MATHEMATICS · GRADES 7-9

Interior 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 angles inside a shape, like cutting tiles to fit a floor or designing a stop sign with eight equal corners. Every polygon has a total for its inside angles that depends only on how many sides it has, so you can work out each corner without measuring it. A tiler uses it to cut tiles that fit together with no gaps, a builder uses it for roofs and frames, and a designer uses it for anything from a stop sign to a honeycomb pattern.



Rule

The interior angles of a polygon with n sides add up to (n - 2) × 180 degrees.

For a regular polygon, divide that total by n to get each angle.

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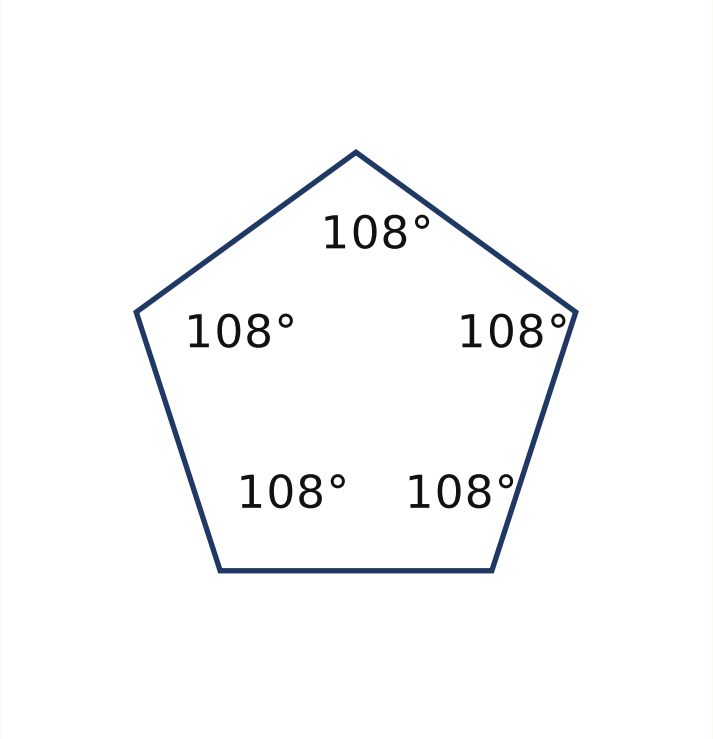
Worked examples

EXAMPLE 1

Q Find the sum of interior angles of a regular pentagon



SOLUTION

Use (n - 2) × 180 degrees, with n = 5 sides.

(5 - 2) × 180 = 3 × 180 = 540 degrees

The sum is 540 degrees.

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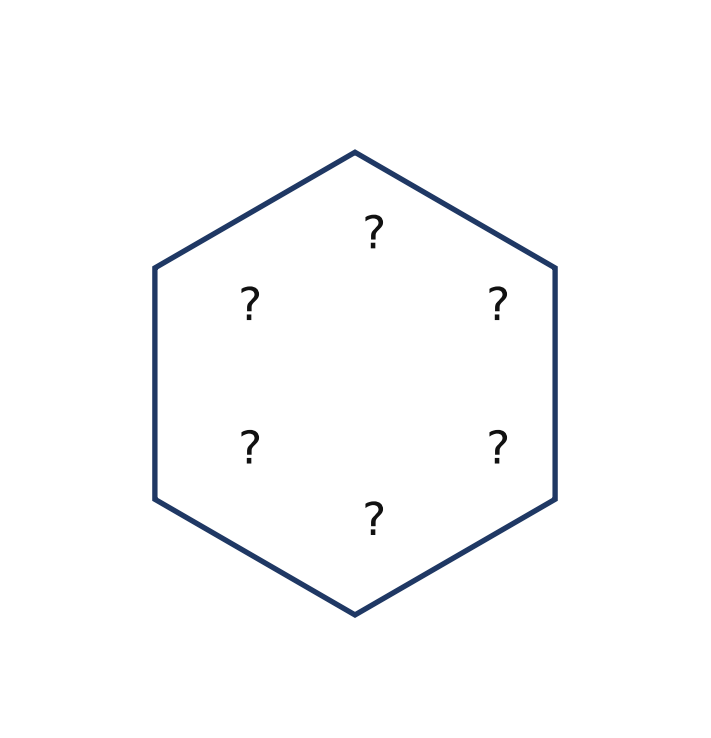
EXAMPLE 2

Q Find each interior angle of a regular hexagon



SOLUTION

Sum: $(6 - 2) \times 180 = 4 \times 180 = 720$ degrees

A regular hexagon has 6 equal angles, so divide: $\frac{720}{6} = 120$.

Each interior angle is 120 degrees.

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Practice questions

1 A decagon patio is divided into triangles from one corner. Find the sum of the interior angles of a decagon.

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2 A decagon is divided into triangles from one corner. How many triangles are there?

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3 A quadrilateral has angles of 90 degrees, 80 degrees, and 100 degrees. What is the fourth angle?

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4 The interior angles of a polygon add up to 1080 degrees. How many sides does it have?

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5 A regular decagon tile has one interior angle marked. Find each interior angle of a regular decagon.

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6 A regular hexagon has each interior angle 120 degrees. What is the sum of its interior angles?

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7 Each interior angle of a regular polygon is 150 degrees. How many sides does it have?

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8 A polygon is divided into 5 triangles from one corner. What is the sum of its interior angles?

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9 The interior angles of a polygon add up to 1440 degrees. How many triangles is it divided into from one corner?

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10 **A stop sign is a regular octagon and a honeycomb cell is a regular hexagon. Which has the bigger interior angle?**

A The octagon

B The hexagon

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ANSWER KEY

1. 1440 degrees

2. 8

3. 90 degrees

4. 8

5. 144 degrees

6. 720 degrees

7. 12

8. 900 degrees

9. 8

10. The octagon

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