



NOTES

The Polygon Angle-Sum Theorems

UNIT 7

ASSIGNMENT #1



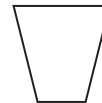
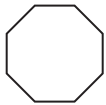
Vocabulary

● Review

1. Underline the correct word to complete the sentence.

In a *convex* polygon, no point on the lines containing the sides of the polygon is in the interior / exterior of the polygon.

2. Cross out the polygon that is NOT *convex*.



● Vocabulary Builder

regular polygon (noun) REG yuh lur PAHL ih gahn

Definition: A **regular polygon** is a polygon that is both equilateral and equiangular.

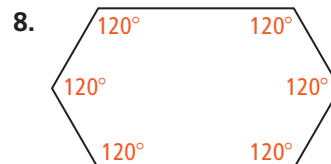
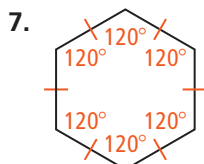
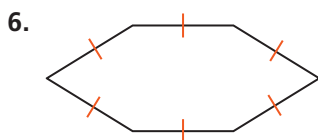
Example: An equilateral triangle is a **regular polygon** with three congruent sides and three congruent angles.

● Use Your Vocabulary

Underline the correct word(s) to complete each sentence.

3. The sides of a *regular polygon* are congruent / scalene .
4. A right triangle is / is not a *regular polygon*.
5. An isosceles triangle is / is not always a *regular polygon*.

Write *equiangular*, *equilateral*, or *regular* to identify each hexagon. Use each word once.



Theorem 6-1 Polygon Angle-Sum Theorem and Corollary

Theorem 6-1 The sum of the measures of the interior angles of an n -gon is $(n - 2)180$.

Corollary The measure of each interior angle of a regular n -gon is $\frac{(n - 2)180}{n}$.

9. When $n - 2 = 1$, the polygon is a(n) .

10. When $n - 2 = 2$, the polygon is a(n) .



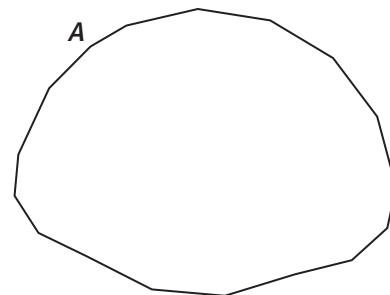
Problem 1 Finding a Polygon Angle Sum

Got It? What is the sum of the interior angle measures of a 17-gon?

11. Use the justifications below to find the sum.

$$\begin{aligned} \text{sum} &= (\text{ } - 2)180 && \text{Polygon Angle-Sum Theorem} \\ &= (\text{ } - 2)180 && \text{Substitute for } n. \\ &= \text{ } \cdot 180 && \text{Subtract.} \\ &= \text{ } && \text{Simplify.} \end{aligned}$$

12. Draw diagonals from vertex A to check your answer.



13. The sum of the interior angle measures of a 17-gon is .



Problem 2 Using the Polygon Angle-Sum Theorem

Got It? What is the measure of each interior angle in a regular nonagon?

Underline the correct word or number to complete each sentence.

14. The interior angles in a regular polygon are congruent / different.

15. A regular nonagon has 7 / 8 / 9 congruent sides.

16. Use the Corollary to the Polygon Angle-Sum Theorem to find the measure of each interior angle in a regular nonagon.

$$\begin{aligned} \text{Measure of an angle} &= \frac{(\text{ } - 2)180}{\text{ }} \\ &= \frac{(\text{ })180}{\text{ }} \\ &= \text{ } \end{aligned}$$

17. The measure of each interior angle in a regular nonagon is .



Problem 3 Using the Polygon Angle-Sum Theorem

Got It? What is $m\angle G$ in quadrilateral $EFGH$?

18. Use the Polygon Angle-Sum Theorem to find $m\angle G$ for $n = 4$.

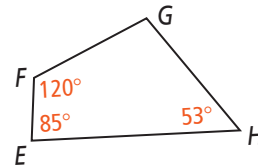
$$m\angle E + m\angle F + m\angle G + m\angle H = (n - 2)180$$

$$m\angle E + m\angle F + m\angle G + m\angle H = (\square - 2)180$$

$$\square + \square + \square + \square = \square \cdot 180$$

$$m\angle G + \square = \square$$

$$m\angle G = \square$$



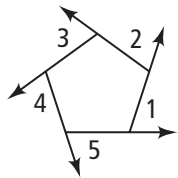
19. $m\angle G$ in quadrilateral $EFGH$ is \square .

take note

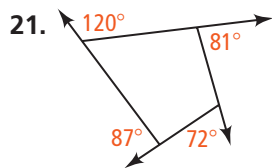
Theorem 6-2 Polygon Exterior Angle-Sum Theorem

The sum of the measures of the exterior angles of a polygon, one at each vertex, is 360.

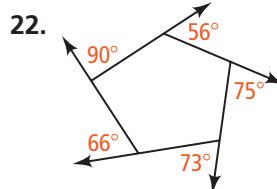
20. In the pentagon below, $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 + m\angle 5 = \square$.



Use the Polygon Exterior Angle-Sum Theorem to find each measure.



$$120 + 81 + \square + 87 = 360$$



$$90 + \square + 75 + 73 + 66 = \square$$



Problem 4 Finding an Exterior Angle Measure

Got It? What is the measure of an exterior angle of a regular nonagon?

Underline the correct number or word to complete each sentence.

23. Since the nonagon is regular, its interior angles are congruent / right .

24. The exterior angles are complements / supplements of the interior angles.

25. Since the nonagon is regular, its exterior angles are congruent / right .

26. The sum of the measures of the exterior angles of a polygon is 180 / 360 .

27. A regular nonagon has 7 / 9 / 12 sides.

28. What is the measure of an exterior angle of a regular nonagon? Explain.



Lesson Check • Do you UNDERSTAND?

Error Analysis Your friend says that she measured an interior angle of a regular polygon as 130. Explain why this result is impossible.

29. Use indirect reasoning to find a contradiction.

Assume temporarily that a regular n -gon has a 130° interior angle.

$$\text{angle sum} = \boxed{} \cdot n$$

A regular n -gon has n congruent angles.

$$\text{angle sum} = (\boxed{})180$$

Polygon Angle-Sum Theorem

$$\boxed{} = (\boxed{})180$$

Use the Transitive Property of Equality.

$$\boxed{} = \boxed{} - \boxed{}$$

Use the Distributive Property.

$$\boxed{} = \boxed{}$$

Subtract $180n$ from each side.

$$n = \boxed{}$$

Divide each side by -50 .

$$n \neq \boxed{}$$

The number of sides in a polygon is a whole number ≥ 3 .

30. Explain why your friend's result is impossible.



Math Success

Check off the vocabulary words that you understand.



equilateral polygon



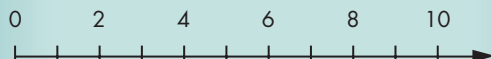
equiangular polygon



regular polygon

Rate how well you can *find angle measures of polygons*.

Need to
review



Now I
get it!