

What's Going On?

Checking In

The Last Test

Minds on

Polygon Investigation

Action!

Angle Relationships in Polygons

Consolidation

Aquayo!

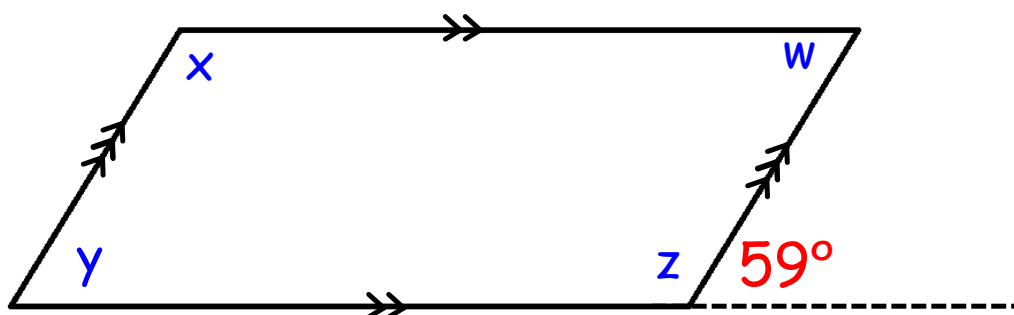
Learning Goal - I will be able to determine and describe the properties and relationships of the interior and exterior angles of polygons.

Checking In

Exit Question from Last Time

Find the measure of angles w , x , y and z .

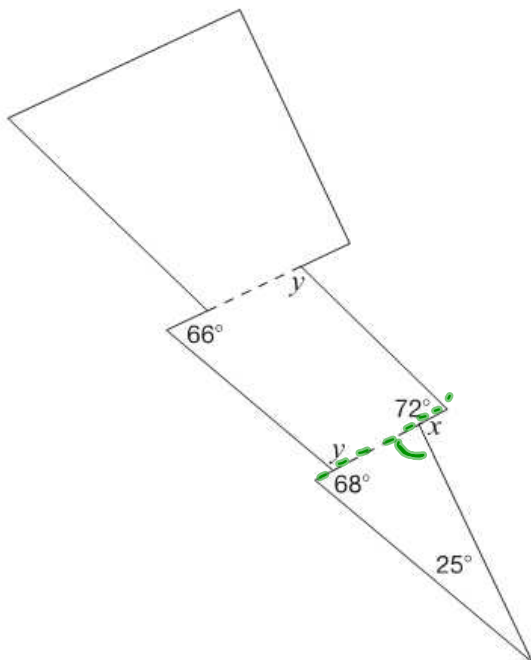
JUSTIFY



Minds on Aquayo!

31 Shazam

Pravin designs a lightning bolt using two quadrilaterals and one triangle as shown below.



$$\begin{aligned}
 &140^\circ - 68^\circ - 25^\circ \\
 &= 47^\circ \quad \boxed{\text{IAT}} \\
 &180^\circ - 87^\circ = 93^\circ \\
 &x = 93^\circ \quad \boxed{\text{SAT}}
 \end{aligned}$$

$$\begin{aligned}
 &360^\circ - 66^\circ - 72^\circ \\
 &= 222^\circ \quad (\text{SAQT}) \\
 &\frac{222^\circ}{2} = 111^\circ \\
 &y = 111^\circ
 \end{aligned}$$

Complete the table below.

Justify your answers using geometric properties.

Unit 6: Geometric Relationships

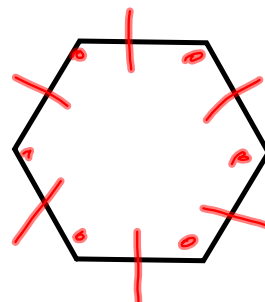
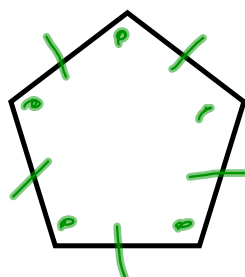
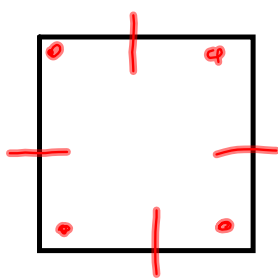
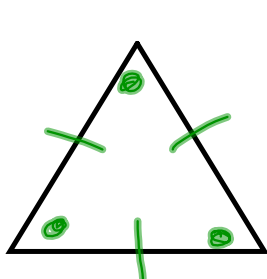
Topic #3

Angle Relationships in Polygons

Minds on

A New Term

"Regular" Polygons



All sides and angles are equal.

Minds on

Polygon Investigation

First, we will, divide up the class into 4 groups.

Pentagons, Hexagons, Heptagons, Octagons

5 6 7 8

Follow the instructions on the next slide.

Minds on

Polygon Investigation

1. Write the number of sides of your polygon on the top of your page.
2. With a protractor determine the measure of each interior angle (~~HINT: these are **regular** polygons... all interior angles are the same!!~~)
3. Extend each side to create the exterior angles.
4. Repeat step 2 but with the exterior angles.
5. Determine:

The sum of the interior angles.
The sum of the exterior angles.

Minds on

Polygon Investigation

6. Find another person with the same polygon as you, make sure you got the same answer!
7. Find people with polygons with different numbers of sides and record their answers.

	<u>Interior</u>		
<u>Pentagon</u>	<u>Hexagon</u>	<u>Heptagon</u>	<u>Octagon</u>
540°	720°	900°	1080°
	<u>Exterior</u>		
<u>Pentagon</u>	<u>Hexagon</u>	<u>Heptagon</u>	<u>Octagon</u>
360°	360°	360	360

Action!

Angle Investigation

Polygon	Number of Sides	Sum of Interior Angles	Sum of Exterior Angles
Triangle	3	180	360
Quadrilateral	4	360	360
Pentagon	5	540	360
Hexagon	6	720	360
Heptagon	7	900	360
Octagon	8	1080	360

Handwritten red annotations in the table show arrows pointing from the interior angle sum to the exterior angle sum for each polygon, with the number 180 written next to the arrow. This indicates that the exterior angle sum is always 180 degrees more than the interior angle sum for these polygons.

Action!

A New Equation!

Number of Sides	Sum of Interior Angles
3	180
4	360
5	540
6	720
7	900
8	1080

$$y = mx + b$$

$$S = 180(n - 2)$$

Action!

Angle Relationships in Polygons

Exterior Angle Theorem

The sum of the exterior angles
of ~~a triangle~~ OR ~~a quadrilateral~~ is 360° .

any polygon

Action!

Angle Relationships in Polygons

Interior Angle Theorem

The sum of the interior angles (S) of a polygon is $S = 180(n - 2)$ where n is the number sides.

Action!

Whiteboards!

Interior Angle Theorem

The sum of the interior angles (S) of a polygon is $S = 180(n - 2)$ where n is the number sides.

What is the sum of the interior angles of a 12-sided polygon?

$$S = 180(n - 2)$$

$$S = 180(12 - 2)$$

$$S = 180(10)$$

$$S = 1800$$

16 sides

$$\begin{aligned} &160(16-2) \\ &= 160 \times 14 \\ &= 2240 \end{aligned}$$

Action!**Whiteboards!****Interior Angle Theorem**

The sum of the interior angles (S) of a polygon is $S = 180(n - 2)$ where n is the number sides.

If the sum of the interior angles of a polygon is 1620° , how many sides does the polygon have?

$$S = 180(n - 2)$$

$$1620 = 180n - 360$$

$$+360 \quad \quad \quad +360$$

$$\frac{1980}{180} = \frac{180n}{180}$$

$$11 = n$$

divide by 180°
then add 2
 3780°

To find the sum of the angles of a polygon

subtract 2 from the number of sides
then multiply by 360° !

To find the number of sides of a polygon

divide the sum of the angles by 180°
then add 2!

Consolidation

Homework

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