LESSON MAKER PRO

Polygon Angle Quest

Use triangles to find interior angle sums.

GRADE 8 · MA.8.GR.1.6

MA.8.GR.1.6 "Develop and use formulas for the sums of the interior angles of regular polygons by decomposing them into triangles."

NAME _____ DATE _____

BUILD THE FORMULA

Draw diagonals from one vertex of an n-sided polygon to split it into n - 2 triangles. Each triangle has an angle sum of 180 degrees, so the interior angle sum is (n - 2) x 180 degrees.

WORKED EXAMPLE

Find the sum of the interior angles of a regular heptagon.

1. A heptagon has 7 sides.
2. It splits into 7 - 2 = 5 triangles.
3. Multiply: 5 x 180 = 900.

Answer: 900 degrees

PRACTICE 6 problems

1 Find the sum of the interior angles of a regular triangle.

ANSWER _____

2 Find the sum of the interior angles of a regular quadrilateral.

ANSWER _____

3 Find the sum of the interior angles of a regular hexagon.

ANSWER _____

4 Find the sum of the interior angles of a regular octagon.

ANSWER _____

5 A regular polygon has an interior angle sum of 1,260 degrees. How many sides does it have?

ANSWER _____

6 A regular polygon has an interior angle sum of 1,440 degrees. How many sides does it have?

ANSWER _____

APPLY IT Show your work

1 The student council is making a regular 14-sided photo backdrop for a school event. What is the sum of its interior angles?

WORK SPACE

ANSWER _____

2 In a video game, a character's shield is shaped like a regular polygon with an interior angle sum of 1,980 degrees. How many sides does the shield have?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A regular polygon has an interior angle measure of 156 degrees. How many sides does the polygon have? Explain your reasoning.

_____

_____

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the sum of the interior angles of a regular triangle.	**180 degrees**
2	Find the sum of the interior angles of a regular quadrilateral.	**360 degrees**
3	Find the sum of the interior angles of a regular hexagon.	**720 degrees**
4	Find the sum of the interior angles of a regular octagon.	**1,080 degrees**
5	A regular polygon has an interior angle sum of 1,260 degrees. How many sides does it have?	**9 sides**
6	A regular polygon has an interior angle sum of 1,440 degrees. How many sides does it have?	**10 sides**

PART 2 · APPLY IT

1. **2,160 degrees** Use (n - 2) x 180 with n = 14. (14 - 2) x 180 = 2,160 degrees.
2. **13 sides** Set (n - 2) x 180 equal to 1,980. Since 1,980 / 180 = 11, n - 2 = 11 and n = 13.

CHALLENGE

15 sides. The total interior angle sum is 156n, and it also equals (n - 2) x 180. Solving 156n = 180n - 360 gives 24n = 360, so n = 15.

Accept answers written with or without the word degrees. For the challenge, accept any correct equation or triangle-decomposition explanation that shows the polygon has 15 sides.