

GCSE Maths: Interior and exterior angles of polygons (Higher): answers

GCSE Maths - Angles, Polygons and Symmetry - Higher - Lesson 17.6

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch17-angles-polygons-symmetry/higher/interior-and-exterior-angles-of-polygons/

Exercise 17G Angles in polygons: sums and missing angles Non-calculator

1 Work out the sum of the interior angles of each polygon.

(a) a pentagon

Answer: 540°

(b) a hexagon

Answer: 720°

(c) a octagon

Answer: 1080°

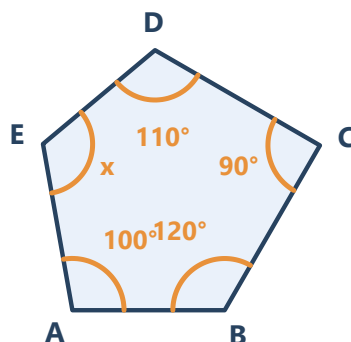
(d) a decagon

Answer: 1440°

(e) a dodecagon

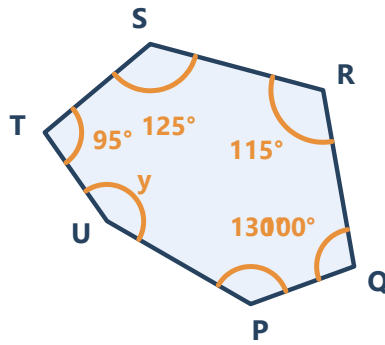
Answer: 1800°

2 The diagram shows a pentagon. Work out the size of angle x . Give a reason for your answer.



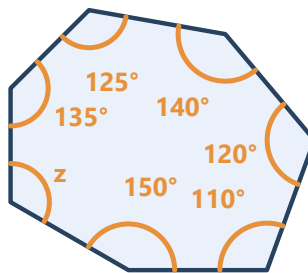
Answer: 120° (the interior angles of a pentagon add up to 540°)

3 The diagram shows a hexagon. Work out the size of angle y . Give a reason for your answer.



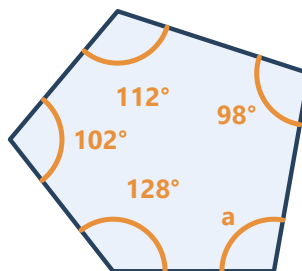
Answer: 155° (the interior angles of a hexagon add up to 720°)

- 4 The diagram shows a heptagon. Work out the size of angle z . Give a reason for your answer.



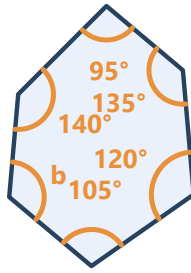
Answer: 120° (the interior angles of a heptagon add up to 900°)

- 5 The diagram shows a pentagon. Work out the size of angle a . Give a reason for your answer.



Answer: 100° (the interior angles of a pentagon add up to 540°)

- 6 The diagram shows a hexagon. Work out the size of angle b .



Answer: 125°

- 7** The sum of the interior angles of a polygon is 1260° . How many sides does the polygon have?

Answer: 9

- 8** Work out the size of each interior angle of these regular polygons.

- (a) a regular pentagon

Answer: 108°

- (b) a regular hexagon

Answer: 120°

- (c) a regular octagon

Answer: 135°

- (d) a regular decagon

Answer: 144°

- (e) a regular dodecagon

Answer: 150°

- 9** Is it possible for the interior angles of a polygon to add up to 900° ? Give a reason. If so, how many sides does it have?

Answer: Yes: 7 sides (heptagon)

- 10** A hexagon has five interior angles of 130° . Work out the sixth angle.

Answer: 70°

- 11** The interior angles of a pentagon are x° , $2x^\circ$, $(x + 30)^\circ$, $(2x - 20)^\circ$ and $(3x - 10)^\circ$. Work out the value of x .

Answer: $x = 60$

- 12** Show that the sum of the interior angles of any polygon with n sides is $(n - 2) \times 180^\circ$.

Answer: See the solution

- 13** Zoe says: "A hexagon has 6 sides, so the sum of its interior angles is $6 \times 180 = 1080^\circ$." Explain her mistake and give the correct answer.

Answer: She should use $(n - 2)$ triangles: $4 \times 180 = 720^\circ$

Exercise 17H Regular polygons and exterior angles

Non-calculator

1 Work out the size of each exterior angle of these regular polygons.

(a) a regular triangle

Answer: 120°

(b) a regular quadrilateral

Answer: 90°

(c) a regular pentagon

Answer: 72°

(d) a regular hexagon

Answer: 60°

(e) a regular octagon

Answer: 45°

(f) a regular decagon

Answer: 36°

2 Each exterior angle of a regular polygon is given. Work out the number of sides.

(a) 60°

Answer: 6

(b) 45°

Answer: 8

(c) 40°

Answer: 9

(d) 30°

Answer: 12

(e) 20°

Answer: 18

(f) 15°

Answer: 24

3 Work out the number of sides of a regular polygon with each interior angle given.

(a) 120°

Answer: 6

(b) 144°

Answer: 10

(c) 150°

Answer: 12

(d) 160°

Answer: 18

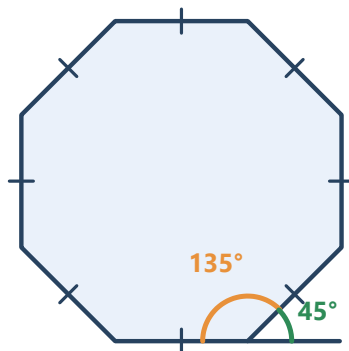
(e) 168°

Answer: 30

4 Work out the size of the interior angle of a regular polygon with 15 sides.

Answer: 156°

5 A stop sign is a regular octagon. Work out (a) the size of each exterior angle (b) the size of each interior angle.



(a) each exterior angle

Answer: 45°

(b) each interior angle

Answer: 135°

6 Can a regular polygon have an exterior angle of 50° ? Give a reason.

Answer: No: $360 \div 50 = 7.2$, not a whole number

7 A regular pentagon and a regular hexagon are placed with one corner at a point so that they do not overlap. Work out the angle that is left to complete a full turn.

Answer: 132°

8 Three regular polygons meet at a point so that there are no gaps: a square, a regular hexagon and a regular n -sided polygon. Work out n .

Answer: 12

9 Why can you tile a floor with regular hexagons but not with regular pentagons? (Tiles must meet at a point with no gaps and no overlaps.)

Answer: 3 hexagons: $3 \times 120 = 360$; pentagons: $3 \times 108 = 324$ (gap), $4 \times 108 = 432$ (overlap)

10 The exterior angle of a regular polygon is one fifth of its interior angle. Work out the number of sides.

Answer: 12

- 11** Each interior angle of a regular polygon is $(4x + 10)^\circ$ and each exterior angle is $(x - 5)^\circ$. Work out x and the number of sides.

Answer: $x = 35$; 12 sides

- 12** Prove that the exterior angles of a triangle add up to 360° . (Use the three interior angles a , b and c .)

Answer: $(180 - a) + (180 - b) + (180 - c) = 540 - 180 = 360$