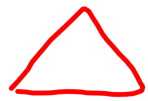
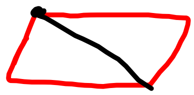
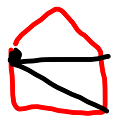
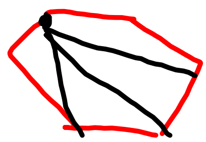
L5-4 Polygons and Angles

Number of Sides	Sketch	Number of Triangles	Sum of Triangles
3		1	1(180) = 180
4		2	2(180) = 360
5		3	3(180) = 540
6		4	4(180) = 720

Triangles = # sides − 2
(Interior angles)

Total Degrees Interior Angles = (# sides − 2) 180

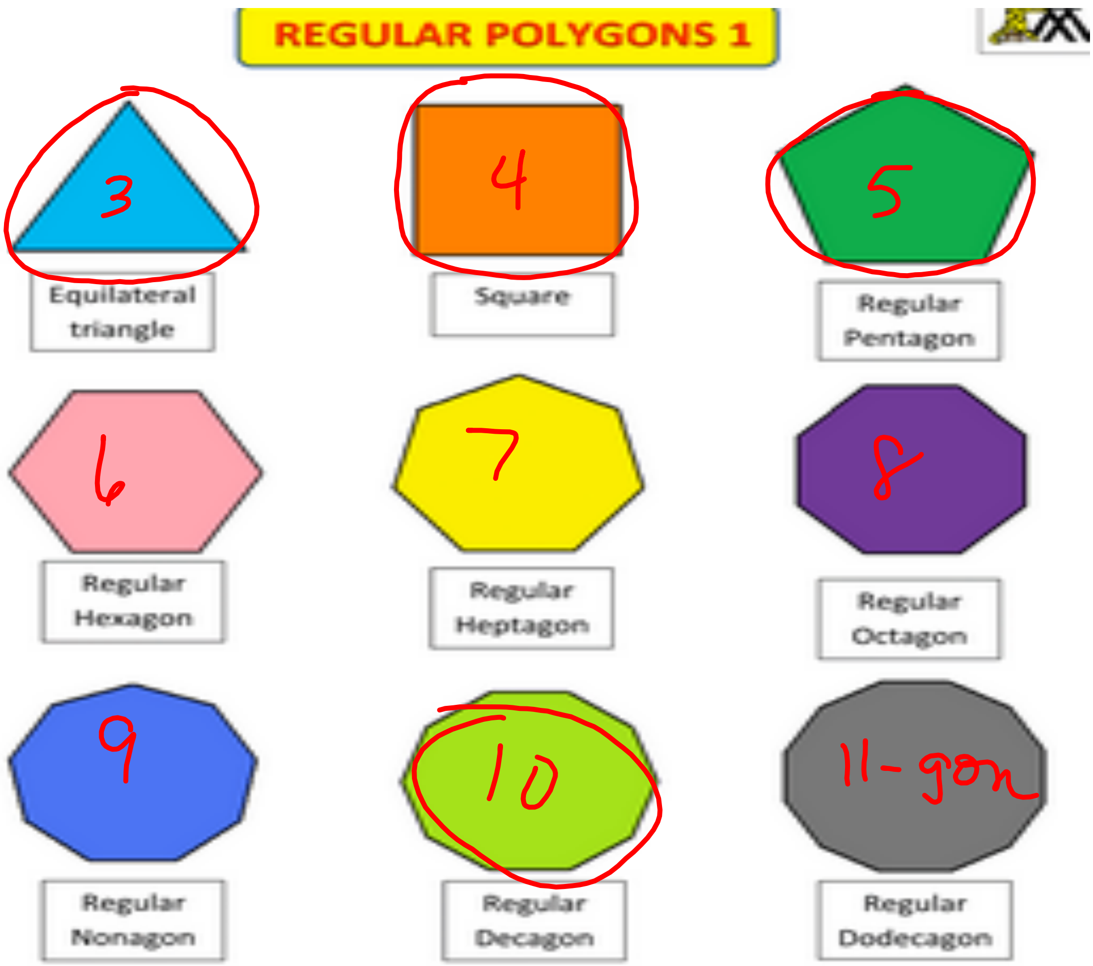
<u>polygon</u> ⇒ closed figure w/ 3 or more sides

<u>regular polygon</u> ⇒ equiangular & equilateral
⇒ angles & sides have the same measure

Interior Angle Sum of a Polygon

Words The sum of the measures of the interior angles of a polygon is $(n - 2)180$, where n represents the number of sides.

Symbols $S = (n - 2)180$



Example

1. Find the sum of the measures of the interior angles of a decagon.

decagon = 10-gon = 10 sides

Total degrees = (# sides − 2) 180

= (10 − 2) 180

= 8 · 180 = 1440° in decagon

Got It? Do these problems to find out.

Find the sum of the interior angle measures of each polygon.

a. hexagon

Total degrees $= (6-2)\,180$
$= 4 \cdot 180$
$= 720^\circ$

b. octagon

Total degrees $= (10-2)\,180$
$= 8 \cdot 180$
$= 1080^\circ$

c. 15-gon

Total degrees $= (15-2)\,180$
$= 13 \cdot 180$
$= 2340^\circ$

Example

2. **Each chamber of a bee honeycomb is a regular hexagon. Find the measure of an interior angle of a regular hexagon.**

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Got It? Do these problems to find out.

Find the measure of one interior angle in each regular polygon. Round to the nearest tenth if necessary.

d. octagon

$1080°$

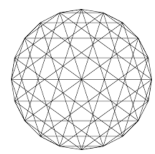
e. heptagon

Total degrees $= (7-2)\,180$

$= 5 \cdot 180$

$= 900°$

f. 20-gon



Total degrees $= (20-2)\,180$

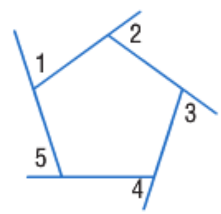
$= 18 \cdot 180$

$= 3240°$

Exterior Angles of a Polygon

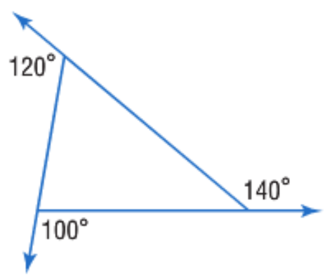
Words In a polygon, the sum of the measures of the exterior angles, one at each vertex, is 360°.

Model

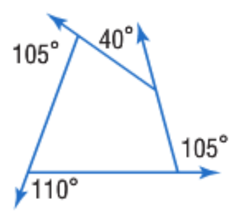


Symbols $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 + m\angle 5 = 360°$

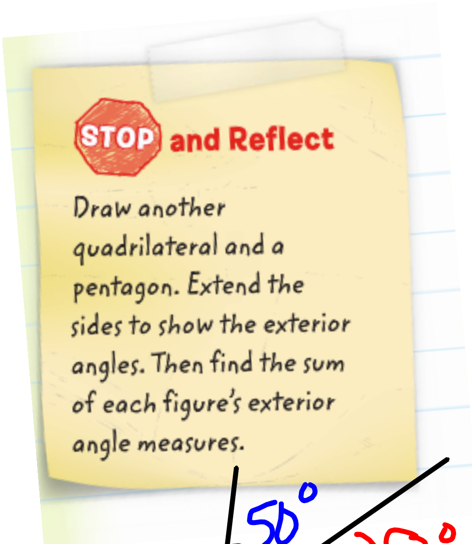
Regardless of the number of sides in a polygon, the sum of the exterior angle measures is equal to 360°.

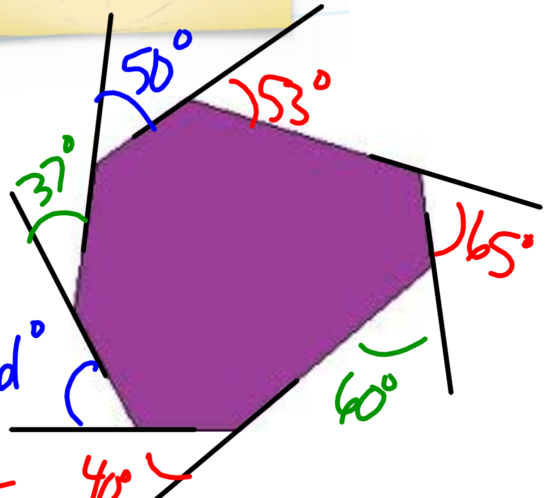


$120 + 100 + 140 = 360°$

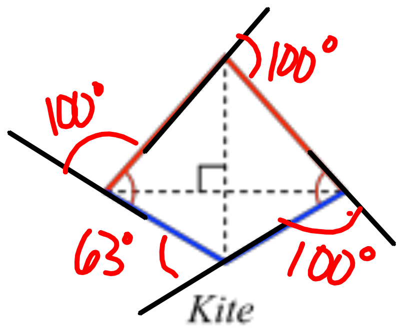


$105 + 110 + 105 + 40 = 360°$

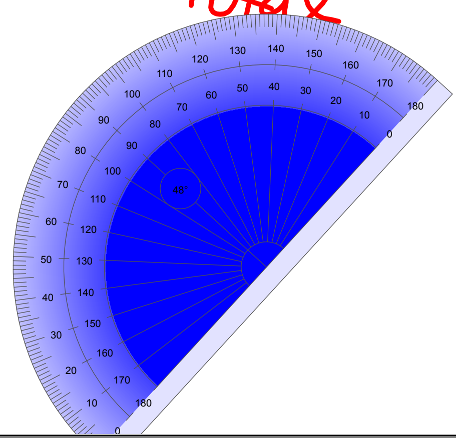




Total = 366°



363° Total

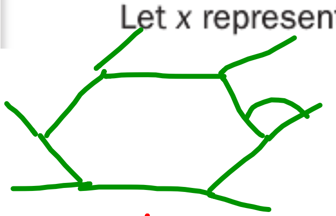


Example

Tutor

3. Find the measure of an exterior angle in a regular hexagon.

Let x represent the measure of each exterior angle.



Total = 360°

Only works for regular polygons.

$$\frac{\text{Total measure}}{\#\text{angles}} = \frac{360}{6} = 60^\circ$$

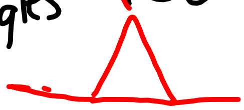
each exterior angle.

Got It? **Do these problems to find out.**

Find the measure of an exterior angle of each regular polygon.

g. triangle

$\frac{360^\circ}{3 \text{ angles}} = 120^\circ$



h. quadrilateral

$\frac{360^\circ}{4 \text{ angles}} = 90^\circ$

i. octagon

$\frac{360^\circ}{8 \text{ angles}} = 45^\circ$

As the # of sides increases, the measure of the exterior angles decreases.