7.1 Angles of Polygons

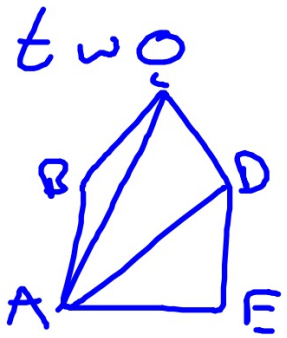
Learning Target Find angle measures of polygons.

Success Criteria

- I can find the sum of the interior angle measures of a polygon.
- I can find interior angle measures of polygons.
- I can find exterior angle measures of polygons.

Vocab:

Diagonal → segment between two non-consecutive vertices



Equilateral Polygon
equal sides

Equiangular Polygon – equal angles

Regular Polygon equal sides & angles

How many degrees are in a triangle? 180

3 x2

How many degrees are in a quadrilateral? 360

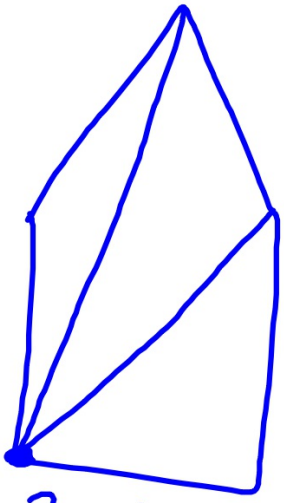
(4-2)180 4

x3

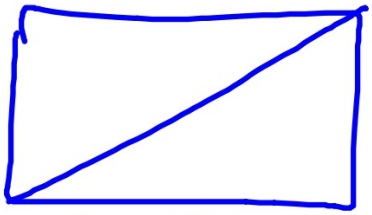
How many degrees are in a pentagon? 540

(5-2)180 5

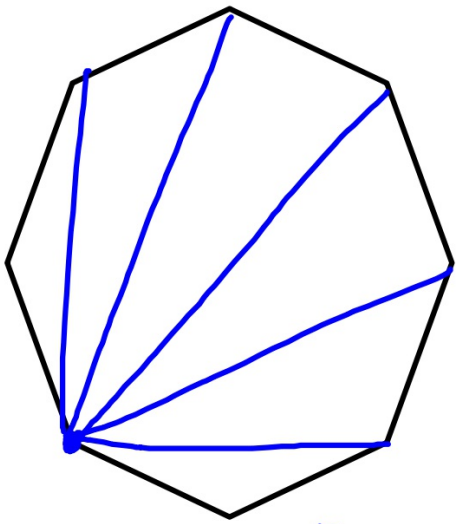
Do you notice a patern? (n-2)180



3x180



2x180



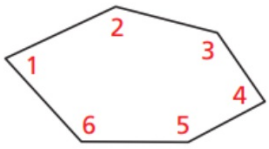
6x180

THEOREM

7.1 Polygon Interior Angles Theorem

The sum of the measures of the interior angles of a convex n-gon is $(n - 2) \cdot 180°$.

$$m\angle 1 + m\angle 2 + \cdots + m\angle n = (n - 2) \cdot 180°$$



$n = 6$

Prove this Theorem Exercise 39 (for pentagons), page 353

EXAMPLE 1 Finding the Sum of Angle Measures in a Polygon

n=16 n=24 n=8

2520 3960 1080

÷16

If regular then what is each angle?

157.5 165 135

EXAMPLE 2 Finding the Number of Sides of a Polygon

The sum of the measures of the interior angles of a convex polygon is 900°. Classify the polygon by the number of sides.

How many sides do the following have?

1620°	1260°	1980°
	9	13

$$\frac{(n-2)180}{180} = \frac{1620}{180}$$

$$n-2 = \frac{1620}{180}$$

$$+2 \quad +2$$

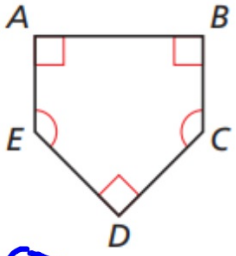
$$n = 11$$

EXAMPLE 3 Finding an Unknown Interior Angle Measure

Find the value of x in the diagram.

EXAMPLE 4 Finding Angle Measures in Polygons

A home plate for a baseball field is shown.



a. Is the polygon regular? Explain your reasoning.

b. Find the measures of $\angle C$ and $\angle E$.

SOLUTION

$(5-2)180=540$

270

270

$\div \quad 2$

135

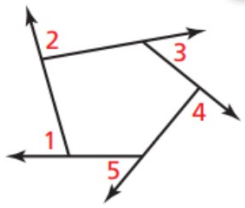
THEOREM

7.2 Polygon Exterior Angles Theorem

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

$$m\angle 1 + m\angle 2 + \cdots + m\angle n = 360°$$

Prove this Theorem Exercise 46, page 354

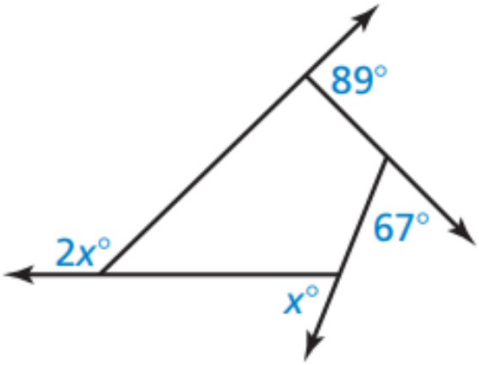


$n = 5$

Exterior angles Add to 360

EXAMPLE 5 Finding an Unknown Exterior Angle Measure

Find the value of x in the diagram.



3 - Triangle
4 - quadrilateral
5 - Pentagon
6 - Hexagon
7 - Heptagon
8 - Octogon
9 - nonagon
10 - Decagon
11 - hendecagon
12 - Dodecagon

HW:

p 352

2-30 e