Angles 4 · Angles in polygons

Graded Drill Set

Name: _____ Class: _____ Date: _____

Work through Levels 1 to 3 in order. Angles are in degrees. Diagrams are drawn accurately, but always **calculate**, never measure. In Level 3, write a reason for every step. Answers are at the back.
Sum of the interior angles of an n-sided polygon = $(n - 2) \times 180°$ · The **exterior angles** of any polygon add up to 360° · Interior angle + exterior angle = 180° · In a **regular** polygon, each exterior angle = $360° \div n$.

Section A · Level 1 · One step

1 Find the sum of the interior angles of a hexagon.

Answer: _____

2 Find the size of each exterior angle of a regular octagon.

Answer: _____

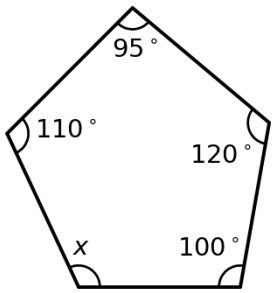
3 Find the size of each interior angle of a regular decagon.

Answer: _____

4 Each exterior angle of a regular polygon is 24°. How many sides does the polygon have?

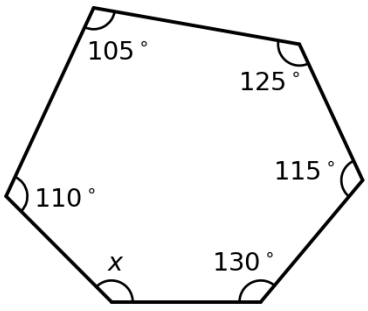
Answer: _____

5 Find x.



Answer: _____

6 Find x.



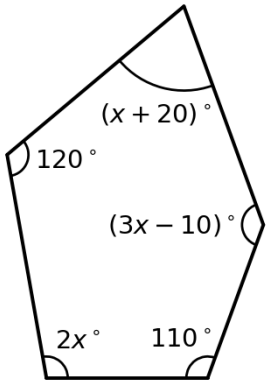
Answer: _____

Section B · Level 2 · Form and solve an equation

7 Each interior angle of a regular polygon is 165°. How many sides does the polygon have?

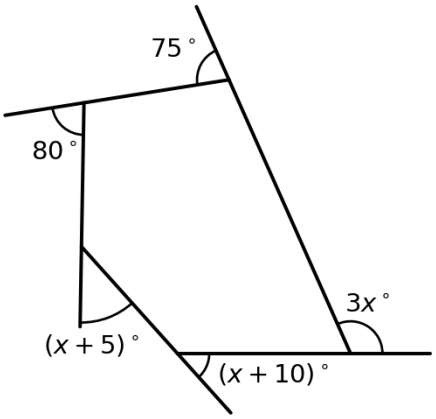
Answer: _____

8 Find x.



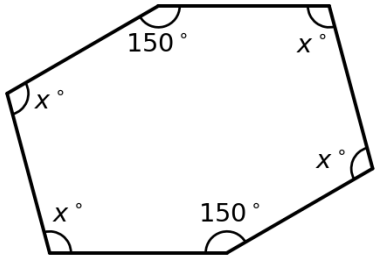
Answer: _____

9 The diagram shows the exterior angles of a pentagon. Find x.



Answer: _____

10 Find x.



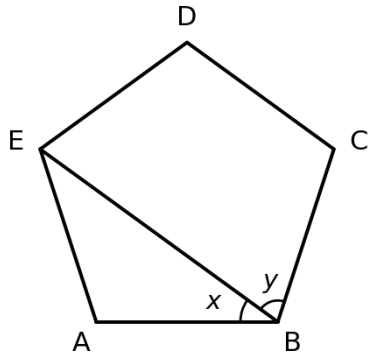
Answer: _____

11 Each interior angle of a regular polygon is 4 times the size of each exterior angle. How many sides does the polygon have?

Answer: _____

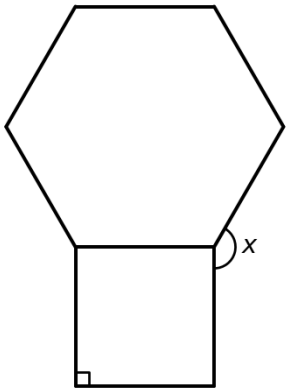
Section C · Level 3 · Multi-step, give reasons

12 ABCDE is a regular pentagon. Find x and y, giving reasons.



Answer: _____

13 The diagram shows a regular hexagon and a square. Find x.



Answer: _____

14 Show that a regular polygon cannot have an interior angle of 130°.

Answer: _____

15 A square, a regular hexagon and a regular polygon with n sides fit together around a point with no gaps. Find n.

Answer: _____

Answers

1	$(6 – 2) \times 180 = 720°$
2	$360 \div 8 = 45°$
3	Exterior angle $= 360 \div 10 = 36°$, so interior angle $= 180 – 36 = 144°$
4	$360 \div 24 = 15$ sides
5	Sum $= 540°$, so $x = 540 – (100 + 120 + 95 + 110) = 115°$
6	Sum $= 720°$, so $x = 720 – (130 + 115 + 125 + 105 + 110) = 135°$
7	Exterior angle $= 180 – 165 = 15°$, so number of sides $= 360 \div 15 = 24$
8	$2x + 110 + (3x – 10) + (x + 20) + 120 = 540$, so $6x = 300$ and $x = 50$
9	$(x + 10) + 3x + 75 + 80 + (x + 5) = 360$, so $5x = 190$ and $x = 38$
10	$4x + 150 + 150 = 720$, so $x = 105$
11	Interior + exterior $= 180$, so $4e + e = 180$, $e = 36°$ and number of sides $= 360 \div 36 = 10$
12	Each interior angle $= 108°$. Triangle ABE is isosceles (AB = AE), so $x = (180 – 108) \div 2 = 36°$; $y = 108 – 36 = 72°$
13	$x = 360 – 120 – 90 = 150°$ (angles at a point; hexagon angle 120°, square angle 90°)
14	Exterior angle would be $180 – 130 = 50°$, and $360 \div 50 = 7.2$, which is not a whole number of sides
15	Angle of the third polygon $= 360 – 90 – 120 = 150°$; exterior angle $= 30°$, so $n = 360 \div 30 = 12$