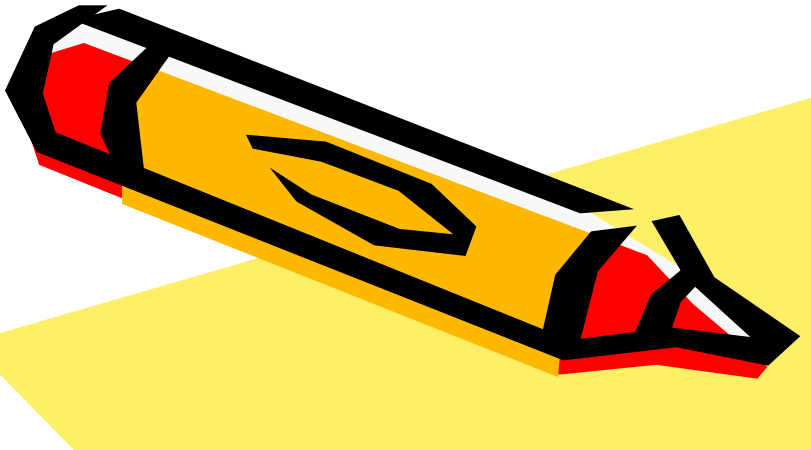


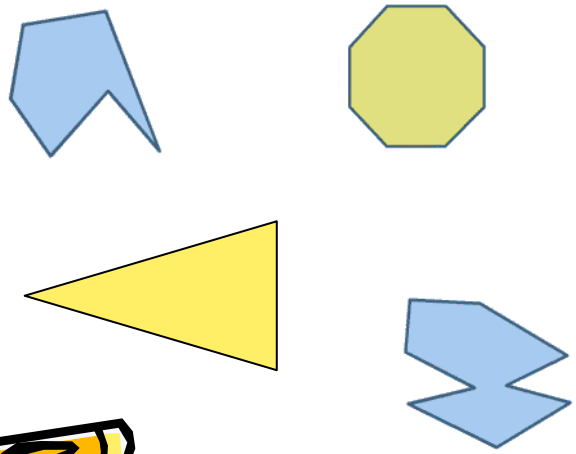
# Geometry

Polygons

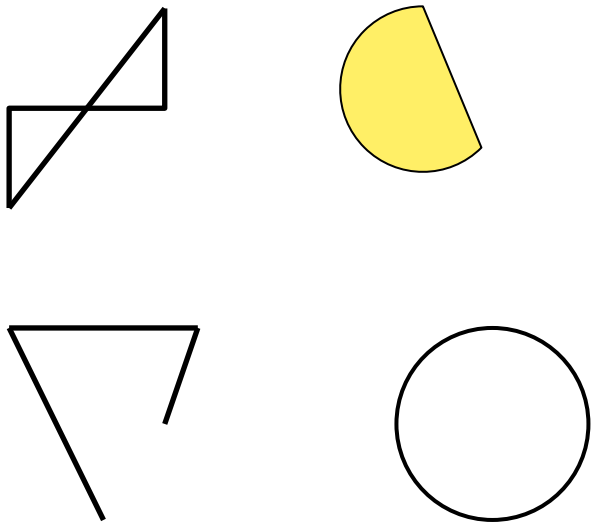
# Vocabulary

Polygon: multi-sided closed figure. Sides (segments) may only intersect at their endpoints.

<u>polygons</u>



<u>not polygons</u>



# Vocabulary

Convex polygon: a polygon in which no line containing a side of the polygon also contains a point in the interior of the polygon.

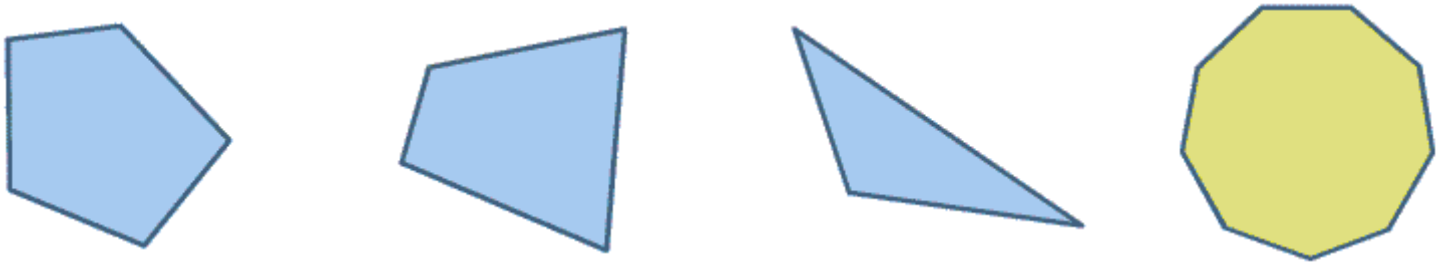
Simply: All vertices point out.

Concave polygon: a polygon which is not convex.

Simply: At least one vertex points in (think cave).

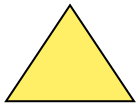
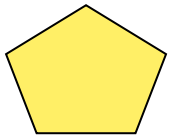
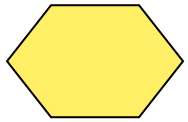
# Vocabulary

Convex polygon:

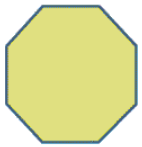
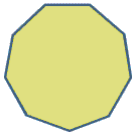
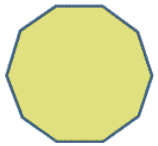


Concave polygon:

# Classify polygons by # sides

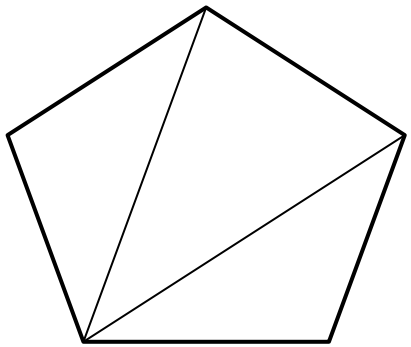
| # sides | Name | Picture |
|---|---|---|
| 3 | Triangle |  |
| 4 | Quadrilateral |  |
| 5 | Pentagon |  |
| 6 | Hexagon |  |
| 7 | Heptagon |  |

# Classify polygons by # sides

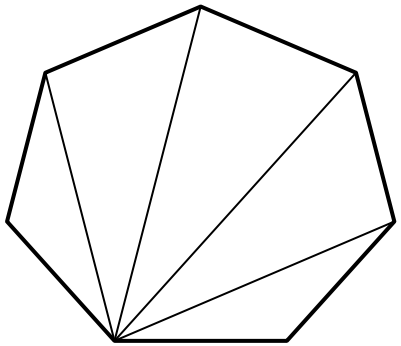
| # sides | Name | Picture |
|---|---|---|
| 8 | Octagon |  |
| 9 | Nonagon |  |
| 10 | Decagon |  |
| 11 | Hendecagon |  |
| 12 | Dodecagon |  |
| n | n-gon | Figure with n sides |

# Sum of the Interior Angles

By taking any convex polygon and drawing in the diagonals from a single vertex, we can determine the sum of the interior angles of the polygon based on the number of triangles observed.

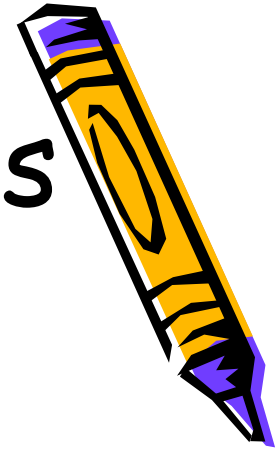


A 5 sided figure contains 3 triangles. Since every triangle contains $180^0$, a pentagon's interior angles total $540^0$.



A 7 sided figure contains 5 triangles. Therefore, a heptagon's interior angles total $900^0$.

# Sum of the Interior Angles



In any convex polygon, the sum of the measures of the interior angles is:

$$S = (n - 2) \cdot 180^\circ$$

$n$ = # of sides of the polygon

# Practice

Find the sum of the interior angles for each convex polygon:

1. octagon
2. 14-gon
3. heptagon
4. dodecagon
5. 22-gon

# Practice

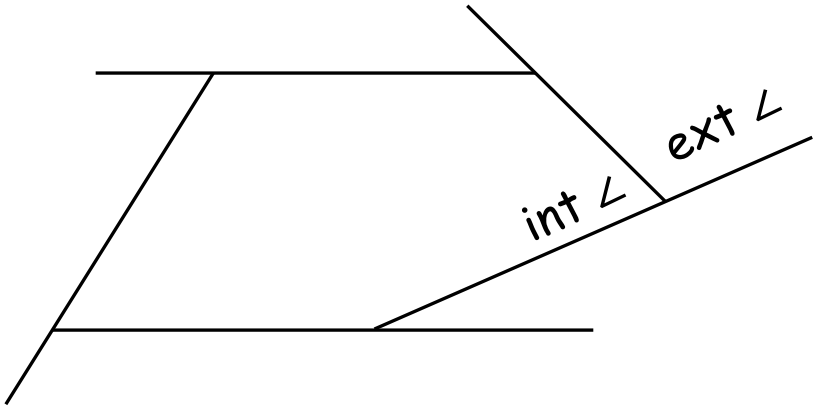
Find the # of sides of the polygon given the sum of interior angles. Then name the polygon.

1. 1080°
2. 540°
3. 3240°
4. 1620°

# Sum of the Exterior Angles

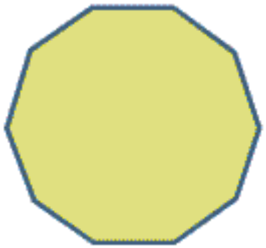
- The sum of the measures of the exterior angles of a convex polygon, one angle at each vertex, is 360°.

- Exterior angles and interior angles (that are adjacent), are supplementary.



# Regular Polygons

Regular polygon: a convex polygon in which all sides and all angles are congruent (all interior angles are congruent, all exterior angles are congruent).



# Regular Polygons

In a regular polygon, the sum of the interior angles,

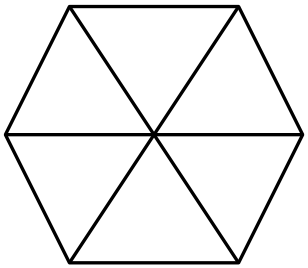
$$S = (n - 2) \cdot 180^\circ$$

divided by the number of angles, will equal the measure of each interior angle.

Remember: int $\angle$ + ext $\angle$ = $180^0$

the sum of the exterior angles = $360^0$

Note: the # of sides = # of interior angles = # of exterior angles = # of isosceles triangles used to form the regular polygon



# Practice

Find the measurement of each interior angle for the given regular polygon:

1. hexagon
2. nonagon
3. 14-gon

# Practice

Given the measure of an exterior angle, determine the number of sides of the regular polygon. Then name/classify the polygon.

1. $90^0$
2. $8^0$
3. $30^0$

# Practice

Find the measure of an interior and an exterior angle for each regular polygon.

1. decagon
2. 21-gon

# Practice

Given the measure of an interior angle of a regular polygon, determine the number of sides. Then name/classify the polygon.

1. $120^0$
2. $150^0$
3. $135^0$
4. $108^0$