MATHEMATICS · GRADES 7-9

# Exterior Angles of Polygons

### Difficulty level: Intermediate

### Mathematics: Grades 7-9

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## *Overview of the concept*

This is how you work out the turn at each corner of a shape. A builder setting out a garden bed needs to know how much to turn at each corner, and a robot following a course turns by the same amount at each corner. The turns always add up to the same total, no matter how many sides the shape has. Knowing that lets you check your corners before you start building.



## *Rule*

**Exterior angles of polygons: the exterior angles of any polygon always add up to 360 degrees.**

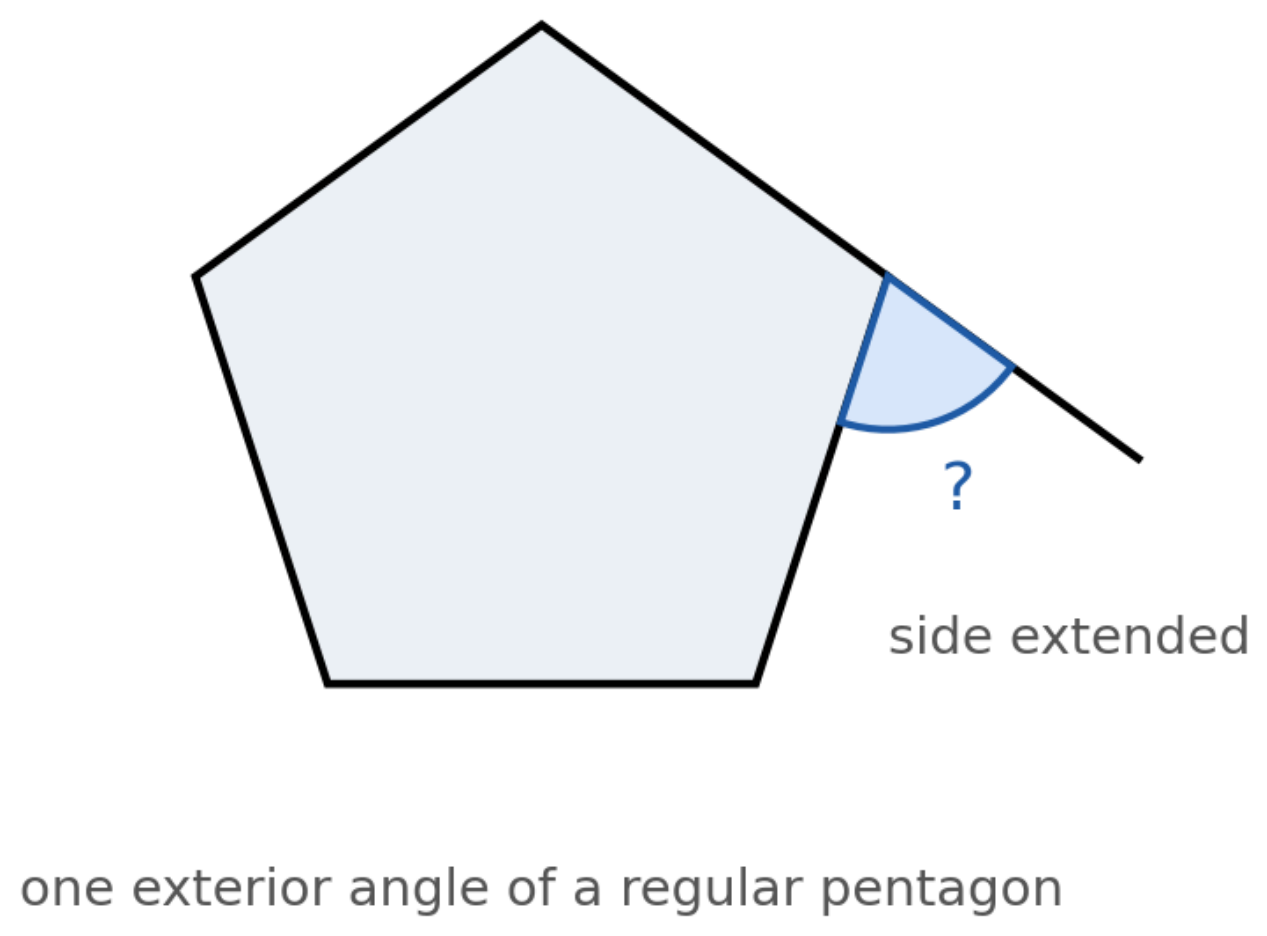
For a regular polygon, each exterior angle = $\frac{360°}{\text{number of sides}}$.

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## Worked examples

EXAMPLE 1

### Q Find each exterior angle of a regular pentagon




**SOLUTION**

The exterior angles of any polygon come to 360 degrees in all.

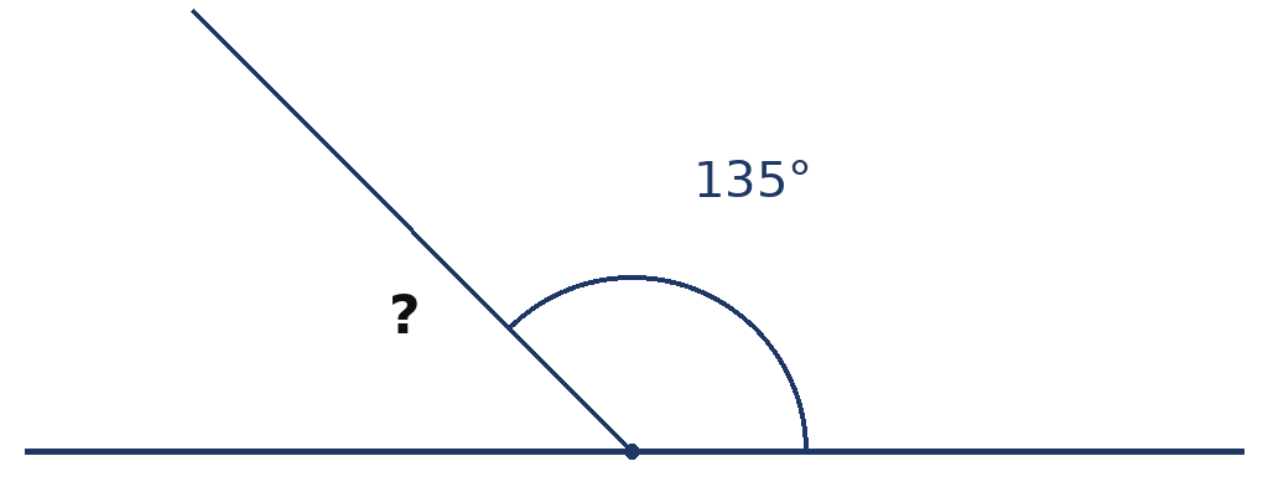
A regular pentagon has 5 equal exterior angles, so divide: 360 ÷ 5 = 72

Each exterior angle is 72 degrees.

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EXAMPLE 2

## Q Find the exterior angle at a corner where the interior angle is 135 degrees




### SOLUTION

Interior and exterior angles at a corner add to 180 degrees.

Subtract: 180 - 135 = 45

The exterior angle is 45 degrees.

## Practice questions

**1** Find each exterior angle of a regular decagon.

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2 A regular polygon has 6 sides. What is the sum of its exterior angles?

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3 Find the exterior angle of a square.




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4 A regular octagon has exterior angles of 45 degrees. What is each interior angle?

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5 At one corner of a polygon, the interior angle is 150 degrees. Find the exterior angle at that corner.

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6 A regular polygon has exterior angles of 60 degrees. What is the sum of its interior angles?

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7 At one corner, the interior angle is 90 degrees and the exterior angle is 90 degrees. What do the two angles add up to?

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8 The exterior angles of a polygon are 90, 80, 70, 60 and 60 degrees. How many sides does the polygon have?

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9 A regular polygon has exterior angles of 30 degrees. How many sides does the polygon have?

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10 **A regular polygon has 9 sides. What is the sum of its interior angles?**

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## ANSWER KEY

**1.** 36 degrees

**2.** 360 degrees

**3.** 90 degrees

**4.** 135 degrees

**5.** 30 degrees

**6.** 720 degrees

**7.** 180 degrees

**8.** 5 sides

**9.** 12 sides

**10.** 1260 degrees

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