Name: _*Key*_
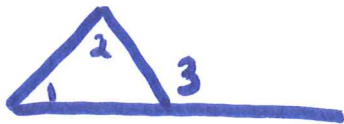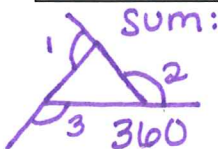
Polygon Sum Theorem Examples and Vocabulary Review

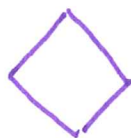**(GSP Demo) Exterior Angle Theorem:**

sum: 360

The sum of the remote interior angles is = the Exterior ∠!

$∠1 + ∠2 = ∠3$

Polygon Sum Theorem:

Sum of the interior angles is $180(n-2) = S$ where n is the # of sides the polyon has.

$n=4$

Regular Polygon:

A polygon that has all ≅ sides and all ≅ ∠s ie

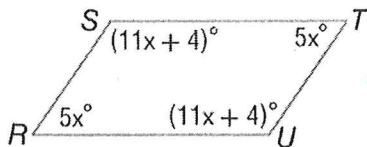1. What is the measure of an individual angle of a regular 25-gon?

one angle:
$$\frac{180(n-2)}{n} = \frac{180(25-2)}{25}$$

$A = 165.6°$

2. What is the measure of an individual angle of a regular dodecagon?

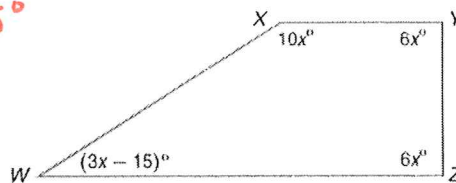$$\frac{180(n-2)}{n} = \frac{180(12-2)}{12}$$

$A = 150°$

EXAMPLE 1 Find the Interior Angles Sum of a Polygon

B. Find the measure of each interior angle of parallelogram *RSTU*.

S $(11x+4)°$ $5x°$ T
R $5x°$ $(11x+4)°$ U

$∠S = 11(11) + 4 = 125°$
$∠U = 125°$
$∠R = 5(11) = 55°$
$∠T = 55°$

$S = 180(n-2)$
$S = 180(4-2)$
$S = 360$

$360 = ∠S + ∠R + ∠U + ∠T$

$360 = 11x+4 + 5x + 11x+4 + 5x$
$360 = 32x + 8$
$352 = 32x$
$\boxed{11 = x}$

X $10x°$ $6x°$ Y
W $(3x-15)°$ $6x°$ Z

$S = 360$ Quadrilateral

$360 = ∠W + ∠Z + ∠Y + ∠X$
$360 = 3x - 15 + 6x + 6x + 10x$
$360 = 25x - 15$
$375 = 25x$
$\boxed{15 = x}$

$∠X = 150°$
$∠Y = 90°$
$∠Z = 90°$
$∠W = 30°$

plug in x=15 for each angle.

Exterior Angle Practice Problems

1. What is the sum of the measures of the exterior angles of a dodecagon?

$$360°$$

2. What is the measure of an exterior angle of an equiangular pentagon?

$$\frac{360}{5} = 72°$$

3. How many sides does a regular polygon have if each exterior angle measures 24°?

$$24 = \frac{360}{n} \qquad n = 15 \text{ sides.}$$

EXAMPLE 4 Find Exterior Angle Measures of a Polygon

A. Find the value of x in the diagram.

$$360 = 5x + 4x - 6 + 5x - 5 + 4x + 3 + 6x - 12 + 2x + 3$$
$$+ 5x + 5.$$

$$360 = 31x - 12$$

$$372 = 31x$$

$$\boxed{12 = x}$$

5x

5x + 5

4x − 6

2x + 3

5x − 5

6x − 12

4x + 3

Add: The measure of an interior angle of a regular polygon is 120°. Find the # of Sides.

$$S_{um} = 180(n-2)$$
$$120n = 180(n-2)$$
$$120n = 180n - 360$$
$$-60n = -360$$
$$\boxed{n = 6}$$