Oxford Revise | Edexcel GCSE Maths Higher | Answers

Chapter 18 Polygons, angles, and parallel lines

Question	Answer	Extra information	Marks
18.1	Angle *AFG* = 75° (opposite angles) Angle AGF = 80° (adjacent angles in a parallelogram) Angle *GAF* (x) = 180 – 75 – 80 = 25°		1 1 1
18.2 (a)	$x = 3$		1
18.2 (b)	1 + 3 + 1 + 3 = 8 parts The angles in a parallelogram add up to 360°. 360° ÷ 8 = 45° 3 × 45° = 135° Two of the angles are 45° and two of the angles are 135°	360 ÷ 8 (= 45) Fully correct answer	1 1
18.3	Angle $x = 136° – 4c$ (Corresponding angles are equal.) $3c + 63° + 136° – 4c = 180°$ (Angles on a straight line sum to 180°) $199° – c = 180° \Rightarrow c = 19°$ $y = 136° – 4 \times 19° = 60°$ (Alternate angles are equal.) $d = 180° – 90° – 60° = 30°$ (Angles on a straight line sum to 180°)	$3c + 63 + 136 – 4c = 180$ Solving equation $d = 30$ Geometric reasons given.	1 1 1 1

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18.4	$151° - 3x + x + y + 51° = 180°$ (Angles on a straight line sum to $180°$) $x + 53° + 2y + 36° = 180°$ (Angles on a straight line sum to $180°$) Simplifying both equations, $22 = 2x - y$ (1), $91 = x + 2y$ (2) $2 \times (1) + (2)$: $135 = 5x$; $x = 27°$ Substituting into (2), $91 = 27 + 2y$; $2y = 64$; $y = 32°$ Substituting these values into each slice size, the angles are $70°$, $110°$, $100°$ and $80°$. The largest slice size is $110°$	$151 - 3x + x + y + 51 = 180$ or $x + 53 + 2y + 36 = 180$ with reason (angles on a straight line sum to $180°$) Attempt to solve Correct answer for both x and y $110°$ as final answer.	1 1 1 1
18.5	Angles on a straight line add up to $180°$. Angle *ABC* $= 180° - 95° = 85°$ Opposite angles of a rhombus are equal. Therefore, $x = 85°$	Each correct reason stated Correct answer of $85°$	1 1
18.6	Angle *EAD* $= 44°$ (alternate angles) Angle *FDE* $= 180° - 90° - 44° = 46°$ (Angles in triangle add up to $180°$)	Angle *EAD* $= 44$ $180 - 90 -$ angle *EAD* Correct final answer.	1 1 1
18.7	Angle *STU* = angle *PQR* $= 60°$ (equilateral triangles) $t = \dfrac{360 - (60 + 60)}{2} = 120°$ (Opposite angles of a parallelogram are equal and angles in a quadrilateral sum to $360°$.)	2 marks for $t = 120$ or 1 mark for either *STU* or *PQR* $= 60$; 1 mark for any correct geometrical reason; 1 mark for fully correct geometrical reasons.	3

Question	Answer	Extra information	Marks
18.8	$x + y = 2x - y + 99°$ (from kite symmetry) $x + y + 2x - y + 99° + y + 25 + x - 25 = 360°$ (Angles in a quadrilateral add up to 360°.) Simplifying both equations, $-x + 2y = 99$ (1), $4x + y = 261$ (2) $4 \times (1) + (2)$: $9y = 657$; $y = 73°$ Substituting into (2), $4x + 73 = 261$; $4x = 188$; $x = 47°$	$x + y = 2x - y + 99$ or $x + y + 2x - y + 99 + y + 25 + x - 25 = 360$ Attempt to eliminate either x or y and solve Correct answer for x or y Correct answer for both x and y.	1 1 1 1
18.9	360° ÷ 60° = 6 The shape is a (regular) hexagon.	360 ÷ 60 = 6 or for stating that exterior angles add to 360° Hexagon	1 1
18.10	$(n - 2) \times 180° = 1620°$ $n = 1620 \div 180 + 2 = 11$ The polygon has 11 sides.	$(n - 2) \times 180 = 1620$ 11	1 1
18.11	$(8 - 2) \times 180° = 1080°$ 1080° ÷ 8 = 135° (= angle in octagon) x = 360° – 60° (equilateral triangle) – 90° (square) – 135° (octagon) = 75° (Angles around a point add up to 360°)	Method to find interior angle of octagon 135 Subtracting your 3 angles from 360 Correct final answer of 75°. If no marks scored, score 1 mark for 60 (equilateral triangle) or 90 (square).	1 1 1 1
18.12	Exterior angle = 180° – 80° = 100° 360° ÷ 100° = 3.6 A polygon cannot have 3.6 sides, so Sophia is correct.	180 – 80 (= 100°) 360 ÷ 100 (= 3.6°) Concluding that Sophia is correct with full explanation.	1 1 1

Question	Answer	Extra information	Marks
18.13	Angle *BFE* = 50° (Alternate angles are equal) Angle *FHE* = 100° (Angles in a triangle sum to 180°) Angle *FHI* = 80° (Angles on a straight line sum to 180°) x = 90° (Angles in a triangle sum to 180°)	1 correct angle with a correct reason 2 correct angles with correct reasons Fully correct answer	1 1 1
18.14	Sum of interior angles = (6 – 2) × 180 = 720° Let angle *FED* = x Then angle *BCD* = $2x$ $141 + 127 + 90 + 134 + 2x + x = 720°$ $3x = 228°$ $x = 76°$ Angle *FED* = 76°	Method for sum of interior angles (= 720°) Use of *BCD* = *FED* (e.g. algebraically) Correct equation Correct method of solution Correct answer	1 1 1 1 1
18.15	Sum of interior angles = (5 – 2) × 180 (= 540°) Angle *ABC* = 1.5 × 82 (= 123°) So angle *AED* = 123° (by symmetry) Let angle *BCD* = x Then angle *CDE* = x (by symmetry) $82 + 123 + 123 + x + x = 540°$ $2x = 212°$ $x = 106°$ Angle *BCD* = 106°	Method for sum of interior angles (= 540°) 1.5 × 82 (= 123°) Symmetry used at least once (e.g. *AED* = 123°) Correct equation Correct method of solution Correct answer	1 1 1 1 1 1

Question	Answer	Extra information	Marks
18.16	$4^2 \times 8^2 = \frac{1}{2^x}$ $(2^2)^2 \times (2^3)^2 = \frac{1}{2^x}$ $2^4 \times 2^6 = 2^{-x}$ $2^{10} = 2^{-x}$ $x = -10$	Convert 4 and 8 to powers of 2 Use rules of e$x$ponents to e$x$press each as the number 2 raised to a single power Write $\frac{1}{2^x}$ as 2^{-x} Equate the powers to get the final answer	1 1 1 1

Question	Answer	Extra information	Marks
18.17	$y \propto \sqrt{2x}$ $y = \frac{k}{\sqrt{2x}}$ $\frac{1}{4} = \frac{k}{\sqrt{64}}$ $\frac{1}{4} = \frac{k}{8}$ $k = 2$ $3\sqrt{2} = \frac{2}{\sqrt{2x}}$ $3\sqrt{2} \times \sqrt{2x} = 2$ $3\sqrt{2} \times \sqrt{2} \times \sqrt{x} = 2$ $3 \times 2 \times \sqrt{x} = 2$ $\sqrt{x} = \frac{1}{3}$ $x = \frac{1}{9}$	Write the relationship using a constant of proportionality Solve for the constant of proportionality Use this with the value $y = 3\sqrt{2}$ Obtaining $\sqrt{x} = \frac{1}{3}$ Fully correct answer	1 1 1 1 1