line segment

polygon

vertex
(vertices)

Not a
polygon

Find the sum of the interior angle measures of each polygon. (Example 1)

1. quadrilateral __360°__

2. nonagon __1,260°__

3. 12-gon __1,800°__

Show your work.

4. The quilt pattern shown is made of repeating equilateral triangles. What is the measure of one interior angle of an equilateral triangle? (Example 2)

__60°__

Rate Yourself!

5. Find the measure of an exterior angle of a regular

pentagon. (Example 3) __72°__

6. (e) **Building on the Essential Question** How can I find
the sum of the interior angle measures of a polygon?

Sample answer: Subtract 2 from the number of sides

of the polygon and then multiply by 180.

Find the sum of the interior angle measures of each polygon. (Example 1)

1. pentagon **540°**

2. 11-gon **1,620°**

3. 13-gon **1,980°**

show your work.

4. The soccer ball at the right consists of repeating regular pentagons and hexagons. Find the measure of one interior angle of a pentagon.

(Example 2) **108°**

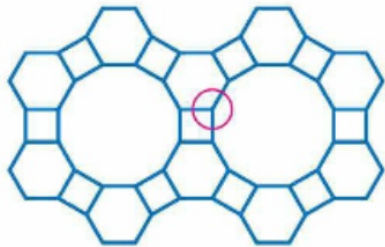**Find the measure of an exterior angle of each regular polygon.** (Example 3)

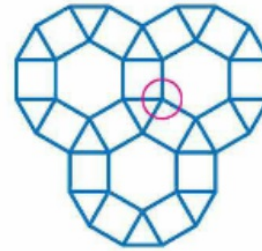5. decagon **36°**

6. 20-gon **18°**

7. 15-gon **24°**

A tessellation is a repetitive pattern of polygons that fit together without overlapping and without gaps between them. For each tessellation, find the measure of each angle at the circled vertex. Then find the sum of the angles.
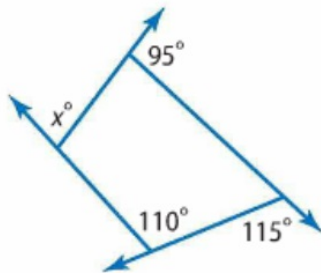
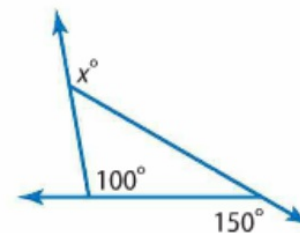**8.**

90°, 120°, 150°; 360°

9.

60°, 90°, 90°, 120°; 360°

Find the value of x in each figure.

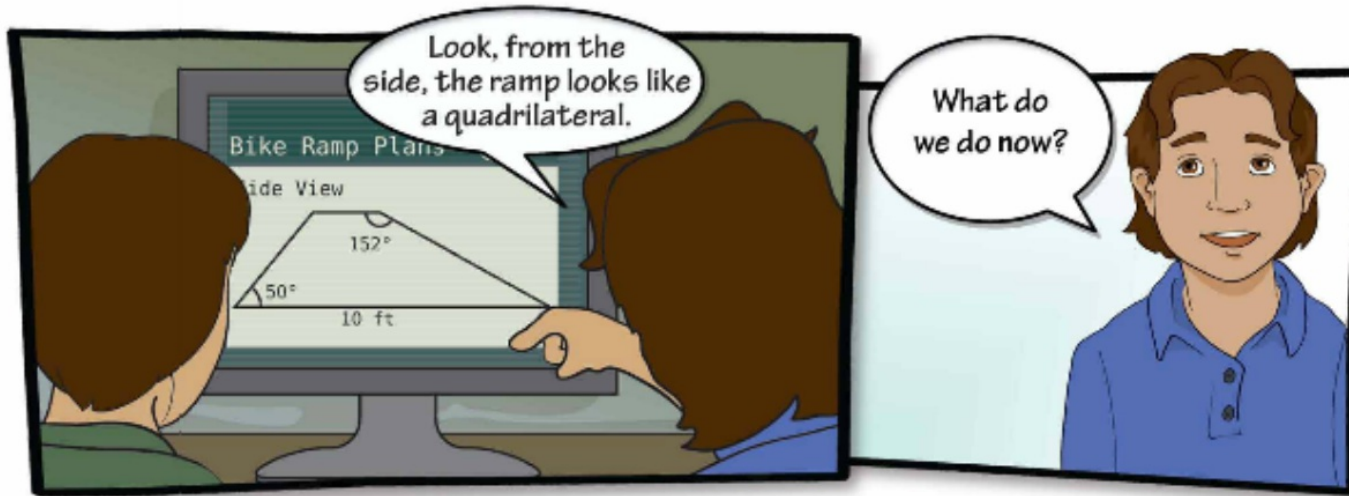**10.** **80**

95°

$x°$

110° 115°

11. **130**

$x°$

100°

150°

12. **CCSS** **Model with Mathematics** Refer to the graphic novel frame below. Find the measures of the two missing angles using properties of quadrilaterals and parallel lines. **130° and 28°**

🔥 **H.O.T. Problems** **Higher Order Thinking**

13. **CCSS** **Persevere with Problems** How many sides does a regular polygon have if the measure of an interior angle is 160°? Justify your answer.

18; $\dfrac{(n-2)180}{n} = 160$

$(n-2)180 = 160n$ **Multiplication Property of Equality**

$180n - 360 = 160n$ **Distributive Property**

$20n = 360$ **Properties of Equality**

$n = 18$ **Division Property of Equality**

14. CCSS **Reason Inductively** If the number of sides of a polygon increases by 1, what happens to the sum of the measures of the interior angles?

It increases by 180°.

15. CCSS **Reason Inductively** Devon drew a regular polygon and measured one of its interior angles. Explain why it is impossible for his angle measure to be 145°.

Regular decagons have equal angles measuring 144° and regular 11-sided polygons have angles measuring 147.27°. 145° is between these two values so it cannot be the interior angle measure of a regular polygon.