question	Working	Answer	Notes
41 (a)		$\frac{\sqrt{3}}{2}$	B1
(b)		6	M1 starts process eg $\sin 30 = \frac{x}{12}$ A1 answer given

Question	Working	Answer	Notes
42 i		5	B1
ii		8	B1
43		No with reason	M1 Starting reasoning 120 + 57 (= 177) A1 Comparison of 177 with 180 C1 Completes correct reasoning with reference to eg co-interior (or allied) angles total 180
44		No with reasoning	M1 Derive AC=9 cm and identify as hypotenuse M1 $4^2 + 7^2$ A1 for using eg $AC = \sqrt{4^2 + 7^2}$ or 65 and 81 C1 for concluding explanation that ABC is not a right-angled triangle with evidence.
45		500g	P1 $\frac{1}{8} \times 160$ (=20) P1 '20' × 25 A1 500 (or 0.5) B1 Correct units g (or kg)

Question	Answer	Mark	Mark scheme	Additional guidance
46	Reflection	M1	for a correct reflection of the shape in any horizontal line other than the given mirror line	Allow free hand drawing
		A1	for a fully correct reflection	
47 (i)	21	M1	for 180 – 75 – 84	
		A1	cao	Angle may be indicated on the diagram
(ii)	Reason given	C1	for reason that Angles on a straight line add up to 180	The key words underlined must be present There should be no incorrect reasons given
48	41.6	P1	for start of process to find the length of the hypotenuse, eg (hyp^2 =) $8^2 + 10^2$ (= 164)	Note lengths may be seen on the diagram
		P1	for complete process to find hypotenuse, eg $\sqrt{8^2+10^2}$ **or** $\sqrt{64+100}$ **or** $2\sqrt{41}$ **or** $\sqrt{164}$ (= 12.8…)	
		P1	(dep P2) for complete process to find the required perimeter, eg 8 + 8 + 10 + "12.8" + "12.8 – 10" **or** $16 + 4\sqrt{41}$	8 + 8+ "12.8" + "12.8" oe is acceptable for this mark
		A1	for answer in the range 41 to 42	If an answer in the range 41 to 42 is given in the working space then incorrectly rounded, award full marks.
49 (a)	17.8	M1	for tan 56 = $\frac{x}{12}$ or (BC) =12 × tan 56 oe **or** alternative method to find BC	For any alternative method candidates must arrive at an equation with BC as the only unknown
		A1	for an answer in the range 17.7 to 17.8	If an answer in the range 17.7 to 17.8 is given in the working space then incorrectly rounded, award full marks.
(b)	33.6	M1	for cos x = $\frac{15}{18}$ **or** cos x =0.83.. **or** x = cos^{-1} $\frac{15}{18}$ **or** alternative method to find x	For any alternative method candidates must arrive at an equation with x as the only unknown
		A1	for an answer in the range 33.5 to 33.91	If an answer in the range 33.5 to 33.91 is given in the working space then incorrectly rounded, award full marks.

Question	Answer	Mark	Mark scheme	Additional guidance
50 (a)(i)	30	B1	cao	
(ii)	Reason	C1	reason, eg angles on a straight line add up to 180°	
(b)	Explanation	C1	for explanation eg the two angles don't add up to 360 **Acceptable examples** 90 + 280 = 370 The two angles don't add up to 360 280 should be 270 Angles around a point equal 360° It should be 360 (in a circle) It should be 80 It should not be a right angle It cannot be 280° **Not acceptable examples** They don't add up to 180 365 degrees in a circle ⌝ means 90 degrees	
51	600 cm^3	M1	for a complete method to find the volume eg 4 × 10 × 15	If extra steps are shown do not award this mark
		A1	for 600	Ignore incorrect or absent units for this mark
		B1	(indep) cm^3	Ignore incorrect or absent numerical answer for this mark
52	Rotation 180º about (−1, 0)	C2	rotation 180° about (−1, 0) **or** enlargement sf −1 centre (−1, 0)	Award no marks if more than one transformation is given
		(C1	rotation 180° **or** rotation about (−1, 0) **OR** enlargement sf −1 **or** enlargement centre (−1, 0))	
53	99.5	M1	for $\sin(34) = \frac{x}{178}$ oe **or** alternative method to find x	
		A1	for answer in range 99.5 to 99.7	If an answer in the range 99.5 to 99.7 is given in the working space then incorrectly rounded, award full marks

Question	Answer	Mark	Mark scheme	Additional guidance
54	$\begin{pmatrix}-9\\14\end{pmatrix}$	M1 A1	for $2\begin{pmatrix}3\\4\end{pmatrix}-3\begin{pmatrix}5\\-2\end{pmatrix}$ **or** $\begin{pmatrix}6\\8\end{pmatrix}$ **and** $\begin{pmatrix}15\\-6\end{pmatrix}$ **or** $\begin{pmatrix}-9\\y\end{pmatrix}$ **or** $\begin{pmatrix}x\\14\end{pmatrix}$ cao	May be seen in two separate calculations eg $2\times3+-3\times5$ and $2\times4+-3\times-2$ Condone incorrect notation if method is clear for this mark only
55	35.3	P1 P1 P1 A1	for starting the process to find length of third side of triangle, eg 9^2-6^2 (=45) **or** $6^2+x^2=9^2$ for $\sqrt{9^2-6^2}$ or $\sqrt{81-36}$ or $\sqrt{45}$ or $3\sqrt{5}$ (= 6.7..) **or** $r^2=45$ for stating or using $\pi\times[\text{radius}]^2\div4$ for answer in range 35.2 to 35.4	 [radius] is any value If an answer in the range 35.2 to 35.4 is given in the working space then incorrectly rounded, award full marks No working, answer only no marks
56	24	M1 A1	for a complete method eg $360\div15$ (=24) cao	If extra steps are shown do not award this mark.

Question	Answer	Mark	Mark scheme	Additional guidance
57	enlargement	B2 (B1	for correct enlargement for any two sides correct **or** a correct enlargement with scale factor other than 3 or 1)	Any orientation
58	26	M1 M1 A1 C1	for *ADB* = 64 **or** *ABD* = 52 for complete method, eg (180 – 64 – 64) ÷ 2 oe for 26 (dep on first M1) for two correct reasons appropriate to their method from base angles of isosceles triangle are equal sum of angles in a triangle = 180 sum of angles on a straight line = 180 the exterior angle of a triangle is equal to the sum of the interior opposite angles	May be shown on the diagram Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
59	No (supported)	P1 P1 P1 P1 A1	for finding the area of 3 or more faces of the cuboid **and** adding eg (6 × 8) + (8 × 18) + (6 × 18) … or "48" + "144" + "108" … (= 300) complete process to find surface area of cuboid, eg 6 × 8 × 2 + 6 × 18 × 2 + 8 × 18 × 2 (= 600) for process to find side length of cube, eg [surface area] ÷ 6 **and** square rooting (= 10) (dep on previous P1) for processes to find volume of cube **and** volume of cuboid, eg [side length]^3 (= 1000) **and** 6 × 8 × 18 (= 864) for a process to find the volume of the cuboid 6 × 8 × 18 (= 864) **and** cube rooting (= 9.52…) to find a side length (dep on previous P1) for process to find surface area of cube, eg. ("9.52…")^2 × 6 (= 544.28…) No with 1000 **and** 864 **OR** No with 600 **and** 544(.28…)	Could be an addition of *any* three faces eg 48 + 48 + 144 etc. [surface area] must come from the addition of at least three attempts at area, but not from volume.

Question	Answer	Mark	Mark scheme	Additional guidance
60	Vector drawn	M1	for $5 - 2 \times 3$ (= –1) **or** $2 - 2 \times -1$ (= 4) seen as a calculation **OR** for $\begin{pmatrix}5\\2\end{pmatrix} - \begin{pmatrix}2\times3\\2\times-1\end{pmatrix}$ **OR** for $\begin{pmatrix}-1\\b\end{pmatrix}$ **or** $\begin{pmatrix}a\\4\end{pmatrix}$ **OR** for $\begin{pmatrix}5\\2\end{pmatrix}$ **or** $\begin{pmatrix}-3\\1\end{pmatrix}$ **or** $\begin{pmatrix}-6\\2\end{pmatrix}$ drawn	May be in a column vector Condone missing arrows
		M1	for $\begin{pmatrix}-1\\4\end{pmatrix}$ **OR** for $\begin{pmatrix}-1\\4\end{pmatrix}$ drawn with no arrow or incorrect arrow **OR** for $\begin{pmatrix}-1\\b\end{pmatrix}$ **or** $\begin{pmatrix}a\\4\end{pmatrix}$ drawn with arrow, where $b \neq 4$ and $a \neq -1$	
		A1	cao	For this mark the drawn vector must include an arrow showing direction.

Question	Answer	Mark	Mark scheme	Additional guidance
61	Shaded region	M1	for 180 ÷ 30 (= 6) or 150 ÷ 30 (= 5)	This may be just used in a correct locus drawn on the diagram
		M1	draws an arc of radius "6 cm" centre A or draws a line segment parallel to BC and "5 cm" away	Ignore any additional arcs or lines drawn
		M1	for an arc of radius "6 cm" centre A **and** a line parallel to BC and "5 cm" away with no additional arcs or lines drawn	
		A1	Answer within tolerance with region shaded	Accept shading out leaving the required region unshaded
62	8	P1	for working with volume of the cuboid, eg 30 × 6 × 19 (= 3420) **OR** for using $\frac{2}{3}$ with one dimension, eg. 30 × 2÷ 3 (= 20)	For P marks, ignore attempts at unit conversion
		P1	for "3420" × 2 ÷ 3 (= 2280) or "3420" ÷ 3 (= 1140) **OR** "20" × 6 × 19 (= 2280) **OR** "3420" ÷ 275 (= 12.4….. = 12 cups)	
		P1	(dep on P2) for "2280" ÷ 275 (= 8.29..) **or** "1140" ÷ 275 (= 4.14..) **OR** "12" × 2 ÷ 3 **OR** for 275 × 8 (= 2200) **or** 275 × 9 (= 2475)	
		A1	cao	
63	9.85	M1	for $\sin(38) = \frac{AB}{16}$ oe **or** alternative method to find AB	
		A1	for an answer in the range 9 76 to 9 92	
64	$\begin{pmatrix}-2\\1\end{pmatrix}$	M1	for 4 – 2 × 3 (= –2) or 5 – 2 × 2 (=1) seen as a calculation **OR** for $\begin{pmatrix}4\\5\end{pmatrix} - \begin{pmatrix}2\times3\\2\times2\end{pmatrix}$ **OR** for $\begin{pmatrix}-2\\b\end{pmatrix}$ where b ≠ 1 or $\begin{pmatrix}a\\1\end{pmatrix}$ where $a \neq -2$	May be in a column vector
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
65 (a)	36	P1	square root of 81 eg $\sqrt{81}$ **or** 9 **or** 9 × 4	9 could be seen on the diagram
		A1	cao	
(b)	12	M1	finding area of triangle eg ½ (16 × 9) (=72)	
		M1	equating with area of parallelogram eg [area of triangle] × 5 = 30 × h **or** (h =) [area of triangle] × 5 ÷ 30 **or** (h =) [area of triangle] ÷ 30 **or** sight of 2.4	[area of triangle] must be 72 or 144 or come from ½ (16 × 9) or 16 × 9
		A1	cao	
66	Reflection in x-axis	B1	for reflection	Award no marks if more than one transformation is given
		B1	for x-axis **or** y = 0	
67	60	M1	use of parallel lines to find an angle eg ABE=70 **or** EBG=75 **or** EBC = 110 **or** shows parts of x as 35 or 25	Parts of x should be identified on the diagram by the insertion of a dividing line through angle x (need not be identified or drawn parallel).
		M1	for a complete method to find angle x; could be in working or on the diagram	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for x = 60	
		C1	(dep on M1) for one reason linked to parallel lines and one other reason, supported by working taken from: alternate angles are equal, allied angles / co-interior angles add up to 180, angles on a straight line add up to 180, angles in a triangle add up to 180°	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. There should be no incorrect reasons given.

Question		Answer	Mark	Mark scheme	Additional guidance
68	(a)	Correct evaluation	C1	for explanation eg x is not a base angle or states $x = 54°$	
	(b)	Correct or corrected reasoning given	C1	eg (because) alternate angles are equal, **or** Allied angles / Co-interior angles add up to 180 **or** they are not corresponding (they are alternate) **OR** selects correct reason used by William	
69		Correct description	B2	reflection **and** y axis **or** reflection **and** $x = 0$	If more than 1 transformation given award B0
			(B1	reflection **or** y axis **or** $x = 0$)	
70		4378.2(0)	P1	for a process to find the circumference of the circle **or** the semi circle, eg $\pi \times 50$ (= 157.0796327) **or** $0.5 \times \pi \times 50$ (= 78.53981634)	Figures may be truncated or rounded
			P1	for a complete process to find the perimeter of the field, eg $(0.5 \times \pi \times 50) + 50$ (= 128.5...) **OR** for working with one cost eg "157.07…" × 29.86 (= 4690.11..) **or** "78.5…" × 29.86 (= 2345.198…) **or** 50 × 29.86 (=1493) **or** 3 × 180 (= 540)	May use circle at this point, figures imply method One cost is 1 length or labour Figures may be truncated or rounded
			P1	For finding the costs of two different aspects eg 2 of "78.5…" × 29.86 (= 2345.1..) **or** 50 × 29.86 (= 1493) **or** 3 × 180 (= 540)	Two different aspects means arc and straight edge or arc and labour or straight edge and labour Condone circle and labour or circle and straight edge.
			P1	for a adding at least 2 costs eg "2345.1.." + "540" (=2885.1..) **or** "1493" + "540" (=2033) **or** "128.5…" × 29.86 (= 3838.2..)	Finding the cost of the perimeter is two costs added and so implies the previous P1 The circle is not allowed to be counted as one of the two costs for this mark
			A1	for answer in the range 4377 – 4392	

Question		Answer	Mark	Mark scheme	Additional guidance
71		280	P1	for starting to use Pythagoras to find the missing side eg $8.4^2 - 7.2^2$ (= 18.72)	Award P1 for a correct Pythagorean statement eg $x^2+7.2^2=8.4^2$
			P1	for a complete process to find the missing side eg $\sqrt{70.56-51.84}$ **or** $\sqrt{18.72}$ (=4.32....)	4.3 truncated or rounded can imply P2
			P1	(dep P1) for a process to find the area of the triangular face eg [length of base] × 7.2) ÷ 2 (=15.57..) **OR** the volume of the cuboid eg [length of base] × 7.2 ×18 (=560.7..)	Uses a figure they show as the length of the base of the right angled triangle but dep on P1 Allow 15.57.. truncated or rounded if unsupported
			P1	for a complete process to find the volume of the prism eg "15.5.." × 18 **or** "560.7.." ÷ 2	
			A1	answer in the range 278 – 281	If an answer is given in the range 278 to 281 but then incorrectly given to 3 sig fig this mark can still be awarded.

Question	Working	Answer	Mark	Notes
72 (a)		2.75	M1	for accurately measuring the distance between Backley and Cremford as 5.3 cm – 5.7 cm oe or their measurement × 0.5 oe
			A1	for answer in the range 2.65 to 2.85
(b)		130	B1	for answer in the range 128 to 132
73 (a)		12 cm²	B1	for numerical answer of 12
			B1	for units shown as cm²
(b)		kite	B1	cao
74		31.4	P1	for working with circumference formula, eg π × 80 (=251.(….)) oe
			A1	for answer in the range 31.4 to 31.5 accept 10π
75 (a)		(−2, 1) (−4, 1) (−2, 2) (−5, 2)	B1	Shape labelled **A**
(b)		(1, −4) (3, −4) (1, −5) (4, −5)	B1	Shape labelled **B**

Question	Working	Answer	Mark	Notes
76		32.3	P1	for using Pythagoras to find length of third side of triangle, eg $7.5^2 - 6^2$ or $6^2 + x^2 = 7.5^2$ or uses trigonometry to find angle in triangle eg $\sin A = \frac{6}{7.5}$ or $\cos B = \frac{6}{7.5}$
			P1	(dep P1) for complete process to find length of third side of triangle eg $\sqrt{7.5^2 - 6^2}$ or $\sqrt{56.25 - 36}$ or $\sqrt{20.25}$ (=4.5) or uses trigonometry to find base length of triangle eg $7.5 \times \cos$ "A" or $7.5 \times \sin$ "B" or $\frac{6}{\tan"A"}$
			P1	(dep P2) for $24 - 10 -$ "4.5" (= 9.5)
			P1	(indep) for process to find angle CDA, eg $\tan CDA = \frac{6}{base}$ from right-angled triangle
			A1	for answer in the range 32.2 to 32.3

Question	Working	Answer	Mark	Notes
77		54	M1 M1 A1	for method to form equation, eg $90 + 2x + 3x = 360$ or for $360 - 90$ (= 270) for $5x = 360 - 90$ or for $2x + 3x = 360 - 90$ or for $2x = 108$ or for $3x = 162$ or for $270 \div 5$ cao
78 (a)		Rotation	B2 [B1	for a fully correct rotation at (–4,–1), (–3,–1), (–4,–4), (–1,–2) for the quadrilateral in correct orientation and size or rotated 90° anticlockwise about the origin]
(b)		Reflection in the *y*- axis	B1 B1	for reflection for *y*-axis (or $x = 0$) [A combination of transformations scores 0 marks]
79		*T* shown on the map	C1 C1 C1	for showing a perpendicular bisector or point *T* equidistant from points *B* and *C*. for a circle or arc of circle of radius 2.5 cm or point *T* 2.5 cm from point *A* for *T* shown in correct position
80		Side elevation Front elevation	C2 [C1 C2 [C1 [Ignore incorrect or no labelling]	for the side elevation (4 cm by 2 cm rectangle with a solid line drawn 1 cm from the 2 cm edge, and correct orientation) for the side elevation as a rectangle] for the front elevation as a trapezium in correct orientation with base 4 cm, parallel sides 1 cm and 4 cm for the front elevation as a trapezium with two right angles]

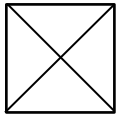
Question	Working	Answer	Notes
81		shown	B1 $ABC = 80$ M1 $180 - 80° - 50°$ A1 $ACB = 50$ C1 statement that since $ACB = CAB = 50°$ with reasons eg Vertically opposite angles are equal, Angles in a triangle add up to 180^o, The exterior angle of a triangle is equal to the sum of the interior opposite angles; Base angles of an isosceles triangle are equal.
82		13.9	P1 finds the volume of a cuboid eg 50×40×60 (=120000) P1 finds 35% of the oil from the cuboid eg 120000 × 0.35 oe (=42000) P1 removes 35% of oil from cuboid eg 120000 – 42000 (=78000) P1 division to find missing side length eg 78000÷(80×70) or 13.928... A1 for answer to an appropriate degree of accuracy eg (13.9 or 14 or 10)
83		22.5	M1 interpret information eg use the scale A1

Question	Working	Answer		
84 (a)		90	P1	for the process of finding an area eg 6×11 (=66)
			P1	(dep on area calculation) for the process of working out the number of tins eg "66" ÷ 12 (=5.5 or 6 tins)
			P1	for the process of working out the cost eg "6" tins × £15
			A1	cao
(b)		reason	C1	she might need to buy more tins
85		20.9	M1	correct recall of appropriate formula eg $\sin x = \frac{5}{14}$
			A1	for 20.9(248…)
86		9.54	P1	$10^2 - 5^2$ (=75)
			P1	"75" + 4^2 (=91)
			P1	$\sqrt{(10^2 - 5^2 + 4^2)}$
			A1	9.53 – 9.54

Question	Working	Answer	Notes
87		62.5	M1 for 12.5 squares or use of 1 sq = 5% M1 for 12.5 ÷ 20 × 100 oe A1 for 62.5
88		12	P1 for correct use of scale, eg 360 ÷ 30 or 3.6 ÷ 30 A1 cao
89		56^o with reasons	M1 for a method leading to the evaluation of another angle, eg angle A =180 – 90 – 22 (= 68) M1 for correctly using the isosceles property in identifying two equal angles, eg (180 – "68") ÷ 2 (= 56) for at least one correct reason given linked to clear working. C1 for all correct reasons included C1 Reasons as appropriate from: sum of angles in a triangle = 180^o base angles of isosceles triangle are equal sum of angles on a straight line = 180^o sum of angles in a quadrilateral = 360^o
90		66.9	P1 for process to find the area of one shape, eg. 19×16 (= 304) or $\pi \times 8^2$ (= 201.06...) P1 for process to find the shaded area, eg. "304" – "201.06" ÷2 (= 203.46...) P1 for a complete process to find required percentage, eg. $\frac{"203.46"}{304} \times 100$ A1 for answer in range 66 to 68
91		43.5	P1 for process to establish a right-angled triangle with two sides of 5 cm and 9 – 7 = 2 cm P1 for correct application of Pythagoras, eg $5^2 + "2"^2$ P1 for a complete process to find perimeter, eg. 9 + 7 + 5 + "5.39" (= 26.385...) P1 for process to find area of square, eg $(26.385... \div 4)^2$ A1 for answer in range 43.5 to 43.6

Question	Working	Answer	Notes	
92		No + explanation	C1	No, with explanation, eg the angle will still be 25°
93		Translation by $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$	B1 B1	for translation $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$
94		105	P1 P1 A1	for process to find the exterior angle or interior angle of a hexagon or octagon for process to find the both exterior angles or both interior angles for 105 from correct working
95	$\frac{1}{4} \times \pi \times 4.8^2$ $\frac{1}{2} \times 4.8 \times 4.8$ $\frac{1}{4} \times \pi \times 4.8^2 - \frac{1}{2} \times 4.8 \times 4.8$	6.58	B1 P1 A1	for use of formula for area of a circle for complete process to find area of shaded region for 6.56 – 6.58
96	$\angle ADB = 72°$ (base angles of isosceles triangle ABD) $\angle BAD = 180° - 2 \times 72°$ (angle sum of a triangle is 180°) $\angle BCA = 36°$ (base angles of isosceles triangle ABC) $\angle BDC = 180° - 72°$ (angles on a straight line sum to 180°) $\angle DBC = 180° - 36° - 108°$ (angle sum of a triangle is 180°)	Result shown	M1 M1 M1 C1 C1	for $\angle ADB = 72°$ and $\angle BAD = 180° - 2 \times 72°$ for $\angle BCA =$ "36°" for $\angle BDC = 180° - 72°$ for complete chain of reasoning to find angle $DBC = 36°$ and one correct reason C1 dependent on all previous marks for correct deduction and full reasons.

Question	Answer	Mark	Mark scheme		Additional guidance
97	Midpoint marked	B1	within tolerance		
98	Explanation	C1	for explanation **Acceptable examples** They do not add to 360 They add to 100 too least It is missing a 100 angle / It needs 100 more Because the total has to be 360 A whole circle is 360 **Not acceptable examples** They add up to 260 One of the angles is wrong A shape with 4 angles adds up to 360		
99	Enlargement centre (1,1) scale factor 4	B2 (B1	Enlargement, centre (1,1) and scale factor 4 two of Enlargement, centre (1,1), scale factor 4 with nothing incorrect)		No extras. Accept *A* as centre. If there is a clear reference to a different transformation award no marks
100	34 cm²	P1	for finding one area eg 8 × 8 (= 64) or 0.5 ×3 × 5 (=7.5)	for first stage in working with Pythagoras eg sight of $3^2 + 5^2$ or 9 + 25	
		P1	for a complete process to find the area eg "64" − 4 × "7.5" (=34)	for full use of Pythagoras eg $\sqrt{3^2+5^2}$ or $\sqrt{34}$ or 5.83…	Any figure used must come from a correct process
		A1 B1	for an answer in the range 33.6 to 34 (indep) for cm²		Can be awarded with incorrect units stated Can be awarded with an incorrect or absent numerical answer
101	18.3	P1 P1 P1 A1	for finding the area of the triangle eg 0.5 × 8 × 8 (=32) for finding the area of the circle π × 8 × 8 (= 201.06..) for finding the area of the sector eg ¼ × π × 8^2 **or** "201.06.." ÷ 4 (= 50.26...) for an answer in the range 18.2 to 18.3		Accept rounded or truncated figures If the answer is given within the range but then rounded incorrectly award full marks.

Question	Answer	Mark	Mark scheme	Additional guidance
102	110	M1 M1 A1	for use of angles in a quadrilateral add to 360°, eg 360 – 130 – 95 – 65 (= 70) for 180 – "70" or for (130 + 95 + 65) – 180 cao	May be seen in diagram or as a sum to 360°. (130 + 95 + 65) – 180 gains M2
103	34	M1 A1	for start to method, eg 10 – 4 (= 6) or 7 – 5 (= 2) **or** 10 + 7 + 4 + 5 (=26) **or** (10 + 7) × 2 cao	6, 2 may be seen on diagram
104	accurate drawing	M1 A1	for drawing a side of length 6cm for correct triangle	
105		M1 A1	for square, side 6 cm or complete plan with incorrect scale cao	Do not award if the 6 cm square is included with a triangle attached externally (eg elevation)

Question	Answer	Mark	Mark scheme	Additional guidance
106 (a)	Diameter drawn	B1	diameter drawn	Accept hand drawn, intention through centre and from edge to edge. Ruler not required but intention clear.
(b)	Segment shaded	B1	segment drawn unambiguously	Line must go edge to edge (condone extending outside the circle). Freehand acceptable. Can also draw a diameter here (as semi-circle).
107 (a)	Explanation	C1	for a correct explanation, eg that he has found the area not perimeter **Acceptable examples** He has found the area (not perimeter) He should have added The perimeter is 7+3+7+3 (=20) oe He did base×height He has timesed (not added) **Not acceptable examples** He has worked it out wrong He should have squared it He should have done 14×6 **or** 7×3×7×3 **or** 7×3 twice then add them He didn't include the top or the other side He should have doubled it It should be P=7×3 **or** he has done the sum not found the answer	Any incorrect statement as part of a correct response can be ignored unless it contradicts the statement, eg, he found area but perimeter equals 10
(b)	Explanation	C1	for correct explanation, eg that you cannot have a length of −2 **Acceptable examples** *x* cannot be negative Cannot have a negative length Has to be positive It is impossible Can't have −2(cm) (as a measurement) It has to be more than 0 **Not acceptable examples** You can have −2 Won't add to 180 He has a minus sign and the other sides have add signs It has to be a whole number or decimal there are no negative numbers to get a negative answer there is no cm after his answer It should be +2	Any incorrect statement as part of a correct response can be ignored unless it contradicts the statement.

Question	Answer	Mark	Mark scheme	Additional guidance
108	Correct reflection	B2 (B1	correct triangle drawn with vertices (1, 2) (2, 2) (1, −1) for a correct reflection in the line $y = a$ **or** a correct reflection in the line $x = 3$, **or** triangle in correct orientation with 2 of 3 vertices correct)	
109	45	P1 P1 P1 A1	for 180 – 117 (=63) **or** states, or uses, exterior angle + x =117 for process to find the exterior or the interior angle of the pentagon, eg 360 ÷ 5(=72) **or** 180 – (360 ÷ 5) (=108) **or** ((5–2) × 180) ÷ 5 (=108) for a complete process to find x, eg 180 – "72" – "63" **or** "108" – "63" **or** 117 – "72" cao	Angles may be shown on the diagram. Any angle labelled correctly as 63 and not contradicted scores this mark Exterior = 108 or interior =72 does not score the mark An answer of 45 with no supporting working scores 0
110	Result shown	M1 M1 C1 	for finding the area of **A or** the area of **B**, eg $(\pi \times 15^2) \div 4$ (=56.25π = 176.(7…) or 177) **or** $\pi \times 2.5^2$ (= 6.25π = 19.6(3…)) for finding the area of **A and** the area of **B**, eg $(\pi \times 15^2) \div 4$ **or** "6.25π" × 9 (=56.25π = 176.(7…) or 177) **AND** $\pi \times 2.5^2$ **or** "56.25π" ÷ 9 (= 6.25π = 19.6(3…)) for conclusion eg, $\sqrt{56.25\pi \div 9 \div \pi}$ =2.5 oe **or** $\sqrt{\frac{6.25\pi \times 9 \times 4}{\pi}}$ = 15 oe **or** 56.25π ÷ 9 = 19.6(3…) **and** $\pi \times 2.5^2$ = 19.6(3…) oe **or** 6.25π × 9 = 176.(7…)or 177 **and** $(\pi \times 15^2) \div 4$ = 176(.7..) or 177 oe **or** for $((\pi \times 15^2) \div 4) \div (\pi \times 2.5^2)$ =9 oe	May work without π or with an approximation of π Values may be rounded or truncated

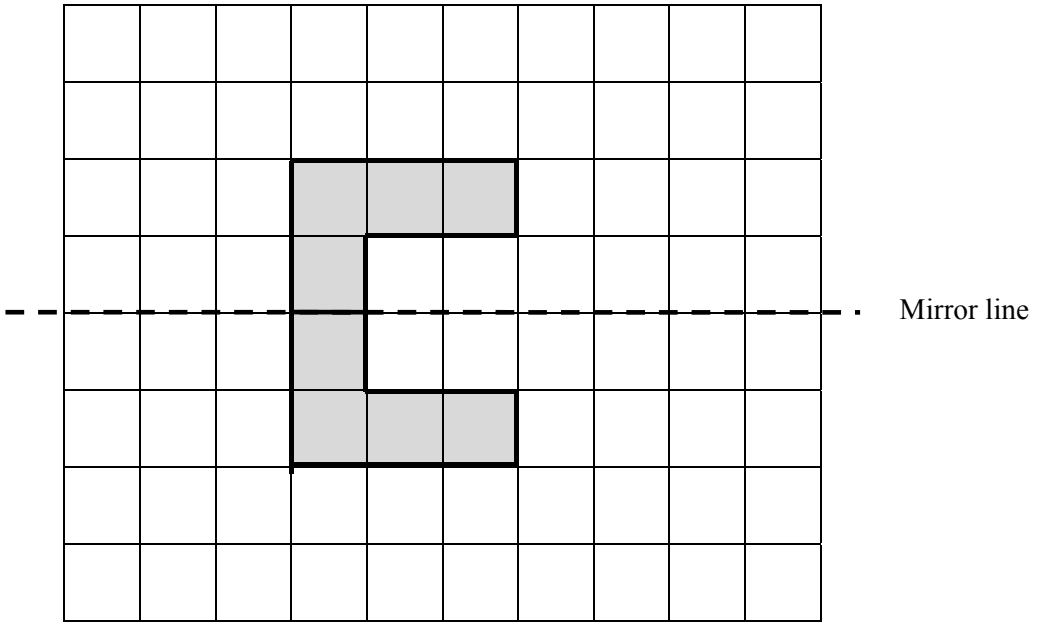
Question	Answer	Mark	Mark scheme	Additional guidance
111	32	P1	for a process to work out the missing length eg 6 – 4 (=2) **or** for a process to work out the length of the base eg 4 + 6 (= 10) **OR** for finding total perimeter of 2 rectangles, eg 2(6 + 4 + 6+ 4) (= 40) **OR** for writing at least 5 figures correctly on the diagram	May be seen on the diagram
		P1	for a process to work out the perimeter eg 4 + "2" + 6 + 4 + 6 + 4 + 6 **or** 20 + 20 – 2 × 4 **or** 16 + 14 + "2"	May be seen in different forms
		A1	cao SC B1 for 30	
112	105	M1	for evidence of understanding the angle properties of a square or equilateral triangle, eg stating angle *DBC* = 60 or angle *EBD* = 45 or angle *BAE* = 90	Accept on the diagram with no contradiction in working, or no contradiction or ambiguity on the diagram; 90 can be shown as a right angle
		A1	cao	Could be shown on the diagram or in working, but do not accept contradiction or ambiguity.

Question	Answer	Mark	Mark scheme	Additional guidance
113	162 supported	M1	for method to find sum of the interior angles of a hexagon eg $(6 - 2) \times 180$ (= 720) oe **OR** for method to find sum of the interior angles of a pentagon, eg $(5 - 2) \times 180$ (= 540) **OR** for method to find angle *AFC* or *BCF*, eg $(360 - 2 \times 117) \div 2$ (= 63) **OR** for dropping a perpendicular from *A* or *B* to *ED* with 90° marked on *ED* and 27° at the top	Must be a complete process that would lead to a figure of 720 if evaluated correctly. For a pentagon there must be an indication that they have divided the hexagon into two halves. 63 may be shown on the diagram for angle *AFC* or angle *BCF*
		M1	for method to use ratio 2 : 1 eg marks as $2x$ and x or as x and $\frac{1}{2}x$ on diagram **OR** for ([angle sum of hexagon] $- 2 \times 117) \div 6$ (= 81) oe **or** ([angle sum of hexagon] $\div 2 - 117) \div 3$ (= 81) oe **or** $117 + 117 + 2x + 2x + x + x =$ [angle sum of hexagon] oe **OR** eg ([angle sum of pentagon] $- 117 - 180) \div 3$ (= 81) oe **or** $117 + 180 + 2x + x =$ [angle sum of pentagon] oe	Ratio must be used correctly if awarded for diagram Award provided [angle sum of hexagon] is greater than 700 or [angle sum of pentagon] is greater than 500 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified.
		M1	for finding angle *FED* = 81 or for finding angle *CDE* = 81 **OR** for complete process to find angle *AFE* eg ([angle sum of hexagon] $- 2 \times 117) \div 6 \times 2$ oe **OR** ([angle sum of pentagon] $- 117 - 180) \div 3 \times 2$ oe	This may be shown by solving a correct equation to find the value of x.
		C1	for accurate working leading to angle *AFE* = 162	Award marks for 162 on the diagram with working and not contradicted by the answer line. Award 0 marks for 162 without working.

Question	Answer	Mark	Mark scheme	Additional guidance
114	No Supported	P1	for finding the area of a circle eg $\pi \times 0.8^2$ (= 2.01...)	Must be area of circle and not part of a volume, eg $\pi r^2 h$ May be seen as $2\pi r^2$
		P1	for finding the curved surface area eg $2\pi \times 0.8 \times 1.8$ (= 9.047…)	May be seen from $2\pi rh$ or from πdh
		P1	for use of the coverage information with an area eg "2.01…" ÷ 5 (= 0.402…) or "4.02…" ÷ 5 (= 0.804…) or "9.047…" ÷ 5 (= 1.8095…) or "11.058" ÷ 5 (= 2.2116..) or "13.069…" ÷ 5 (= 2.6138…) **OR** for process to find total coverage for comparison eg 5 × 7 (= 35)	Accept numbers without working written to no less than 2dp Do not award if a volume has been used as part of the calculation. An independent mark for 5 × 7
		P1	(dep P1) for finding total surface area for 3 tanks eg [total surface area] × 3 (= 39.2…) **OR** for complete process to find the number of tins needed for total area of 3 tanks eg "13.069"....× 3 ÷ 5 (= 7.84..…) **OR** for complete process to find coverage needed from each tin eg "13.069"...× 3 ÷ 7 (= 5.6...)	[total surface area] must come from the addition of two attempts at area, but not from volume.
		C1	for conclusion "No" supported by accurate figures eg 8 tins **or** 7.84 (> 7) **or** 39.2 > 35 **or** 5.6 (>5)	Clear statement that there is **not** enough paint supported by correct figures for comparison. NB: 2.6 × 3 = 9 tins needed is inaccurate 8 or 7.84 tins is sufficient without restating the 7, 5.6 m^2 is sufficient without restating the 5 but 39.2 and 35 are needed for comparison. A statement of "No, 8 tins" alone gets 0 marks without supporting working.

Question	Answer	Mark	Mark scheme	Additional guidance
115 (a)	Cuboid	B1		
(b)	12	B1	cao	.
116 (a)	Trapezium	B1	cao	
(b)	C and D	B1	cao	Accept in either order.
117	Reflection drawn	C1	for accurate reflection drawn	Can be hand drawn. Need not be shaded.
118	17.3	P1	for full process to find either angle eg (180 − 90) ÷ (2+3) ×2 **or** for 36 or 54 seen as an angle	May be seen on diagram Condone correct values if incorrectly placed.
		P1	for a correct equation using trigonometry eg cos [A] = 14÷ AB	This must be shown as an equation with all four elements (eg cos, [A], 14, AB) present. [A] could be 36 or any angle clearly and unambiguously identified as A. This also applies to [B] with Sine.
		P1	(dep previous P mark) for rearranging their trigonometry equation to make AB the subject eg (AB =) "14 ÷ cos 36"	
		A1	for an answer in the range 17.3 to 17.4	If an answer is shown in the range in working and then incorrectly rounded award full marks.

117



Question	Answer	Mark	Mark scheme	Additional guidance
119	Triangle of area 18	M1	for a complete method to find area of trapezium eg $\frac{1}{2}(2 + 7) \times 4$ (= 18) **OR** for a triangle drawn of area 36 **OR** for a triangle that would give an area ft their area of trapezium	The value for the area of the trapezium must be clear for the ft to be checked.
		A1	for a triangle drawn of area 18 eg base = 6, height = 6 or base = 9, height = 4	Accept use of dimensions that are not whole numbers as long as the intention is clear
120 (a)	50.5	M1	for $\cos ABC = \frac{7}{11}$ (0.63…) oe	Must be a complete statement for cos, sin or tan with all three elements present.
		A1	for answer in the range 50.4 to 50.51	If an answer is in the range 50.4 to 50.51 is given in the working space then incorrectly rounded, award full marks.
(b)	Increase (supported)	C1	States increase with supporting reason eg " $\frac{7}{10}$ is greater than $\frac{7}{11}$" " 0.636 is less than 0.7" …."cos increases as angle decreases" "decreasing the denominator increases the value of the fraction" "angle is now 45.6" (accept 45.5 – 45.6)	If figures are given they must be correct (truncated or rounded).

Question	Answer	Mark	Mark scheme	Additional guidance
121	140	P1	for complete process to find sum of the interior angles of a pentagon eg $(5 - 2) \times 180$ or exterior $360 \div 5 = 72$, interior $180 - 72 = 108$, 108×5 **OR** for complete process to find sum of the exterior angles of the pentagon eg $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90)$	Must be a complete process that could lead to a figure of 540 if that process is evaluated incorrectly
		A1	for sum of interior angles is 540 **OR** for sum of exterior angles is 360	360 must be identified as the sum of the exterior angles
		P1	for start to process to find angle ABC eg [angles in a pentagon] – 115 – 125 – 90 (= 210) or $115 + 125 + 90 + x + 2x =$ [angles in a pentagon] **OR** $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90)$ $= 360$	Award provided [angles in a pentagon] is greater than 400 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified
		P1	for process to find angle ABC eg "210" ÷ 3 (= 70), "210" divided in the ratio 2 : 1 **or** for process to find angle BCD eg $\frac{2}{3} \times$ "210" **or** for $3x =$ "210" or $-3x = -$"210"	Award if 70 is given for either ABC or BCD on the diagram
		A1	cao	Award marks for 140 on the diagram with working and not contradicted by the answer line. Award 0 marks for 140 without working.

Question	Working	Answer	Mark	Notes
122		shown	M1	for (angle *BCA*) = 180 – 117 (= 63)
			M1	for (angle *CAB*) = 180 – "63" – 54 (= 63) or (angle *CAB*) = 117 – 54 (= 63)
			C2	for statement, eg. isosceles since angle *BCA* = angle *CAB* = 63 with fully correct reasons, from: angles on a straight line add up to 180º angles in a triangle add up to 180º exterior angle of a triangle is equal to sum of interior opposite angles
			[C1	for angle *BCA* = 63 and angle *CAB* = 63 and one of the above reasons]
				OR
			M1	for $\frac{(180-54)}{2}$ (= 63)
			M1	for identification of **two** angles in triangle *ABC* being "63"
			C2	for statement, eg. isosceles since angle *BCA* = angle *CAB* = 63 **and** angles on a straight line add up to 180º **and** fully correct reasons: base angles of an isosceles triangle are equal and angles in a triangle add up to 180º
123		Reflection	B1	for reflection
		in the *x*-axis (or *y* = 0)	B1	for *x*-axis (or *y* = 0) NB: award no marks if more than one transformation is given

Question	Working	Answer	Mark	Notes
124 (a)		40	P1	for the start of a process to find the number of boxes that will fit along one edge, eg. 240 ÷ 40 (= 6) or 150 ÷ 30 (= 5) or 140 ÷ 35 (= 4) or 240 ÷ 30 (= 8) or 240 ÷ 35 (= 6.85… ie 6 boxes), etc. or for a process to find a volume, eg. 40 × 30 × 35 (= 42000) or 0.4 × 0.3 × 0.35 (= 0.042) or 240 × 150 × 140 (= 5040000) or 2.4 × 1.5 × 1.4 (= 5.04) NB: condone incorrect or no conversion between m and cm
			P1	for a complete process to find the maximum number of boxes, eg. "6" × "5" × "4" (= 120) or "5040000" ÷ "42000" (= 120) or "5.04" ÷ "0.042" (= 120)
			P1	(dep on P1) for (their number of boxes) ÷ 3, eg. 120 ÷ 3 (= 40)
			A1	cao
(b)		explanation	C1	for explaining that it could take more time or it could take less time **with** an appropriate reason, eg. "less space means less number of boxes which will take less time" or "it will take more time since a different arrangement would be required"
125		147	P1	starts process, eg uses x and $x + 7$
			P1	starts to work with at least 6 correct sides, may be on the diagram or in an expression
			P1	(dep on previous P1) gives a correct expression for the perimeter, eg $x + x + 7 + x + 7 + x + 7 + x + x + 7 + x + 7 + x + 7$ or adds at least 6 correct sides and equates to 70
			A1	for width = 3.5 oe **and** length = 10.5 oe
			B1	ft (dep P2) for correct area for their x

Question	Working	Answer	Mark	Notes
126 (a)		Yes (supported)	M1 C1	method to find volume of one cube, eg $2 \times 2 \times 2$ or 2^3 (= 8) or draws a solid of 6 cubes Yes with supporting evidence eg $2 \times 2 \times 2 = 8$, $8 \times 6 = 48$
(b) (i)		cuboid drawn	B1	either a 1 by 6 by 1 cuboid (2 cm by 12 cm by 2 cm) or a 2 by 3 by 1 cuboid (4 cm by 6 cm by 2 cm) drawn
(ii)		104 or 88	M1 A1	ft for finding areas of 3 or more faces of their cuboid and adding for 104 or 88
127		92, 65, 23	P1 P1 P1 P1 A1	for two of x, $4x$ and $4x - 27$ (where x is the smallest angle) (dep) for equation summing their three angles to 180, eg $x + 4x + 4x - 27 = 180$ (dep P1) for correct process to simplify their algebraic expression, eg $9x - 27$ (=180) for correct process to solve their equation of the form $ax + b = 180$ for three correct angles (order irrelevant)
128		Shows polygon is a hexagon	M1 M1 A1 C1	for a complete method to find the interior or exterior angle of the dodecagon eg $180 - \frac{360}{12}$, $\frac{180}{12}(12-2)$ oe (= 150), 360 ÷ 12 (=30) for a complete method to find the interior angle of polygon **P** eg at B or C: 360 – "150" – 90 (= 120) or "30" + 90 (= 120) **or** for a complete method to find the interior or exterior angle of the hexagon eg $180 - \frac{360}{6}$, $\frac{180}{6}(6-2)$ oe (= 120), 360 ÷ 6 (= 60) for 30 and 120 **or** 30 and 60 **or** 120 and 150 **or** 60 and 150 complete solution, fully supported by accurate figures
129		Shown (supported)	M1 C1	method to divide a pair of corresponding sides, eg 7.5 ÷ 3 (= 2.5) or 3 ÷ 7.5 (= 0.4), or states scale factor is 2.5 or 0.4 or method to work out the size of an angle, eg $\tan^{-1}\left(\frac{7.5}{10}\right)$ (= 36.8 to 36.9) shows or states that all sides are enlarged by the same factor or works out a pair of corresponding angles and states that the two triangles have the same angles

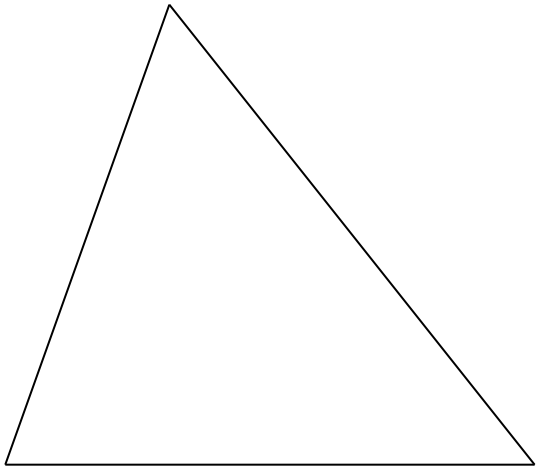
Question	Working	Answer	Notes
130 (a)		(3, 5)	B1
(b)		Plotted	B1
(c)		eg. (5,6) plotted	B1
131		48	P1 For start to process eg.96 ÷ 12 **or** 96 ÷ 2 A1 cao
132 (a)(i)		33	B1 The sum of the angles on a straight line is 180^o
(ii)		The sum of the angles on a straight line is 180	B1
(b)	$(360 - 33 - 145) \div 2$	91	P1 For a correct process to find angle ZWX A1
133 (a)	$2x + 2x - 2y + 2x + 2x - 2y$	Shown	M1 For method to acquire correct inside lengths C1 For completion
(b)	$8x$ and $4y$ are multiples of 4 Their difference must be a multiple of 4 Or $4(2x - y)$ is a multiple of 4	Shown	M1 For method to start argument eg. factorise expression C1 For complete argument
134		252	P1 For start to process eg. radius = 12 ÷ 4 (=3) M1 Method to find area of trapezium or semicircle or circle P1 Process to find area of the shaded region A1 251.7 – 252

Question		Working	Answer	Notes
135	(a)		8	B1 8 ±2mm
	(b)		35	B1 35 ±2˚
136	(a)		Angle marked	B1 cao
	(b)		Face shaded	B1 cao
	(c)		12	B1 cao
137	(i) (ii) (iii)		3 options shown	C1 Diagram with decreased perimeter drawn C1 Diagram with same perimeter drawn C1 Diagram with increased perimeter drawn
138	(a)		70, 40 and 55	P1 for a method to find one of angles eg (180 - 70) ÷ 2 or 70 stated as the equal or 180 – 2 × 70 P1 for a method to find a angle A1 for 70, 40 and 55 (any order)
	(b)		Explanation	C1 Explanation eg cannot have two obtuse angles
139	(a)	160 tiles 18 packs	18	M1 a full method to find the area of the trapezium M1 a full method to calculate both areas in consistent units M1 for the area of the trapezium ÷ area of a tile (with consistent units) M1 (dep previous M1)for method for number of packs required A1
	(b)	176 tiles 20 packs	Supported statement	P1 finding the number of packs for 10% more tiles or 10% of their number of packs, ft from (a) C1 Statement, eg. increase in packs is 2 more which is more than 10%

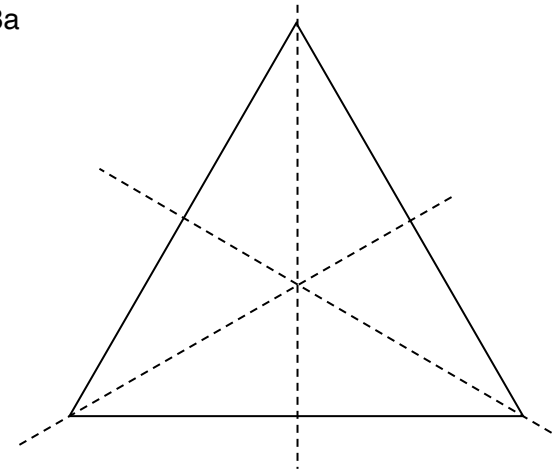
Question	Working	Answer	Notes
140		parallelogram	B1 for parallelogram drawn
141 (a) i		115	B1 cao
ii			C1 angles in a triangle add to 180
(b)		100	P1 complete process to find y ft from (a) A1 for 100 or ft from (a)
142		explanation	C1 'The bearing is 335°' or 'She should have measured clockwise from north' oe
143		plan	C1 a partially correct plan C1 correct plan
144		complete chain of reasoning	C1 starts chain of reasoning eg finds area of large square and area of triangle or use of Pythagoras C1 for $(x+y)^2 - 4\times(x\times y\div 2)$ oe or $\sqrt{x^2+y^2}\times\sqrt{x^2+y^2}$ C1 complete chain of reasoning with correct algebra
145		48	P1 process to start solving problem, eg forms an appropriate equation P1 complete process to isolate terms in x A1 for $x = 6.5$ oe B1 ft (dep P1) for correct perimeter for their x

Question	Working	Answer	Mark	Notes
146 (a)		B and D	1	B1 cao
(b)		E	1	B1 cao
(c)		10	1	B1 cao
147 (a)		40	2	M1 for evidence of using the fact that there are 180° on a straight line eg $100 + 2x = 180$ or $180 - 100 - 2x$ A1 cao
(b)		Acute	1	B1 cao
(c)		Accurate drawing	2	B2 for a fully correct drawing (B1 for $PR = 6.5$ cm ± 0.2 cm or angle $QPR = 70° \pm 2°$)
148 (a)		Correct lines	2	B2 exactly 3 correct lines of symmetry (B1 for 1 or 2 correct lines and no incorrect lines)
(b)		16	3	M1 for a method to find the area of the square e.g 8×8 (= 64) **or** the height of the shaded triangle e.g. $8 \div 2$ (= 4) M1 for a complete method to find the area of the shaded triangle e.g. "64" ÷ 4 **or** ½ × 8 × "4" A1 cao
*149		45	4	M1 for complete method to find angle *ABC* e.g. (180 − 70) ÷ 2 (= 55) M1 for complete method to find *x* e.g. angle *CBD* = 180 –"55" (= 125) **and** "125" – 80 A1 cao C1 base angles of an isosceles triangle are equal **and** the sum of the angles in a triangle is 180 **and** the sum of the angles on a straight line is 180 **or** M1 for complete method to find angle *BAC* e.g. (180 − 70) ÷ 2 (= 55) M1 for complete method to find *x* e.g 70 + "55" (= 125) **and** "125" −80 A1 cao C1 base angles of an isosceles triangle are equal **and** the exterior angle of a triangle is equal to the sum of the two interior opposite angles

147c



148a



Question	Working	Answer	Mark	Notes
150		12	4	M1 for a correct expression for the volume of a block e.g. 2 × 2 × 10 (= 40) M1 for a correct expression for the volume of a box e.g. 10 × 8 × *x* **or** for "40" × 24 M1 for a complete method to find *x* e.g. ("40" × 24) ÷ (10 × 8) A1 cao **or** M1 for a method to find number of blocks that can fit in a bottom row of the box 8 ÷ 2 (= 4) M1 for a method to find the number of rows 24 ÷ 4 (= 6) M1 for a complete method to find *x* e.g. "6" × 2 A1 cao
151		15 200	3	M1 for a method to obtain at least two different areas from 50 × 80 (= 4000), $\frac{1}{2} \times 40 \times 60\ (=1200)$, 60 × 80 (= 4800) M1 (dep on M1) for adding at least 4 correct face areas A1 cao

Question	Working	Answer	Mark	Notes
152 (a)		6.5	1	B1 for 6.5 ± 0.2, accept 6½
(b)		obtuse	1	B1 cao
(c)		135	1	B1 for 135 ± 2
153		(2, –1) or (4, 5) or (–8, –1)	3	M1 for **plotting** one point correctly M1 for plotting all three points correctly A1 **SC B1 ft** their points for coordinates of point giving parallelogram if M0 scored
*154		1.2 m or 120 cm	4	B1 for evidence of using 1 m = 100 cm M1 for subtracting the four post widths from the total length eg $4 - 4 \times 10$ (= 360) or "400" $- 4 \times 10$ or $3x + 40 = 400$ (oe) M1 for dividing their total space found by 3 or subtracting 40 from both sides of $3x + 40 = 400$ C1 for correct conclusion for 1.2 m or 120 cm with supported working
155		25	3	M1 for (opposite angle =) 50 May be marked on the diagram M1 for complete method eg 90 – (180 – "50") ÷ 2 or 50 ÷ 2 A1 cao **or** M1 for 180 – 50 (= 130) May be marked on the diagram M1 for complete method eg (180 – "130") ÷ 2 A1 cao
156	$(7 + 3 + 3) \times (4 + 3 + 3) - 7 \times 4 = 102$ **or** $2 \times 7 \times 3 + 2 \times 4 \times 3 + 4 \times 3 \times 3 = 102$	11	4	M1 for a correct method to find the area of one appropriate rectangle M1 for a complete method to find the area of the path M1 (dep on M1) for "102" ÷ 10 A1 cao

Question	Working	Answer	Mark	Notes
*157		95° with reasons	4	M1 for angle *DBC* = 180 – 125 (= 55) **or** angle *EAC* = 180 – 125 (=55) (May be on diagram) A1 for x = 95 C2 (dep on M1) with full reasons for their given method, e.g. angles on a straight line add up to 180° **and** angles in a triangle add up to 180° **and** corresponding angles are equal **or** allied angles / co-interior angles add up to 180^{o} **and** angles in a triangle add up to 180° (C1 (dep on M1) for one appropriate reason linked to parallel lines) M1 for angle CDB = 125 – 30 (= 95)) (May be on diagram) A1 for x = 95 C2 (dep on M1) for full reasons, for their given method, e.g. exterior angles are equal to the sum of the interior opposite angles **and** corresponding angles are equal (C1 (dep on M1) for one of these appropriate reasons linked to parallel lines)

Question		Working	Answer	Mark	Notes
158	(a)		A, D	1	B1 cao
	(b)		B	1	B1 cao
159	(a)		parallelogram	1	B1 cao
	(b)		Sketch of cuboid	1	B1 for sketch of cuboid
*160			1 cm^2	3	M1 for method to find the area of A or area of B eg for A 6 + 3 (=9), 12 – 3 (=9) eg for B 4 + 4 (=8), 12 – 4 (=8) A1 for 9 and 8 C1 (dep M1) for 1cm^2 or ft from their 2 areas
161	(a)(i)		12	2	B1 cao
	(ii)		8		B1 cao
	(b)		Sketch of net	2	M1 for attempt to draw net with 2 of the following 3 features: 6 rectangles 2 polygon faces with at least 5 edges a net with correct connections to give at least one vertex with 3 faces meeting. A1 for a correct net
	c)		750 cm^3	3	M1 for 30 × 25 A1 for 750 B1 (indep) for cm^3

Question		Working	Answer	Mark	Notes
162	(a)		Correct shape	2	B2 for correct reflection with vertices (–4, 2) (–6, 3) (–6, 7) (–4, 6) (B1 for reflection in a vertical or horizontal line)
	(b)		Correct shape	2	B2 for correct rotation with vertices (–1, 3) (–5, 3) (–6, 5) (–2, 5) (B1 for rotation of 90° clockwise about (0,1) **or** correct orientation fully in correct quadrant)
*163			Conclusion (supported)	5	M1 for finding the area of one rectangle which is not 6 × 10 eg 2×2.5 (=5) or 4×10 (=40) or 2.5 × 6 or 5 × 2 M1 for a complete method to find the total area eg 5+5+40 or 60−10 (=50) M1 for a complete method to find the number of tins needed eg "50" ÷ 5 ÷ 2.5 (=4) OR for a complete method to find the number of litres needed. eg "50" ÷ 5 (=10) OR for a complete method to find the area covered by 3 tins eg 3×2.5×5 (=37.5) A1 for 50 (m^2) **and** (4 tins needed) **or** for 10 (litres) **and** 7.5 (litres) **or** for 50(m^2) **and** 37.5(m^2) C1 (dep M2) for a conclusion supported by their calculations

Question		Working	Answer	Mark	Notes
164	(a)(i) (ii)		56 reason	2	B1 for 56 B1 for angles on a straight line add up to 180 ^{o} oe
	(b)		square or rectangle	1	B1 for square or rectangle
	(c)		kite drawn	1	B1 for kite drawn
165	(a)		10	1	B1 cao
	(b)		reflected shape	2	M1 for shape reflected but in the wrong position A1 for correct reflection
166	(a)		5	2	M1 for equating sides, eg $x + 1 + x - 1 = 10$ or $2x = 10$ or $x + 1 = 6$ or $x - 1 = 4$ A1 for (x =) 5
	(b)		30	2	M1 for $1y + 2y + 3y = 180$ oe or $180 \div 6$ (=30) A1 cao

Question		Working	Answer	Mark	Notes
167*		Common partitioning: 1. 14 + 9 + 9 +12 (=44) 2. 14 + 14 + 8 + 8 (=44) 3. 12 + 10 + 12 + 10 (=44) 4. 9 + 14 + 8 + 13 (=44) 5. 12 + 12 + 8 + 8 + 4 (=44)	No supported by working	4	**Method 1 (partitioning)** M1 for method to find paving stones for 2 (or more) rectangles M1 (dep) for addition of paving stones for complete path A1 for 44 (tiles) C1 (dep on M1) ft for correct decision supported by working **Method 2 (area 1)** M1 for 7×5 − 6×4 (=11) oe M1 (dep) for "11" ÷ 0.5^2 (=44) A1 for 44 (paving stones) C1 (dep on M1) ft for correct decision supported by working **Method 3 (area 2)** M1 for 7×5 − 6×4 (=11) oe M1 for 0.5^2 × 35 (=8.75) A1 for 11 and 8.75 C1 (dep on M1) ft for correct decision supported by working **Method 4 (using perimeter)** M1 for (6 + 4 + 6 + 4) ÷ 0.5 (=40) M1 for "40" + 4 A1 for 44 (tiles) C1 (dep on M1) ft for correct decision supported by correct working
168*			40°	4	M1 for angle FBC=70 or CFG = x or ABF = 110 may be seen in diagram M1 for angle CBF = BFC =70 or 90 – ½ x may be seen in diagram A1 for 40 supported by working C1 (dep on M2) for full reasons linked to appropriate working, eg alternate angles are equal; allied angles / co-interior angles add up to 180°; base angles of an isosceles triangle are equal, angles on a straight line add up to 180°, angles in a triangle add up to 180°

Question		Working	Answer	Mark	Notes
169 *			NO with evidence	4	M1 for 50 × 40 × 30 (=60 000) M1 for "60 000" ÷ 3000 (=20) M1 for "20" × £3.50 C1 for (£)70 and comparison resulting in NO **OR** M1 for 60 ÷ 3.50 (=17 bottles) M1 for "17" × 3000 (=51,000) M1 for 50 × 40 × 30 (=60,000) C1 for 51,000 and 60,000 and comparison resulting in NO

Question		Working	Answer	Mark	Notes
170	(a)		Parallel lines marked	1	B1 for parallel lines marked
	(b)		Right angle	1	B1 for right angle marked
	(c)		35	1	B1 for 33 - 37
*171		g: **2000**, 600 / kg: 2, **0.6** mm: **400**, 450 / cm: 40, **45** mm: **210**, 350 / cm: 21, **35** mm: **75**, 80 / cm: 7.5, **8**	Yes with correct conversions	4	M1 for using 1 kg = 1000 g eg sight of 2000 or 0.6 M1 for using 1 cm = 10 mm eg sight of 400, 210, 25, 45, 35 or 8 M1 for evidence of considering three boxes eg 2.5×3 (=7.5) or reducing the 2kg parcel to compare with one box C1 for "yes" with correct conversions of dimensions and weight NB: Candidates can work in cm or in mm and in kg or g
*172			x =115° with complete reasons	3	M1 for angle CEB = 180 – 25 – 90 (= 65) or angle ABE = 90 – 25 (= 65) or for x = 25 + 90 A1 for 115 C1 (dep on M1) for full reasons, appropriate to their given method e.g. angles in a triangle add up to 180° **and** angles on a straight line add up to 180° e.g. the exterior angle of a triangle is equal to the sum of the interior opposite angles e.g. angles in a quadrilateral add up to 360° e.g. alternate angles are equal
173			12	3	M1 for a method to find volume of a cuboid, eg. 2 × 10 × 15 (= 300) or 5 × 5 × x (= 25x) M1 (dep) for "300" ÷ "25" oe A1 cao OR M1 for 10 ÷5 (= 2) and 15 ÷ 5 (= 3) or 10 ÷5 (= 2) and 2 ÷ 5 (= 0.4) M1 (dep) for 2 × "2" × "3" or 15 × "2" × "0.4" A1 cao

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

Question		Working	Answer	Mark	Notes
175			126 or 176	4	M1 for correct unit conversion of 2 m or 3 m or 20 cm M1 for method to find number in width or number in length **or** 14 or 9 or 16 or 11 M1 (dep on M1) for "number in length" × "number in width" eg 14 × 9 eg 16 × 11 A1 for 126 or 176
176			correct shape	2	M1 for at least 2 correctly enlarged sides A1 for correct shape **SC:** B1 for a fully correct enlargement scale factor 2 or 4
177			700 cm^3	3	M1 for $20 \times 5 \times 7$ A1 for 700 B1 (indep) for cm^3
*178			130 + correct reasons	4	M1 for angle $BFG = 65$ (may be seen on diagram) M1 (dep) for correct method to calculate x eg ($x =$) $65 + 65$ (= 130) **or** ($x =$) $180 - (180 - 2 \times 65)$ (= 130) C2 for $x =$130 **and** full appropriate reasons related to method shown (C1 (dep on M1) for any one appropriate reason related to method shown) eg alternate angles are equal ; base angles in an isosceles triangle are equal; angles in a triangle add up to 180°; angles on a straight line add up to 180°; exterior angle of triangle = sum of two interior opposite angles co-interior angles (allied angles) add up to 180°

Question		Working	Answer	Mark	Notes
179			9	4	M1 for method to find the area of one rectangle eg 15 × 8 (=120) or 15 × 11 (=165) M1 (dep) for subtraction from/by given area eg 138 − "120" (=18) or "165" − 138 (=27) M1 for final step from complete method shown eg 15 − "18"÷ 3 or for "27" ÷ 3 A1 cao **OR** M1 for a correct expression for the area of one rectangle eg (8 + 3) × (15 − x) or 8 × x M1 (dep) for a correct equation eg (8 + 3) × (15 − x) + 8 × x = 138 M1 for correct method to isolate x eg 3x = 27 A1 cao

Question		Working	Answer	Mark	Notes
180	(a)		Pentagon	1	B1 cao
	(b)		Parallel lines marked	1	B1 cao
	(c)		Acute	1	B1 cao
	(d)		10 cm^2	2	B1 for 10 B1 (indep) for cm^2
181			200	3	M1 for $20 \times 40 \times 20$ (=16000) or $5 \times 8 \times 2$ (=80) M1 (dep) for "16000" ÷ "80" A1 cao OR M1 attempt one division (eg 20 ÷ 5), may be implied by marks or number on one edge of diagram M1 (dep) for "(20 ÷ 5)" × "(40 ÷ 8)" × "(20 ÷ 2)" A1 cao
*182		base angles of isosceles triangle are equal **and** angles on a straight line add up to 180° **and** angles in a triangle add up to 180° OR base angles of isosceles triangle are equal **and** angles in a triangle add up to 180° OR base angles of isosceles triangle are equal **and** exterior angle of a triangle is equal to the sum of the interior opposite angles	60° with reasons	4	B1 for angle *ADB* =25 can be shown on the diagram M1 for a complete method to find *x* C2 (dep 2 previous marks) for 60 with full reasoning seen (C1 (dep 1 previous mark) for one reason) QWC: Reasons must be appropriate to the method shown.

Question		Working	Answer	Mark	Notes
*183			3	4	M1 for attempt to calculate at least one area eg 10 × 7 (=70) or 16 × 10 (=160) M1 for a method to find the total area (=124) M1 (dep on M1) for "124" ÷ 36 C1 (dep on M3) for 3 (pigs) clearly identified and supported by correct calculations Or M1 for an area of 36m² drawn with dimensions shown M1 for 3 areas of 36m² drawn with dimensions shown M1 for method to find the area left (=16) C1 (dep on M3) for 3 (pigs) clearly identified and supported by correct calculations
184			Shape drawn	2	B2 for shape with vertices at (0, –1), (–1, –3), (–2, –3), (–2, –1) (B1 for rotation of 180° about the wrong centre)

Question		Working	Answer	Mark	Notes
185	(a)(i)		6	3	B1 cao
	(ii)		12		B1 cao
	(iii)		8		B1 cao
	(b)		120	2	M1 10 × 3 × 4 A1 cao
186	(a)		7	1	B1 for 6.8-7.2
	(b)(i)		78	2	B1 cao
	(ii)				B1 for <u>vertically opposite</u> angles are <u>equal</u> **or** clear indication of 2 step process and <u>angles</u> on a <u>straight line</u> add up to <u>180°</u>
187			×2 enlargement	2	M1 for quadrilateral with at least 2 correct sides A1 cao
188			Triangle drawn	2	M1 for a triangle with at least one side of length 5 cm (± 0.2) or at least one angle 60° (±2°) A1 for a correct triangle
189	(a)		36	2	M1 12 × 6 ÷ 2 A1 cao
	(b)		10	2	M1 55 × 2 ÷ 11 or an embedded answer A1 cao
190	(a)		Shape with vertices at (–1, 3), (0, 6), (2, 6), (1, 3)	1	B1 for correct shape in correct position
	(b)		Rotation centre (0,0) 90˚ anticlockwise	3	B1 Rotation B1 (centre) (0,0) or *O* or origin B1 90˚ anticlockwise or 270˚ clockwise Note: award no marks if more than one transformation is given

Question		Working	Answer	Mark	Notes
*191			Not enough, needs £133	5	M1 for splitting the shape (or showing recognition of the "absent" rectangle) and using a correct method to find the area of one shape M1 for a complete and correct method to find the total area M1 for a complete method to find 70% of 19 (= 13.3) or 70% of their total cost or 70% of their area A1 114(m^2) and (£)133 **or** 114(m^2) and (£)13.3(0) and 108(m^2) C1 (dep on M2) for a conclusion supported by their calculations OR M1 for a complete method for the number of tins required for one section of the area of the floor M1 for a complete method to find the number of tins for the whole floor M1 for a complete method to find 70% of their total number of tins and multiply by 19 A1 (£)133 C1 (dep on M2) for a conclusion supported by their calculations
192			38	5	M1 $3x - 5 = 19 - x$ M1 for a correct operation to collect the x terms or the number terms on one side of an equation of the form $ax+b=cx+d$ A1 for $x = 6$ M1 for substituting their value of x in the three expressions and adding **or** substituting their value of x after adding the three expressions A1 cao

Question		Working	Answer	Mark	Notes
193	(a)		B	1	B1 cao
	(b)		118°	1	B1 Accept 116 – 120
	(c)		10.5 cm	1	B1 Accept 10.3 – 10.7 (or 103 – 107 if cm crossed out and replaced by mm)
194	(a)		14 cm	2	B1 for 14 cao B1 (indep) for cm
	(b)		3 by 3 square	1	B1 cao
*195 QWC			$x = 50^{o}$ with complete reasons	3	M1 for 180 – (65 + 65) A1 for $x = 50$ cao C1 (dep on M1) Base angles of an isosceles triangle are equal **and** angles in a triangle add up to 180
196	(a)	(4,0) (3, 0) (3, -1) (2, -1) (2, 2) (4, 2)	Correct position	2	B2 for correct shape in correct position (B1 for any incorrect translation of correct shape)
	(b)		Rotation 180° (0,1)	3	B1 for rotation B1 for 180° (ignore direction) B1 for (0, 1) **OR** B1 for enlargement B1 for scale factor −1 B1 for (0, 1) (NB: a combination of transformations gets B0)

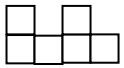
Question		Working	Answer	Mark	Notes
197			1.5	4	M1 for correct expression for perimeter eg. $4 + 3x + x + 6 + 4 + 3x + x + 6$ oe M1 for forming correct equation eg. $4 + 3x + x + 6 + 4 + 3x + x + 6 = 32$ oe M1 for $8x = 12$ **or** $12 \div 8$ A1 for 1.5 oe **OR** M1 for correct expression for semi-perimeter eg. $4 + 3x + x + 6$ oe M1 for forming correct equation eg. $4 + 3x + x + 6 = 16$ M1 for $4x = 6$ **or** $6 \div 4$ A1 for 1.5 oe

Question		Working	Answer	Mark	Notes
198	(a)		Arrows on correct lines	1	B1 Arrows on correct lines with no extras marked
	(b)		8	1	B1 for 8 ± 0.2
	(c)		acute	1	B1 cao
	(d)		124	1	B1 for 124 ± 2
199	(a)		parallelogram	1	B1 Allow trapezium
	(b)		isosceles	1	B1
	(c)		6	2	M1 for a complete method to find the area A1 cao Note: For dots to be a valid method candidates must give an answer in the range 5 to 7
200	(a)		reflection	2	B2 for correct reflection in correct position (B1 for at least 2 vertices in the correct position)
	(b)		enlargement	2	B2 for correct enlargement scale factor 3 (B1 for at least 2 lines correctly enlarged or any enlargement using an incorrect scale factor, sf $\neq 1$)
	(c)		105	2	M1 for $360 - (90 + 128 + 37)$ oe or $x + 90 + 128 + 37 = 360$ A1 cao

Question	Working	Answer	Mark	Notes
* 201		35^o with reasons	4	M1 for correct method to find one angle eg 70 or 110 (angles could be on the diagram) M1 for a complete correct method to work out x A1 (dep on M1) for 35^o C1 for complete geometric reasons for their chosen method without extras eg exterior angle = sum of interior opposite angles **and** base angles of an isosceles triangle are equal OR angles in a triangle add up to 180 **and** angles on a straight line add up to 180 **and** base angles of an isosceles triangle are equal OR M1 $x + x + 20 + 90 = 180$ M1 for a complete correct method to work out x A1 (dep on M1) for 35° C1 for complete geometric reasons for their chosen method without extras eg angles in a triangle add up to 180 **and** base angles of an isosceles triangle are equal

Question		Working	Answer	Mark	Notes
202	(a)		E	1	B1 cao
	(b)		Cylinder	1	B1 for cylinder or circular prism. Use professional judgement re spelling of cylinder
	(c)		6	1	B1 cao
	(d)		8	1	B1 cao
203	(a)		36 – 40 inc.	1	B1 for any answer in the range 36 – 40 inc.
	(b)		line	1	B1 for line of length 4.8 – 5.2cm inc.
204	(a)		(1, 2)	1	B1 cao (accept coordinates just shown on the grid)
	(b)		(0, –3)	1	B1 cao (accept coordinates just shown on the grid)
	(c)		(3, –2)	1	B1 for (3, –2) or (–3, –4) or (–1, 6) [SC: B1 for coordinates reversed, (–2, 3) or (–4, –3) or (6, –1) if coordinates reversed in parts (a) **and** (b)]
205*		360 – 200 – 90 (=70) (180 – '70') ÷2 angles at a point add to 360°, angles in a triangle add to 180°, base angles of an isosceles triangle are equal	$y = 55$ reasons	4	M1 for 360 – 200 – 90 oe M1 for (180 – '70') ÷ 2 Reasons: angles at a point add up to 360° angles in a triangle add up to 180° base angles of an isosceles triangle are equal C2 for $y = 55°$ and all correct reasons Note: An answer of 55° alone, is not enough; $y = 55°$ must be explicitly stated or clearly shown on the diagram (C1 for one correct reason) Note: the award of any C mark is dependant upon the award of at least M1

Question		Working	Answer	Mark	Notes
206			4×6 rectangle	2	B2 for a single 4×6 rectangle drawn anywhere on the grid (B1 for a single 4×n rectangle or a single m×6 rectangle drawn anywhere on the grid) Note: All nets and 3-D sketches get NO marks
207		$\frac{9}{2}\times(12+18)=135$ 135 ÷ 20 = 6.75 (=7 bags) 7 × 4.99 OR $18\times9-\frac{1}{2}(6\times9)$ = 135 135 ÷ 20 = 6.75 (=7 bags) 7 × 4.99	34.93	4	M1 for $\frac{9}{2}\times(12+18)$ or $18\times9-\frac{1}{2}(6\times9)$ or $9\times12+\frac{1}{2}\times(18-12)\times9$ or 135 seen M1 (dep) for '135'÷ 20 or 6 or 7 seen M1 (dep on previous M1) for '6' × 4.99 or '7' × 4.99 A1 cao [SC: M1 for (12×9 + 6×9) ÷ 20 (= 162÷20) or 8 or 9 seen M1 (dep) for '8' × 4.99 or '9' × 4.99 OR M1 for (18×9 − 6×9) ÷ 20 (= 108÷20) or 5 or 6 seen M1 (dep) for '5' × 4.99 or '6' × 4.99]
208		Area of cross section 4×7 + 5×2 or 9×2 + 5×4 **OR** 9 × 7 − 5 × 5 (= 38)	380	3	M1 for 4×7 + 5×2 (=38) or 9×2 + 5×4 (=38) or 7×9 − 5×5 (=38) or 4×7×10 or 5×2×10 (=100) or 9×2×10 (=180) or 5×4×10 (=200) or 9×7×10 (=630) or 5×5×10 (=250) M1 (dep) for '38'×10 or 380 or 4×7×10 + 5×2×10 or 9×2×10 + 5×4×10 or (7×9 − 5×5) ×10 A1 cao

Question		Working	Answer	Mark	Notes
209	(a)		8	1	B1 for 8 ± 0.2
	(b)		35	1	B1 for 35 ± 2°
	(c)		Circle drawn	1	B1 for all parts within ± 2mm, (use overlay)
210	(a)		Isosceles triangle	1	B1 for isosceles triangle
	(b)		Rectangle with area 12 cm^2	2	M1 for rectangle drawn A1 cao
211	(a)		20	2	M1 3 × 3 × 3 oe seen or drawn or 27 seen or use of 3 layers A1 cao
	(b)			2	B2 for correct view (B1 for  or )
212		2 + 8 + 2 + 8 = 20 20 ÷ 4 =	5	4	M2 for 2 + 8 + 2 + 8 oe **or** 20 seen **or** (2 + 8) ÷ 2 oe (M1 for the sum of 3 sides of the rectangle) M1 (dep) for the sum of 3 or 4 sides of the rectangle ÷ 4 **or** an attempt to evaluate (2 + 8) ÷ 2 oe to get the length of one side A1 cao **SC**: B1 for an answer of 4 coming from $\sqrt{2\times 8}$ oe

Question		Working	Answer	Mark	Notes
213 *		Angle *DBC* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal Angle *ABD* = 180 – 65 Angles on a straight line add up to 180 *x* = 180 – 20 – 115 Angles in a triangle add up to 180 **OR** Angle *DBC* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal *x* = 65 – 20 Exterior angle of triangle is equal to sum of interior opposite angles **OR** Angle *DCB* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal *x* = 180 – 50 – 20 – 65 Angles in a triangle add up to 180	45 with reasons	4	M1 for (180 – 50) ÷ 2 oe **or** 65 seen M1 for 180 – 20 – (180 – "65") **or** "65" – 20 or 180 – 50 – 20 –'65' oe C2 for *x* identified as 45 with full reasons QWC: Reasons clearly laid out with correct geometrical language used (C1 (dep on M1) for one reason QWC: Reasons clearly laid out with correct geometrical language used) NOTE: *x* = 45 with no working or without any correct angles marked on the diagram cannot score.

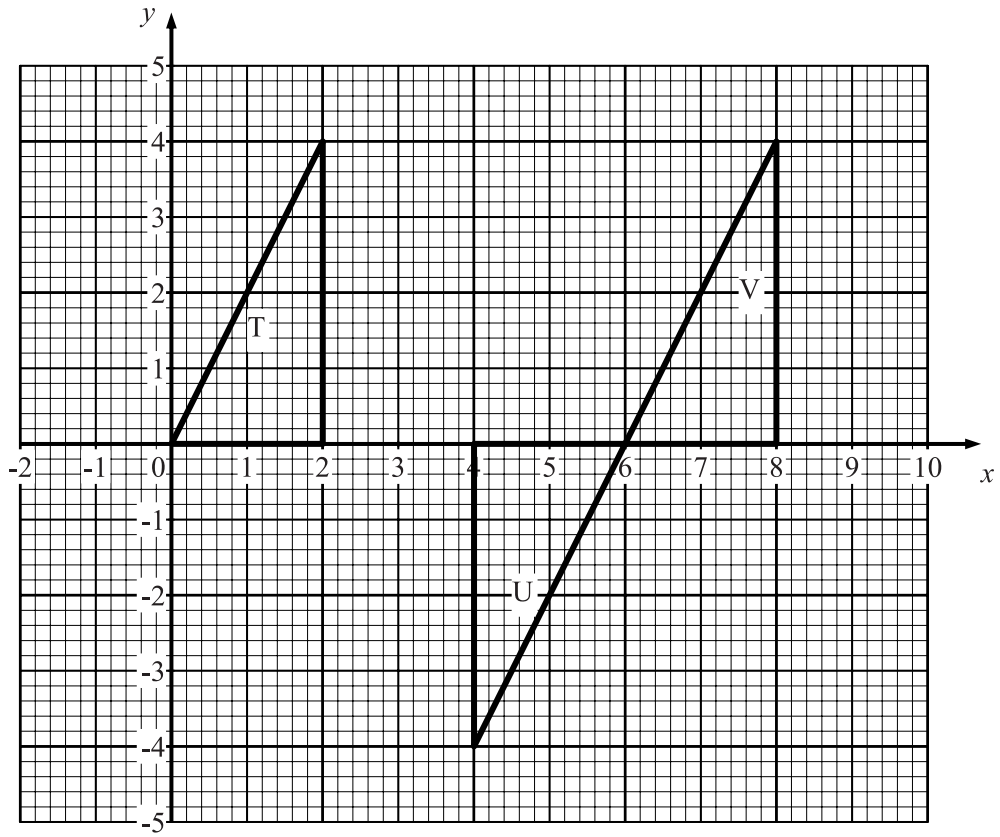
Question		Working	Answer	Mark	Notes
214	(a)	360 ÷ 60 = 6 300 ÷ 60 = 5 6 × 5 =	Yes and 30	3	M1 for dividing side of patio by side of paving slab eg 360 ÷ 60 **or** 300 ÷ 60 **or** 3.6 ÷ 0.6 **or** 3 ÷ 0.6 **or** 6 and 5 seen **or** 6 divisions seen on length of diagram **or** 5 divisions seen on width of diagram M1 for correct method to find number of paving slabs eg (360 ÷ 60) × (300 ÷ 60) oe **or** 6 × 5 **or** 30 squares seen on diagram (units may not be consistent) A1 for Yes **and** 30 (or 2 extra) with correct calculations **OR** M1 for correct method to find area of patio **or** paving slab eg 360 × 300 **or** 108000 seen **or** 60 × 60 **or** 3600 seen **or** 3.6 × 3 **or** 10.8 seen **or** 0.6 × 0.6 **or** 0.36 seen M1 for dividing area of patio by area of a paving slab eg. (3.6 × 3) ÷ (0.6 × 0.6) oe (units may not be consistent) A1 for Yes **and** 30 (or 2 extra) with correct calculations **OR** M1 for method to find area of patio and area of 32 slabs eg. 60 × 60 × 32 **or** 360 × 300 M1 for method to find both areas eg. 60 × 60 × 32 **and** 360 × 300 (units may not be consistent) A1 for Yes **and** 115200 **and** 108000 **OR** Yes **and** 11.52 **and** 10.8 **NB :** Throughout the question, candidates could be working in metres or centimetres

Question		Working	Answer	Mark	Notes
214	(b)	1726 25890 27616 **8 6 3** **2** 24 18 9 **3** **7** 16 12 6 **2** 6 1 6 800 60 3 30 24000 1800 90 2 1600 120 6 24000 + 1800 + 90 + 1600 + 120 + 6 = 27616	276.16	3	M1 for complete correct method with relative place value correct. Condone 1 multiplication error, addition not necessary. **OR** M1 for a complete grid. Condone 1 multiplication error, addition not necessary. **OR** M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary. A1 for digits 27616 A1 ft (dep on M1) for correct placement of decimal point after addition (of appropriate values) (SC: B1 for attempting to add 32 lots of 8.63)

Question		Working	Answer	Mark	Notes
215		$3x-15 = 2x+24$ $x = 39$ **OR** $2x+3x-15+2x+2x+24 = 360$ $9x + 9 = 360$ $9x = 351$ $x = 39$ **OR** $2x + 2x+24 = 180$ $4x + 24 = 180$ $4x = 156$ $x = 39$ **OR** $2x + 3x-15 = 180$ $5x - 15 = 180$ $5x = 195$ $x = 39$	39	3	M1 for forming an appropriate equation eg $3x - 15 = 2x + 24$ **or** $2x + 3x - 15 + 2x + 2x + 24 = 360$ oe **or** $2x + 2x + 24 = 180$ oe **or** $2x + 3x - 15 = 180$ oe **or** $2x + 3x - 15 = 2x + 2x + 24$ M1 (dep) for correct operation(s) to isolate x and non-x terms in an equation to get $ax = b$ A1 cao **OR** M2 for $\frac{351}{9}$ **or** $\frac{195}{5}$ **or** $\frac{156}{4}$ oe A1 cao

Question		Working	Answer	Mark	Additional Guidance
216 FE	(a)		cylinder	1	B1 cao
	(b)		9	1	B1 cao
	(c)		D, E	1	B1 cao
	(d)(i)		Net	5	B3 fully correct (B2 5 correct faces) (B1 a net of a cuboid)
	(ii)		14 cm × 18 cm		B1, B1 ft on d(i)
					Total for Question: 8 marks
217	(a)		16 cm	1	B1 cao (units included)
	(b)		48 cm^3	4	M1 3-D drawing or sketch M1 4 × 4 × 2 and 2 × 2 × 4 / 4 × 4 × 4 and 2 × 2 × 4 M1 adding or subtracting A1 cao (units included)
					Total for Question: 5 marks
218	(a)		C and D	1	B1 cao
	(b)		B and E	1	B1 cao
	(c)		4.5 cm^2	1	B1 cao
					Total for Question: 3 marks
219		Rotates shape about (3,0) by 180° to give U Rotates U about (6, 0) to give V (see graph at end)	Translation by $\begin{pmatrix}6\\0\end{pmatrix}$	3	B3 Translation by $\begin{pmatrix}6\\0\end{pmatrix}$ (B2 translation by 6 to the right or just $\begin{pmatrix}6\\0\end{pmatrix}$ on its own) (B1 translation or move to the right 6) If no marks earned from a description then B1 U correctly placed B1 V correctly placed
					Total for Question: 3 marks

219



Question		Working	Answer	Mark	Additional Guidance
220 FE		Area of the room = 4 × 8 + 4 × 6 = 56 Area of a tile = 0.5 × 0.5 = 0.25 Number of tiles = 56 ÷ 0.25 = 224 Cost = 4 × 224 **OR** No of tiles around room = 2 × lengths of room = 8, 16, 16, 12 Total number of tiles = 8 × 16 + 8 × 12 = 224 Cost = 4 × 224	£ 896	6	M1 for full method for finding the area of the room A1 at least one area correct B1 for area of tile = 0.25m^2 or 2500 cm^2 or 4 tiles = 1m^2 M1 for area of room ÷ area of a tile M1 for 4 × number of tiles A1 cao **OR** M1 for doubling each length to show number of tiles for each side B1 for 8, 16, 16 and 12 M1 for a full method of finding the number of tiles (12×16+8×4) A1 for at least one 'section' correct M1 for 4 × '224' A1 cao
					Total for Question: 6 marks

Question		Working	Answer	Mark	Notes
221	(a)		(2, 1)	1	B1 cao
	(b)		(0, 5)	1	B1 cao
	(c)		(1, 3)	1	B1 cao
	(d)		Point	1	B1 for point marked, eg at (4, 5) or (4, 3) or (5, 5) or (7, 6) or (3, 4) or (4, 7)
222	(a)		4.5	1	B1 for 4.3 to 4.7
	(b)		Sector drawn	1	B1 for sector drawn
	(c)		Chord	1	B1 cao
223			4	3	M1 for 10 + 10 + 10 (= 30) M1 for (“30” – 11 – 11) ÷ 2 oe A1 cao
224	(a)		trapezium	1	B1 cao
	(b)		8	2	M1 for a strategy to find the area, eg splitting the shape into two triangles or drawing a rectangle around it or using the formula for the area of a trapezium A1 cao
	(c)		Shape reflected	2	B2 for correct reflection drawn (B1 for 3 vertices correct or correct orientation, incorrect position)
	(d)		Enlargement sf 3 drawn	2	B2 correct enlargement drawn (B1 for any two sides correct or a correct enlargement with scale factor other than 3)

Question	Working	Answer	Mark	Notes
225		22.6	3	M1 for $19.3^2 + 11.7^2$ or 372.49 + 136.89 or 509.38 M1 for $\sqrt{19.3^2 + 11.7^2}$ or $\sqrt{509.38}$ A1 for answer in range 22.5 to 22.6
*226		No (supported)	5	M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter: 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 (dep M1) for method to find number of rolls required for their perimeter, eg "their total perimeter" ÷ 2.4 eg 25.99..÷2.4 (=10.8), "47.98.."÷2.4 (=19.9) or "43.98.." ÷2.4 (=18.3) M1 for method to work out cost eg 3×10 + 2×3.99 (= 37.98), or 11 × 3.99 (=43.89); 20 →67.98, 19→63.99 or for method to find how many rolls can be bought for £35 (= 10) C1 for a conclusion supported by fully correct answers eg 37.98 (for comparing with 35) or 10 and 10.8 OR M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 for a method to find how many rolls can be bought for £35 (=10) M1 for a method to work out the coverage of 10 rolls e.g. 10 × 2.4 (=24) C1 for a conclusion supported by fully correct answers eg 25.9(...) and 24

Question	Working	Answer	Mark	Notes
227 (a)		6	1	B1 cao
(b)		sketch of net	2	B2 for a correct sketch of a possible net. (B1 for between 3 and 5 faces (of which at least one must be a rectangle and no more than two triangles) with adjoining edges)
(c)		triangle drawn	2	M1 for line length 6.5 cm drawn (± 2mm) A1 for accurately drawn triangle (within overlay)
228		1440	3	M1 for correct method to find volume of a cuboid eg 300 × 600 × 200 (=36000000) or 25 × 50 × 20 (=25000) M1 (dep) for "volume of container" ÷ "volume of box" A1 cao Ignore units. OR M1 for correct method to find number of boxes along one edge eg 300 ÷ 25 (=12) or 600 ÷ 50 (=12) or 200 ÷ 20 (=10) M1 (dep) for intention to use 3 values to find total number of boxes A1 cao Ignore units. NB : must use consistent units for M marks.
229		26	3	M1 for (360 − 90) ÷ 2 (= 135) M1 for $4x + 31$ = "135" or $6x - 21$ = "135" A1 cao OR M1 for forming an appropriate equation eg $4x + 31 = 6x - 21$ or $6x - 21 + 4x + 31 + 90 = 360$ oe M1 (dep) for isolating terms in x and number terms A1 cao
230		41.1	4	M1 for method to work out the area of the circle or quarter circle or semi-circle eg $\pi \times 6^2$ (=113.(09..)) or $\pi \times 6^2 \div 2$ (=56.5(48..)) or $\pi \times 6^2 \div 4$ (= 28.2(7…)) M1 for method to work out the area of the square eg (=72) oe or a triangle eg ½×6×6 (=18) M1 for complete method to find shaded area. A1 for value in the range 41.04 - 41.112

Question	Working	Answer	Mark	Notes
231 (a)		1, 5	1	B1 cao
(b)		Point D marked	1	B1 cao
232 (a)		1270 or 1320	2	M1 for adding the six lengths or an answer of digits 127(0) or digits 132(0) A1 for 1270 or 1320
(b)		32 mm or 3.2 cm	1	B1 for answer in range 30 mm to 34 mm or in range 3 cm to 3.4 cm
(c)		Drawing	3	M1 for at least one right angle M1 for 10cm line or 12.5cm line A1 for fully correct drawing
233		21	2	M1 for $ACD = 180 - 90 - 58$ oe (= 32) or for $CDB = 180 - 58$ (= 122) or for $x = 58 - 37$ A1 cao
234		drawing	2	M1 for (quadrilateral with) at least 2 correct sides A1 cao

Question	Working	Answer	Mark	Notes
235 (a)		45	2	M1 for 60 + 60 + 60 oe (= 180) or 0.75 × 60 oe A1 cao
(b)		48	3	M1 for 120 ÷ 30 (= 4) or 720 ÷ 60 (= 12) M1 (dep) for "4" × "12" A1 cao OR M1 for 120 ÷ 60 (= 2) or 720 ÷ 30 (= 24) M1 (dep) for "2" × "24" A1 cao OR M1 for 720 × 120(= 86400) or 60 × 30 (= 1800) M1 (dep) for "86400" ÷ "1800" A1 cao
236		9.25	3	M2 for $x + x + 4 + x + x + 4 = 45$ oe or $x + x + 4 = 22.5$ oe (M1 for $x + x + 4 + x + x + 4$ oe) A1 for 9.25 or $\frac{37}{4}$ oe OR M1 for 45 – 8 (= 37) or 22.5 – 4 (= 18.5) M1 for (45 – 8) ÷ 4 or (22.5 – 4) ÷ 2 A1 for 9.25 or $\frac{37}{4}$ oe

Question	Working	Answer	Mark	Notes
* 237		124° with reasons	4	M1 for a method to find any angle eg. angle *DEF* = 180 – 70 – 54 (= 56) or angle *AEB* = 70 or angle *EAB* = 54 or angle GEB = 180 – 70 (= 110) A1 for *x* =124 NB: Angles may be shown on the diagram C2 for full reasons, appropriate to their given method, with no additional reasons (C1 for one appropriate reason relating to parallel lines) Possible reasons: corresponding angles are equal; alternate angles are equal co-interior (allied)angles add up to 180; angles on a straight line add up to 180; angles in a triangle add up to 180 vertically opposite angles are equal; the exterior angle of a triangle is equal to the sum of the interior opposite angles; angles at a point add up to 360;

Question		Working	Answer	Mark	Notes
238	(i)		Cylinder	1	B1 cao
	(ii)		Cuboid	1	B1 cao
239	(a)		Angle drawn	1	B1 cao
	(b)		Triangle drawn	2	M1 intersecting arcs of radii 6 cm or an accurate triangle with no arcs A1 for a fully correct triangle with arcs
240			11.25	3	M1 for 40 ÷ 8 (= 5) M1 (dep) for finding the area of the triangle eg "5" × 4.5 ÷ 2 A1 cao
*241			No not enough	5	M1 for substituting into Pythagoras' theorem M1 for complete correct use of Pythagoras' theorem M1 for a complete method to find the perimeter of the trapezium A1 51.(20655..) C1 (dep on first two Ms) for correct conclusion dependent upon supporting calculations

Question		Working	Answer	Mark	Notes
242	(a)		Hexagon	1	B1 cao
	(b)		8	1	B1 cao
243	(a)(i)		95	2	B1 cao
	(ii)		Reason		B1 angles in a triangle add to 180°
	(b)		Drawing	3	B3 for a fully correct triangle (B2 for a triangle with 2 of the 3 aspects: line of 8cm; angle of 40º; angle of 45º) (B1 for 1 of the 3 aspects)
*244			No supported by working	4	M1 for $\pi \times 7$ (= 21.9 to 22) or $\pi \times 7 \times 2.54$ (= 55.5 to 56) M1 (dep) for a complete method that could lead to two figures that are comparable e.g. $\pi \times 7 \times 2.54$; $\pi \times 7$ and $50 \div 2.54$ A1 for correct comparable figures e.g. 55.5 to 56 (cm); 21.9 to 22 (in) and 19.6 to 19.7 (in) C1 (dep M2) for a correct conclusion based on their comparable figures OR M1 for $50 \div \pi$ (= 15.9 to 15.92) or $50 \div 2.54\pi$ (= 6.26 to 6.27) M1 (dep) for a complete method that could lead to two figures that are comparable e.g. $(50 \div \pi) \div 2.54$; $50 \div \pi$ and 7×2.54 A1 for correct comparable figures e.g. 6.26 to 6.27 (in); 15.9 to 15.92 (cm) and 17.7 to 17.8 (cm) C1 (dep M2) for a correct conclusion based on their comparable figures
245			172.1	4	M1 for $30^2 + 20^2$ or 900 + 400 or 1300 M1 for $\sqrt{30^2 + 20^2}$ or $\sqrt{1300}$ (= 36(.0555)) M1 for a complete method to find the length of wire required e.g. 2×'36.1' + 2×30 + 2×20 A1 172 – 172.2

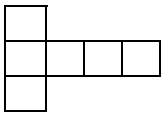
Question		Working	Answer	Mark	Notes
246	(a)		6	1	B1 cao
	(b)		14	1	B1 cao
	(c)		Reflection	1	B1 cao
247	(a)		Perpendicular	1	B1 for a perpendicular line drawn
	(b)		Circle radius 4cm	1	B1 for a circle of radius 4 cm drawn
	(c)		Isosceles triangle	1	B1 for an isosceles triangle
	(d)		Quadrilateral	1	B1 for quadrilateral with exactly two right angles
248	(a)		5, 3	1	B1 cao
	(b)		2, 4	1	B1 cao
	(c)		Point marked	1	B1 cao
249	(a)		14 cm or 0.14 m	3	M1 for 3 × 32 + 2 × 45 (=186) oe M1 (indep) for subtraction of "wood needed" from 2 m using consistent units eg 200 – "186" (=14) or 2 – "1.86" (=0.14) A1 for 14 cm, 0.14 m or 140 mm
	(b)		44	3	M1 for 320 ÷ 14 (= 22.8... or 23) or 2 × 320 ÷ 14 (= 45.7... or 46) M1 (dep) for evidence of truncating "total DVDs" **down** to integer value, e.g. 22.8... to 22 or 45.7... to 45 A1 cao
250			Triangle drawn	2	M1 for angle of 35° or for line 5.5 cm long A1 cao

Question	Working	Answer	Mark	Notes
*251		148°	4	M1 for (angle *BDC* =) 360 – 250 (=110) M1 (dep) for 180 – (180 – '110' – 38) (= 148) or for '110' + 38 (= 148) C2 (dep on M2) for $x = 148$ with full reasons, relevant to the complete correct method used, for example: Angles at a point add up to 360° **and** angles in a triangle add up to 180° **and** angles on a straight line add up to 180°; Or Angles at a point add up to 360° **and** exterior angle of a triangle is equal to the sum of the interior opposite angles or (C1 (dep on at least M1) for one reason relevant to correct method)
252		80	3	M1 for intention to find missing side length 10 – 4 (= 6) or perimeter of 4 rectangles eg 4 × (10 + 4 + 10 + 4) (=112) M1 for complete method to find perimeter eg 4 × (10 + 4 + '6') or '112' – 8 × 4 A1 cao
*253		No + reason	4	M1 for intention to find the circumference eg 140 × π (= 439.82...) A1 for circumference = 439 – 440 M1 (dep on previous M1) for a complete method shown that could arrive at two figures that are comparable, eg "C"÷60×12 (=87.96..), 90÷12×60 (=450) , 90×60 ÷ C"(=12.27), "C"÷90×12 (=58.64..) C1 (dep on both M marks) for No and explanation that shows a correct comparison eg only 84 people could sit around the tables or that 13 tables are needed or that 480 cm is needed.

Question		Working	Answer	Mark	Notes
254	(a)		Line drawn	1	B1 for line length 10 cm drawn
	(b)		Midpoint marked	1	B1 for midpoint of line marked
	(c)		Radius drawn	1	B1 radius shown
	(d)		75	1	B1 for answer in the range 73 – 77
255	(a)		27	2	M1 for a complete method to find the number of extra squares, e.g. by drawing a square of side 6 cm and attempt to find the number of extra squares or for $6^2 - 3^2$ or 3×9 or $4 \times 9 - 9$ A1 cao
	(b)		49	2	M1 for pattern 7 drawn or $(1 + 3 + 5) + 7 + 9 + 11 + 13$ or 40 or 7^2 or a list of square numbers up to 36 A1 cao
256			15, 4.5	3	B1 for 15 M1 for $(23 - 5) \div 4$ A1 for 4.5 **N.B**. Answer can be either way round
257	(a)(i)		9	2	B1 cao
	(ii)		5		B1 cao
	(b)		*P* marked	1	B1 cao [P top left corner]
258			$5\frac{2}{3}$	4	M1 for $AB = 2x$ or $DC = 2x + 4$ or for $38 - 4$ (= 34) M1(dep) for $x + x +$ '$2x$'+ '$2x + 4$' or for "$38 - 4$" $\div 6$ M1 for '$6x + 4$' = 38 A1 for $5\frac{2}{3}$ oe **N.B.** Accept answers in the range 5.6 to 5.7 if M3 scored **SC** if M0 then B2 for an answer in the range 5.6 to 5.7

Question		Working	Answer	Mark	Notes
259	(a)		40	3	M1 for $32^2 + 24^2$ M1 for $\sqrt{1600}$ or $\sqrt{(32^2 + 24^2)}$ A1 cao
	(b)		22.72	4	M1 for use of $\pi \times 60$ oe M1 for method to calculate perimeter of triangle, eg $2 \times$ '40' + 48 (=128) M1(dep M2) for complete method to find total length of strip for both mirrors or to find the cost of strip for one mirror, eg $2 \times$ £5.68 A1 for £22.72 from correct working

Question	Working	Answer	Mark	Notes
260 (i)		Hexagon	1	B1 for (regular) hexagon
(ii)		Decagon	1	B1 for (regular) decagon
261 (a)(i)		Acute	2	B1 for acute
(ii)		65		B1 for 63 – 67
(b)(i)		53	2	B1 cao
(ii)		Reason		B1 for 'Angles on a straight line add up to 180^{o}
262 (a)		(8, 1)	1	B1 cao
(b)		Coordinate shown	2	B2 for N at (5, k) where $k \geq 6.2$) **or** (2, 7) **or** (8,7) (B1 for N at (5, k) where $k < 6.2$)
263		Triangle at (4, 2) (2, 2) (4, 5)	2	B2 for triangle at (4, 2) (2, 2) (4, 5) (B1 for correct reflection in the x axis or for a reflection in any line parallel to y axis)
264		115	4	M1 for $360 - 4 \times 25$ (=260) M1 (dep) for "260"÷ 4 (= 65) M1 for 180 – "65" **or** $(360 - 2 \times$ "65") ÷ 2 A1 for 115 with working **OR** M1 for 360 ÷ 4 (= 90) M1 (dep) for "90" – 25 (=65) M1 for 180 – "65" **or** (360 – 2 × "65") ÷ 2 A1 for 115 with working
265		440	2	M1 for $140 \times \pi$ or 439 A1 for 439.6 – 440

Question		Working	Answer	Mark	Notes
266	(a)(i)		right angle marked	1	B1 for a clear intention to mark bottom left hand angle with R (accept r)or right-angle marked
	(ii)		acute	1	B1 for acute
	(iii)		reflex	1	B1 for reflex
	(b)		perpendicular line from *T* to *AB*	1	B1 for perpendicular line from *T* to *AB* (within guidelines of overlay)
267	(a)		circle drawn, centre *O* radius *OP*	1	B1 for circle drawn radius *OP* within guidelines of overlay
	(b)		chord drawn	1	B1 for any line drawn joining two points on circumference of circle (accept diameter) [NB shaded segment scores B0]
268			110	2	M1 for 30 + 70 + 20 (=120) or 50 + 40 + 20 (=110) or 50 + 10 + 60 (=120) A1 cao
269	(a)		8	1	B1 cao
	(b)			2	M1 for 5 or 6 squares drawn and joined A1 for a correct net [NB missing internal lines may be implied by grid]
	(c)		54	2	M1 for 3 × 3 × 6 oe A1 cao

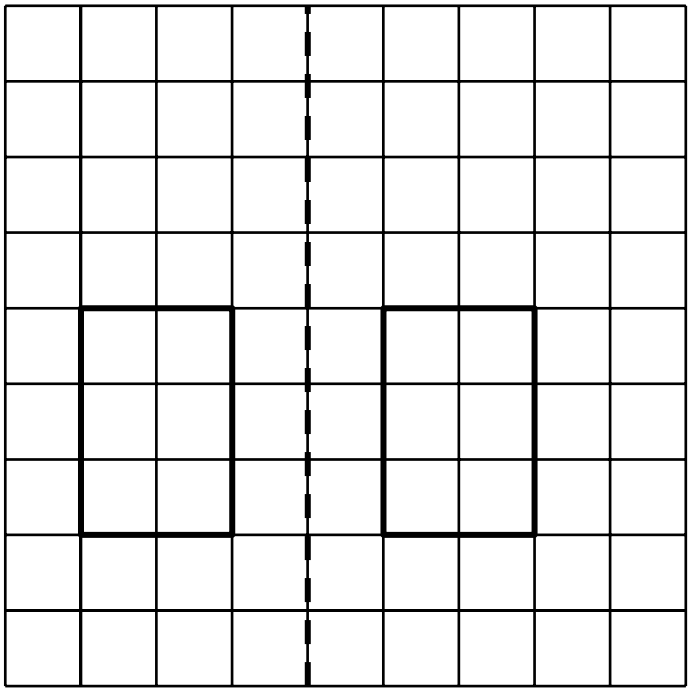
Question		Working	Answer	Mark	Notes
270			40	3	M1 for 120 × 100 (=12 000) or 20 × 15 (=300) M1 (dep) for '12 000' ÷ '300' A1 cao OR M1 for 120 ÷ 15 (= 8) or 100 ÷ 20 (= 5) M1 (dep) for '8' × '5' A1 cao OR M1 for 120 ÷ 20 (=6) or 100 ÷ 15 (=6.66…) M1 (dep) for '6'×'6.66…' (=40) or '6'×'6' (=36) or '6'×'7' (=42) A1 cao

Question		Working	Answer	Mark	Notes
*271		**(Method 1)** Angle *ACB* = 180 – 135 (= 45) (sum of angles on a straight line = 180) Angle *ABC* = 180 – 70 – 45 (=65) (sum of angles in a triangle = 180 (*x* =) 180 – 65 (=115) (sum of angles on a straight line = 180) OR **(Method 2)** Angle *ACB* = 180 – 135 (= 45) (sum of angles on a straight line = 180) (*x* =) 70 + 45 (=115) (exterior angle = sum of interior opposite angles) OR **(Method 3)** Angle DAB = 180 – 70 = 110 (sum of angles on a straight line = 180) (*x* =) 360 – 135 – 110 (sum of exterior angles of a polygon = 360)	*x* = 115	5	M1 for correct method to find angle *DAB* or angle *ACB* or angle *ABC* (may be implied by correct angle marked in diagram) M1 for complete correct method to find *x* A1 for *x* = 115 C2 (dep on M1) for fully correct reasons for chosen method no extras (C1 (dep on M1) for one correct reason for chosen method) [NB *x* = 115 must be stated explicitly, 115 only scores A0]
272			3.52	3	M1 for $1.35^2 + 3.25^2$ M1 (dep) for $\sqrt{(1.35^2 + 3.25^2)}$ $(=\sqrt{12.385})$ A1 for answer in the range 3.51 to 3.52

Question		Working	Answer	Mark	Notes
273			Circle radius 5 cm drawn	1	B1 for a circle of radius 5 cm drawn (condone an alternative centre)
274	(a)(i)		B and D	2	B1 cao
	(ii)		G and E		B1 for G and E (allow B and D if not in (i))
	(b)	3 + 3 + 3 + 2 + 2 +1 + 1 + 1	16	1	B1 cao
275	(a)(i)		5	3	B1 cao
	(ii)		8		B1 cao
	(iii)		5		B1 cao
	(b)		correct sketch	2	B2 for fully correct sketch [B1 for a square (or rectangle) drawn with 2 or 3 connecting triangles on the outside of the square]
276			1180	3	M1 for a correct method to find the area of the cross section M1 (dep) for a complete correct method for the volume of the prism A1 cao OR M1 for a correct method to find the volume of one cuboid M1 (dep) for a complete correct method for the volume of the prism A1 cao

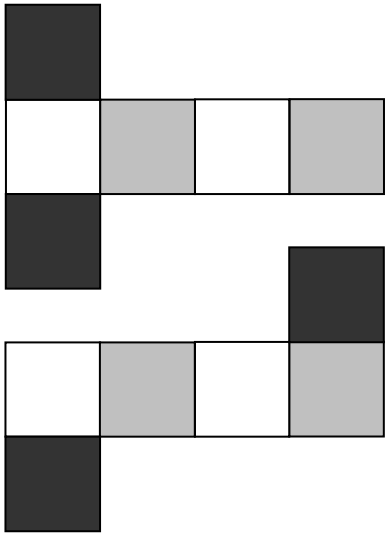
Question		Working	Answer	Mark	Notes
277	(a)		10	1	B1 cao
	(b)		6	1	B1 cao
	(c)		Correct image	2	B2 cao (B1 for reflection in a line parallel to the given line)
278		$20 \times 20 \times 40 = 16000$	16000 cm^3	3	M1 for $20 \times 20 \times 40$ or $0.2 \times 0.2 \times 0.4$ A1 for for 16 000 or 0.016 B1 for cm^3 or m^3 (consistent with working)
279	(a)		A and C	1	B1 for A and C (no extras)
	(b)		B or E	1	B1 for B or E (or both) (no extras)
	(c)		2	1	B1 cao
280		$3 \times 4 = 12$ $12\ m^2 = 120000\ cm^2$ $20 \times 20 = 400$ $120000 \div 400 = 300$ $300 \div 10 = 30$ **OR** 3m = 300cm, 4 m = 400cm $300 \div 20 = 15$, $400 \div 20 = 20$ $15 \times 20 = 300$ $300 \div 10 = 30$ $30 \times 34.99 = 1049.70$	No with working	6	B1 for a correct conversion of 3 m or 4 m to cm or 20 cm to m or a correct and appropriate area conversion. M1 for 300×400 (=120000) or 3×4 (=12) M1 for 20×20 or 0.20×0.20 M1 for '120000'÷ '400' or '12' ÷ '0.04' A1 for 1049.7(0) C1 (dep M1) for comparison and correct deduction using their total cost with supportive working OR B1 for a correct conversion of 3 m or 4 m to cm or 20 cm to m or a correct and appropriate area conversion. M1 for 300 ÷ 20 or 400 ÷ 20 or 3 ÷ 0.2(0) or 4 ÷0 2(0) M1 for 300 ÷ 20 and 400 ÷ 20 or 3 ÷ 0.2(0) and 4 ÷0 2(0) M1 for '15' × '20' A1 for 1049.7(0) C1 (dep M1) for comparison and correct deduction using their total cost with supportive working

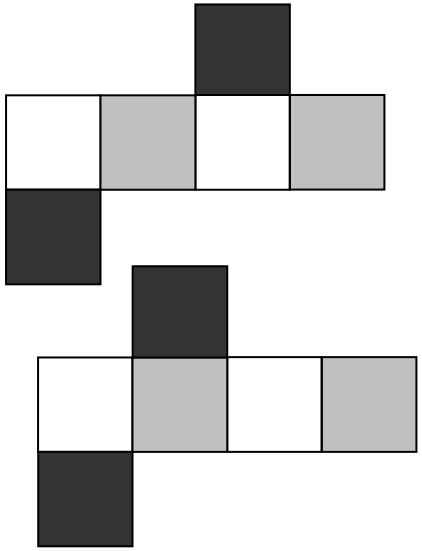
277



Question		Working	Answer	Mark	Notes
281	(a)		Correct net	1	B1 for correct net
	(b)	Shade two faces. For each correct net there are 3 different possibilities	Correct shading	1	B1 for shading 2 opposite faces
	(c)		12	1	B1 cao
*282		Angle DEC = 180 – 41 =139 Angles on a straight line sum to 180° Angle EDC = 60 – 38 **or** Angle ABD = 180 – 120 – 38 (=22) Co-interior/Allied angles of parallel lines sum to 180° **or** Angles in a triangle sum to 180° **and** Alternate angles x =)180 – '139' – '22' (=19) Angles in a triangle sum to 180° **OR** Angle ADC = 180° – 120° = 60° Co-interior/Allied angles of parallel lines sum to 180° Angle EDC = 22° Angle ECD = 41° – 22° = 19° Exterior angle of triangle equals sum of the two opposite interior angles **OR** Angle DBC = 38° Alternate angles Angle BCE = 101° Angle sum of a triangle is 180° Angle BCD = 120° Opposite angles of a parallelogram are equal Angle ECD = 120° – 101° = 19°	x = 19° and reasons	4	M1 for DBC = 38° **or** ADC = 60°(can be implied by BDC = 22°) **or** ABC = 60° **or** DCB = 120° **or** (ABD =) 180 – 120 –38 (=22) M1 for (BDC =) 60 − 38 (=22) **or** BDC = '22' **or** (DEC =) 180 − 41 (=139) **or** (BCE =) 180 −41 − 38 (=101) M1 (dep on both previous M1) for complete correct method to find x **or** (x =) 19 C1 for x = 19° **AND** Co-interior/allied angles of parallel lines sum to 180° **or** Opposite angles of a parallelogram are equal **or** Alternate angles **AND** Angles on a straight line sum to 180° **or** Angles in a triangle sum to 180° **or** Exterior angle of triangle equals sum of the two opposite interior angles **or** Angles in a quadrilateral sum to 360°

281b and c





Question		Working	Answer	Mark	Notes
283		Triangle at (–2, 2), (–2, 0),(–1,–1)	Correct figure	2	M1 for any translation A1 for correct translation

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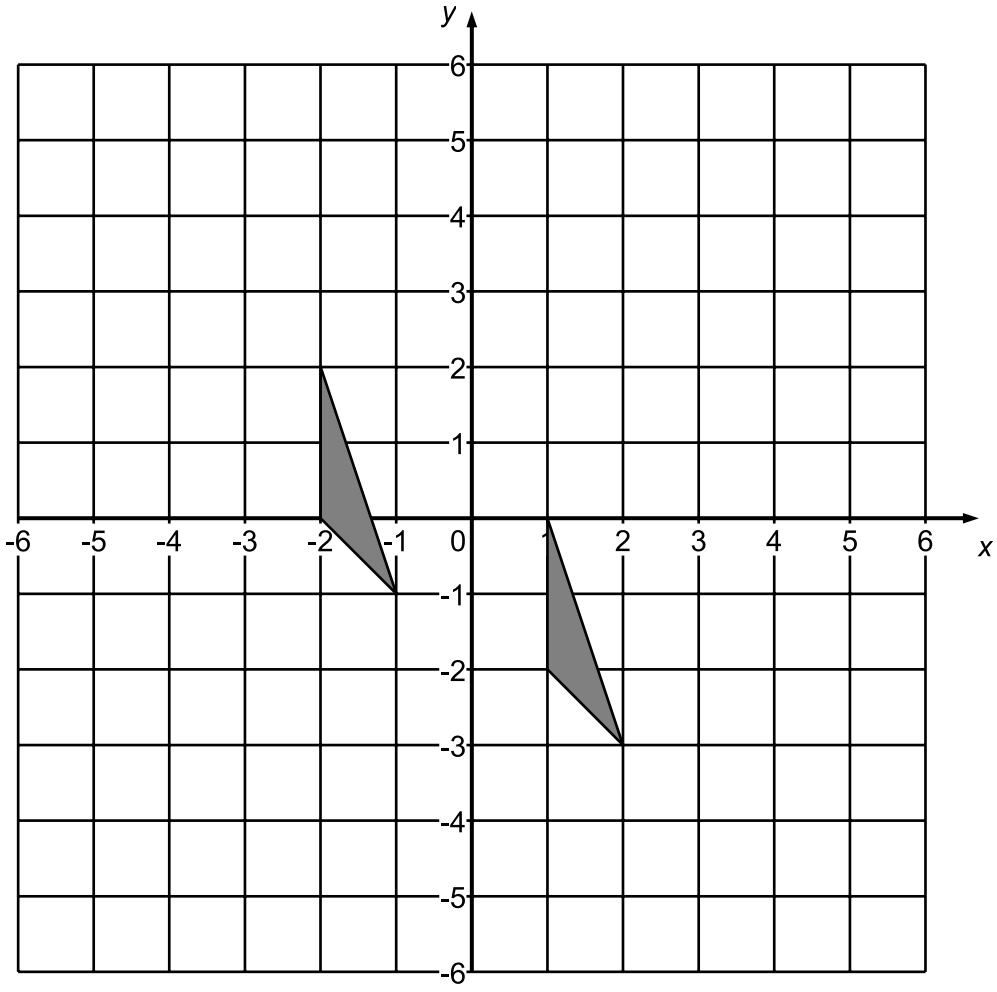

Question		Working	Answer	Mark	Notes
284	(i)		Cuboid	2	B1 for cuboid or (rectangular) prism
	(ii)		Pyramid		B1 for pyramid, rectangular base pyramid, square base pyramid
285	(a)		90	1	B1 cao
	(b)		correct angle marked	1	B1 for O in an obtuse angle
	(c)		2 perpendicular lines marked	1	B1 for two perpendicular lines marked
286	(a)		24	1	B1 cao
	(b)		22	1	B1 for 22
287	(i)	360 – 140 – 60 = 160	160 and reason	2	B1 for 160
	(ii)				C1 (indep) for Angles at a point add up to 360 (o) or angles in a full turn add up to 360 (o)
288	(a)		Triangle with vertices (2,1) (2, 4) (4,4)	2	B2 for triangle with vertices (2,1) (2,4) (4,4) (B1 for triangle reflected in any line parallel to *x*–axis **or** for correct reflection in *y* axis (triangle at (–2,–1) (–2,–4) (–4,–4)) (B1 for a configuration which is the original triangle reflected successively in the x and y axes to give 3 triangles)
	(b)		Enlarged shape	2	M1 for any 3 sides enlarged correctly A1 for correctly enlarged shape (SC : B1 for correct enlargement with a scale factor of 2 or 4 or for a geometrically correct shape in a wrong orientation)
*289		(17–2.8)×9.5 =134.9 $\pi\times(3.8\div2)^2$ =11.34.. 134.9 – 2×11.34 =112.21 112.21 ÷ 25 = 4.488	5	5	M1 for (17–2.8)×9.5 (=134.9) or 17×9.5– 2.8×9.5 (=161.5 - 26.6 = 134.9) M1 for $\pi\times(3.8\div2)^2$ (=11.33 – 11.35) M1(dep on M1) for '134.9' – 2×'11.34' A1 for 112 - 113 C1(dep on at least M1) for 'He needs 5 boxes' ft from candidate's calculation rounded up to the next integer.