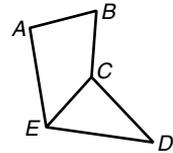


LESSON **Practice A**
6-1 **Properties and Attributes of Polygons**

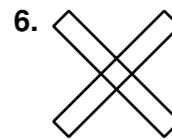
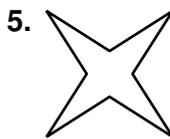
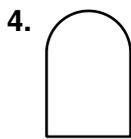
Match each vocabulary term on the left with a part of polygon *ABCDE* on the right.

- 1. a diagonal _____
- 2. a side of the polygon _____
- 3. a vertex of the polygon _____

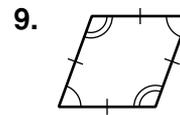
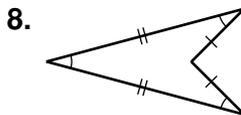
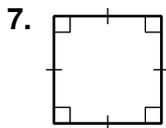
- A. point *D*
- B. \overline{CE}
- C. \overline{CD}



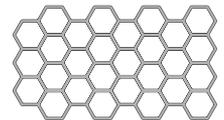
A polygon is a closed flat figure made of straight segments that do not cross each other. Tell whether each figure is a polygon. If it is a polygon, name it by the number of its sides.



A regular polygon has all sides congruent and all angles congruent. Tell whether each polygon is regular or irregular. A concave polygon has a pair of sides that make a “cave” in the polygon. Tell whether each polygon is concave or convex.



Honeybees store their honey in honeycombs. The honeycomb is made of many small wax compartments that are perfect regular hexagons.



- 10. Use the Polygon Angle Sum Theorem to find the sum of the interior angle measures of a regular hexagon. _____
- 11. Find the measure of one interior angle of a regular hexagon.
 (Hint: Divide the answer to Exercise 10 by the number of sides.) _____
- 12. Use the Polygon Exterior Angle Sum Theorem to find the sum of the exterior angle measures, one exterior angle at each vertex, of a regular hexagon. _____
- 13. Find the measure of one exterior angle of a regular hexagon.
 (Hint: Divide the answer to Exercise 12 by the number of sides.) _____

LESSON 6-1 Practice A
Properties and Attributes of Polygons

Match each vocabulary term on the left with a part of polygon $ABCDE$ on the right.

1. a diagonal B A. point D
 2. a side of the polygon C B. \overline{CE}
 3. a vertex of the polygon A C. \overline{CD}



A polygon is a closed flat figure made of straight segments that do not cross each other. Tell whether each figure is a polygon. If it is a polygon, name it by the number of its sides.

4. not a polygon
 5. polygon; octagon
 6. not a polygon

A regular polygon has all sides congruent and all angles congruent. Tell whether each polygon is regular or irregular. A concave polygon has a pair of sides that make a "cave" in the polygon. Tell whether each polygon is concave or convex.

7. regular; convex
 8. irregular; concave
 9. irregular; convex

Honeybees store their honey in honeycombs. The honeycomb is made of many small wax compartments that are perfect regular hexagons.



10. Use the Polygon Angle Sum Theorem to find the sum of the interior angle measures of a regular hexagon. 720°
 11. Find the measure of one interior angle of a regular hexagon. (Hint: Divide the answer to Exercise 10 by the number of sides.) 120°
 12. Use the Polygon Exterior Angle Sum Theorem to find the sum of the exterior angle measures, one exterior angle at each vertex, of a regular hexagon. 360°
 13. Find the measure of one exterior angle of a regular hexagon. (Hint: Divide the answer to Exercise 12 by the number of sides.) 60°

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LESSON 6-1 Practice B
Properties and Attributes of Polygons

Tell whether each figure is a polygon. If it is a polygon, name it by the number of its sides.

1. polygon; nonagon
 2. not a polygon
 3. not a polygon

4. For a polygon to be regular, it must be both equiangular and equilateral. Name the only type of polygon that must be regular if it is equiangular. triangle

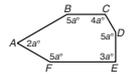
Tell whether each polygon is regular or irregular. Then tell whether it is concave or convex.

5. irregular; concave
 6. regular; convex
 7. irregular; convex

8. Find the sum of the interior angle measures of a 14-gon. 2160°

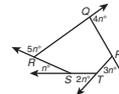
9. Find the measure of each interior angle of hexagon $ABCDEF$.

$m\angle A = 60^\circ$; $m\angle B = m\angle D = m\angle F = 150^\circ$;
 $m\angle C = 120^\circ$; $m\angle E = 90^\circ$



10. Find the value of n in pentagon $PQRST$.

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Before electric or steam power, a common way to power machinery was with a waterwheel. The simplest form of waterwheel is a series of paddles on a frame partially submerged in a stream. The current in the stream pushes the paddles forward and turns the frame. The power of the turning frame can then be used to drive machinery to saw wood or grind grain. The waterwheel shown has a frame in the shape of a regular octagon.



11. Find the measure of one interior angle of the waterwheel. 135°
 12. Find the measure of one exterior angle of the waterwheel. 45°

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LESSON 6-1 Practice C
Properties and Attributes of Polygons

Find the sum of the interior angle measures of each n -gon.

1. 52-gon 9000° 2. 102-gon 18,000° 3. 1002-gon 180,000°

4. Do you believe there is an upper limit to the sum of the interior angle measures in n -gons? Explain your reasoning. Possible answer: No; a convex polygon may have any number of sides. As the number of sides increases, so does the sum of the interior angle measures. So the sum has no upper limit.

5. A polygon is convex if no part of a diagonal lies in the exterior of the polygon. Write an alternative definition for *convex* based on interior angles. Possible answer: A polygon is convex if each interior angle and the interior of the polygon together contain all points of the polygon.

Any regular polygon can be inscribed in a circle. For Exercises 6–9, find the length of a side of the regular polygon in terms of r , the radius of the circle. Give the lengths in simplest radical form.

6. regular quadrilateral (square) $r\sqrt{2}$

7. regular octagon (Hint: The dotted lines show a square.) $r\sqrt{2} - \sqrt{2}$

8. regular hexagon r

9. regular dodecagon (Hint: The dotted lines show a regular hexagon.) $r\sqrt{2} - \sqrt{3}$

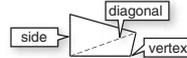
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Holt Geometry

LESSON 6-1 Reteach
Properties and Attributes of Polygons

The parts of a polygon are named on the quadrilateral below.



You can name a polygon by the number of its sides.

A **regular polygon** has all sides congruent and all angles congruent. A polygon is **convex** if all its diagonals lie in the interior of the polygon. A polygon is **concave** if all or part of at least one diagonal lies outside the polygon.

Number of Sides	Polygon
3	triangle
4	quadrilateral
5	pentagon
6	hexagon
7	heptagon
8	octagon
9	nonagon
10	decagon
n	n -gon

Types of Polygons		
regular, convex	irregular, convex	irregular, concave

Tell whether each figure is a polygon. If it is a polygon, name it by the number of sides.

1. polygon; pentagon
 2. polygon; heptagon
 3. not a polygon

Tell whether each polygon is regular or irregular. Then tell whether it is concave or convex.

4. irregular; convex
 5. regular; convex
 6. irregular; concave

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