

SOLUTIONS

GCSE Maths: Geometry and Measures

Mark schemes for the Grade 4 starter questions

Questions	20
Total marks	76
Sub-topics covered	16
Papers drawn from	17
Years	2017 to 2024

The official Edexcel mark scheme for every question in the Geometry and Measures question booklet, in the same order.

Question numbers match: Question 7 here answers Question 7 there.

M marks are for method, A marks for accuracy, B marks stand alone.
'oe' means or equivalent; 'cao' means correct answer only.

G2 Constructions and Loci

Question 1

November 2019 · Paper 1 · Q4

2 marks

4	perpendicular line constructed	C2	for a fully correct construction with all relevant arcs drawn	Perpendicular line segment between P and CD must be within guidelines Accept dotted lines
		(C1	for a perpendicular line drawn from P to the line CD or all relevant arcs drawn)	

G3 Angle Facts

Question 2

June 2017 · Paper 3 · Q5

4 marks

5		Shows polygon is a hexagon	M1	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), $360 \div 12 (= 30)$
			M1	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), $360 \div 6 (= 60)$
			A1	for 30 and 120 or 30 and 60 or 120 and 150 or 60 and 150
			C1	complete solution, fully supported by accurate figures

Question 3

November 2020 · Paper 1 · Q6

5 marks

6	85 with working and reasons	M1	for correct use of corresponding angles eg $AEB = 63$ or co-interior angles eg $BCD = 180 - 148 (= 32)$ or $DEB = 180 - 63 (= 117)$	Angles must be clearly labelled on the diagram or otherwise identified. Full solution must be seen. Correct method can be implied from angles on the diagram if no ambiguity or contradiction. 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.
		M1	(dep) for a complete method to find angle EAB eg. $180 - "63" - (180 - 148)$ or $148 - "63"$ or $"117" - (180 - 148)$	
		A1	for $EAB = 85$ (identified)	
		C2	(dep on M2) all working correct with all appropriate reasons stated. <u>Corresponding angles are equal</u> <u>Allied angles / Co-interior angles add up to 180</u> <u>Angles on a straight line add up to 180</u> <u>Angles in a triangle add up to 180</u> The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u> .	
		(C1	for one reason relating to parallel lines clearly used and stated or for any two reasons clearly stated for their fully correct method)	

G5 Congruence Criteria

Question 4

November 2020 · Paper 1 · Q4

1 mark

4	A & D	B1	cao	
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G6 Deriving and Proving Angle Results

Question 5

June 2023 · Paper 3 · O3

5 marks

3	Shown with reasons	M1 for method to find ACD using parallel lines eg $BCA = 125$ and $ACD = 180 - 125 (= 55)$ or $BCF = 180 - 125 (= 55) = ACD$ or $FCD = 125$ and $ACD = 180 - 125 (= 55)$ or $CFG = 180 - 125 (= 55) = ACD$ M1 for method to find ADC eg $180 - 110 (= 70)$ or for method to find CAD eg $180 - ("70" + "55") (= 55)$ or $110 - "55" (= 55)$ A1 for $ACD = 55$ and $CAD = 55$ C1 for one correct parallel lines reason linked to their method eg <u>Corresponding</u> angles are equal <u>Allied</u> angles / <u>Co-interior</u> angles add up to 180 <u>Alternate</u> angles are equal C1 for one other reason stated linked to their method eg <u>Angles</u> on a straight <u>line</u> add up to 180 <u>Angles</u> in a <u>triangle</u> add up to 180 Vertically <u>opposite angles</u> are equal OR <u>Vertically opposite</u> angles are equal The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u>. <u>Angles</u> in a <u>quadrilateral</u> add up to 360. Accept "4-sided shape"	Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Underlined words need to be shown; reasons need to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram).
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G7 Transformations: Congruence and Similarity

Question 6

June 2018 · Paper 2 · Q7

2 marks

7	Enlargement	B2	for correct enlargement at (1,2) (2,3) (2,4) (1,4)	
		(B1	for correct size and orientation in the wrong position OR 3 of 4 vertices correct and joined OR 4 correct vertices not joined)	

G8 Combined Transformations

Question 7

June 2019 · Paper 1 · Q5

3 marks

5	$c = -6$ $d = -1$	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 $d = -6$	

G11 Geometrical Problems on Coordinate Axes

Question 8

June 2018 · Paper 1 · Q6

5 marks

6	(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 $"32" \div 4 (= 8)$ or process to find half width of diagram eg $"32" \div 2 (= 16)$	
		P1	for process to find x coordinate eg $6 + 2 \times "8" (= 22)$ or $6 + "16" (= 22)$ or $(6 + 38) \div 2 (= 22)$	If $(6 + 38) \div 2$ leads to an answer other than 22, award P2 only
		P1	for process to find y coordinate eg $36 - 2 \times "8" (= 20)$ or $36 - "16" (= 20)$ or $7 + "8" + "29" - 3 \times "8" (= 20)$	
		A1	cao SC: award 4 marks for (20, 22)	Award for P3 for (22, y) or (x , 20) or $x = 22$ or $y = 20$

G13 Plans and Elevations

Question 9

June 2017 · Paper 2 · Q3

4 marks

3		Side elevation	C2	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)
			[C1]	for the side elevation as a rectangle]
		Front elevation	C2	for the front elevation as a trapezium in correct orientation with base 4 cm, parallel sides 1 cm and 4 cm
			[C1]	for the front elevation as a trapezium with two right angles]
				[Ignore incorrect or no labelling]

G15 Measuring Lengths, Angles and Bearings

Question 10

November 2023 · Paper 2 · Q6

2 marks

6	327	M1	for $147 + 180$ or for $360 - (180 - 147)$, or for drawing a suitable diagram with 147 in the correct position and with the bearing of A from B indicated	Diagram can be a sketch
		A1	cao	

G16 Area and Volume Formulae

Question 11

June 2019 · Paper 2 · Q4

4 marks

5	$c = -6$ $d = -1$	M1	for reflection in x -axis shown on diagram	Vertices (3, -2), (5, -2), (3, -5) One correct value is M1A1 regardless of second value or diagram
		A1	for $c = -6$ or $d = -1$	
		A1	for both $c = -6$ and $d = -1$	
			SCB2 for $c = -1$ and $d = -6$	

Question 12

November 2018 · Paper 2 · Q5

5 marks

5	No (supported)	P1	calculates area of trapezium eg $\frac{1}{2} \times 7 \times (10+16)$ (= 91)	[area of trapezium] needs to be clearly stated if the process of finding the area is not clear There must be a conclusion ("No" or equivalent wording) including the figure 169.9 and working showing processes followed.
		P1	for division by coverage eg $\div 2$ or [area of trapezium] $\div 2$ (= 45.5) or process to find coverage per tin eg 5×2 (= 10)	
		P1	for division to find the number of tins eg $\div 5$ or "45.5" $\div 5$ (= 9.1) or [area of trapezium] $\div$ "10" (= 9.1)	
		P1	(dep on at least P2) for a process to multiply a whole number of tins (rounded up) by 16.99	
		C1	for 'No' supported by correct figures eg 169.9 or 90 and 91	

G17 Circles, Perimeters and Composite Solids

Question 13

June 2019 · Paper 3 · Q6

5 marks

6	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...” $\div 5 (= 0.402...)$ or “4.02...” $\div 5 (= 0.804...)$ or “9.047...” $\div 5 (= 1.8095...)$ or “11.058” $\div 5 (= 2.2116...)$ or “13.069...” $\div 5 (= 2.6138...)$ OR for process to find total coverage for comparison eg $5 \times 7 (= 35)$	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] $\times 3 (= 39.2...)$ OR for complete process to find the number of tins needed for total area of 3 tanks eg “13.069”... $\times 3 \div 5 (= 7.84...)$ OR for complete process to find coverage needed from each tin eg “13.069”... $\times 3 \div 7 (= 5.6...)$	[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: $2.6 \times 3 = 9$ 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.

G18 Arcs and Sectors

Question 14

November 2020 · Paper 2 · Q7

4 marks

7	35.3	P1	for starting the process to find length of third side of triangle, eg $9^2 - 6^2 (= 45)$ or $6^2 + x^2 = 9^2$	
		P1	for $\sqrt{9^2 - 6^2}$ or $\sqrt{81 - 36}$ or $\sqrt{45}$ or $3\sqrt{5}$ ($= 6.7..$) or $r^2 = 45$	
		P1	for stating or using $\pi \times [\text{radius}]^2 \div 4$	[radius] is any value
		A1	for answer in range 35.2 to 35.4	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

G19 Similarity: Lengths, Areas and Volumes

Question 15

June 2017 · Paper 2 · Q5

4 marks

5	(a)		3.9	M1	for a ratio of $\frac{8.1}{5.4}$ ($=1.5$) oe or $\frac{5.4}{8.1}$ ($=0.66\ldots$) oe or $\frac{2.6}{5.4}$ ($=0.48\ldots$) oe or $\frac{5.4}{2.6}$ ($=2.07\ldots$) oe
				A1	cao
	(b)		2.05	M1	for $\frac{5.4}{8.1} \times 6.15$ oe ($=4.1$) or $\frac{2.7}{8.1} \times 6.15$ oe or ft “scale factor” from (a)
				A1	cao

G25 Vector Arithmetic and Geometric Proof

Question 16

November 2020 · Paper 2 · Q6

2 marks

6	$\begin{pmatrix} -9 \\ 14 \end{pmatrix}$	M1	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 $\begin{pmatrix} x \\ 14 \end{pmatrix}$	May be seen in two separate calculations eg $2 \times 3 + -3 \times 5$ and $2 \times 4 + -3 \times -2$ Condone incorrect notation if method is clear for this mark only
		A1	cao	

G20.1 Pythagoras' Theorem

Question 17

June 2017 · Paper 1 · Q5

5 marks

5		Shows polygon is a hexagon	M1	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 ($=150$), $360 \div 12$ ($=30$)
			M1	for a complete method to find the interior angle of polygon P eg at <i>B</i> or <i>C</i> : $360 - “150” - 90$ ($=120$) 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 ($=120$), $360 \div 6$ ($=60$)

Question 18

November 2024 · Paper 2 · Q7

5 marks

7	240	P1	for forming an appropriate equation, eg $2x + 11 = 4x - 4$ or $2x + 11 + 4x - 4 + 2x + 5 = 72$ or $8x + 12 = 72$	
		P1	(dep P1) for process to isolate terms in x for their equation, eg $4x - 2x = 11 + 4$ or $2x + 4x + 2x = 72 - 11 + 4 - 5$ or $x = 7.5$ oe	
		P1	for correct application of Pythagoras, eg $(26)^2 - \left(\frac{20}{2}\right)^2$ or $[AC]^2 - \left(\frac{[AB]}{2}\right)^2$ or height = 24 or a complete method to find the height	for a correct trig statement to find CAB or CBA or ACB , eg $\cos CAB = \cos CBA = \frac{20 \div 2}{26}$ or $\cos CAB = \cos CBA = \frac{20^2 + 26^2 - 26^2}{2 \times 20 \times 26}$ or $\cos ACB = \frac{26^2 + 26^2 - 20^2}{2 \times 26 \times 26}$ or $CAB = 67.3 \dots$ or $CBA = 67.3 \dots$ or $ACB = 45.2 \dots$
		P1	for process to find area of triangle, eg $20 \times 24 \div 2$ or $[AB] \times [\text{height}] \div 2$	for process to find area of triangle, eg $\frac{1}{2} \times 26 \times 20 \times \sin 67.3 \dots$ or $\frac{1}{2} \times 26 \times 26 \times \sin 45.2 \dots$ or $\frac{1}{2} \times [AB] \times [AC] \times \sin [BAC]$ or $\frac{1}{2} \times [BC] \times [AC] \times \sin [ACB]$
		A1	cao	ft incorrect figures providing at least one previous P1 awarded. [height] is what they clearly think is the height of the triangle but not 26 or 20 or 10

G20.2 Right-Angled Trigonometry

Question 19

November 2018 · Paper 3 · Q6

4 marks

6	17.3	P1	for full process to find either angle eg $(180 - 90) \div (2+3) \times 2 (=36)$ 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 $\cos [A] = 14 \div AB$	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 $(AB =) "14 \div \cos 36"$	
		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.

Question 20

November 2017 · Paper 2 · Q7

5 marks

7	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 $\tan CDA = \frac{6}{\text{base}}$ from right- angled triangle A1 for answer in the range 32.2 to 32.3
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