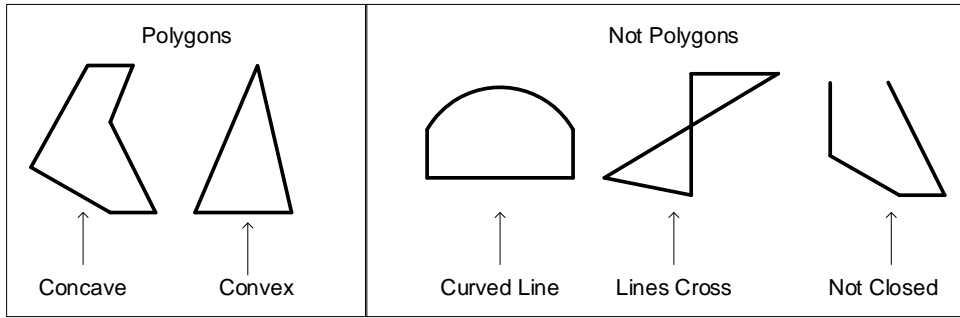


Geometry Notes – Polygons

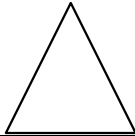
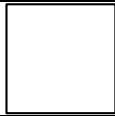
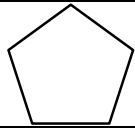
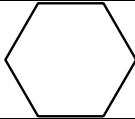
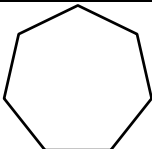
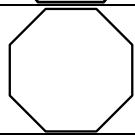
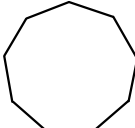
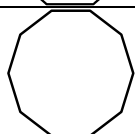
Polygon: Is a 2-dimensional figure made of line segments that are connected to form a closed figure. The line segments may not cross each other.



Concave Polygon: A polygon that contains at least one interior angle that is **greater than 180°** . Also note that extending one or more line segments from a concave polygon **results** in a line passing through the polygon.

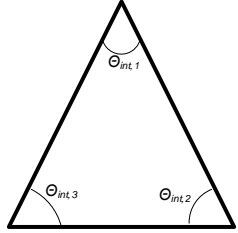
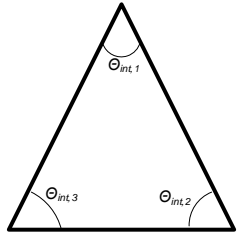
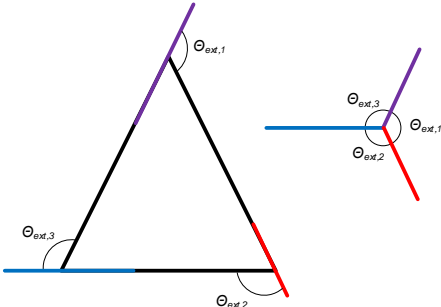
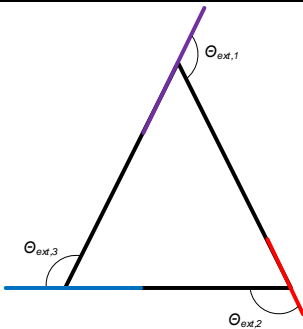
Convex Polygon: A polygon whose interior angles are **all less than 180°** . Also note that extending any of the line segments from a convex polygon **does not result** in a line passing through the polygon.

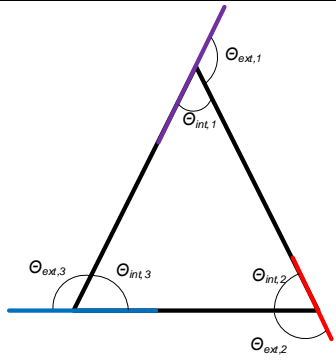
Polygons are classified by the number of sides. Polygons of up to 10 sides are listed below.

Number of Sides	Name	Example
3	Triangle	
4	Quadrilateral	
5	Pentagon	
6	Hexagon	
7	Heptagon	
8	Octagon	
9	Nonagon	
10	Decagon	

Two main types of polygons:

1. **Regular Polygon:** A polygon with all of its sides **and** all of its interior angles equal.
 - ** Only convex polygons can be regular.
2. **Irregular Polygon:** A polygon with unequal sides and unequal angles.

Polygon Interior and Exterior Angle Formulas		
Property	Formula	Example
The sum of interior angles of ANY polygon	$S_{int} = (n - 2) \times 180^\circ$	 $S = (3 - 2) \times 180^\circ$ $S = 180^\circ$
The measure of each interior angle of a REGULAR polygon. ** Note: For an irregular polygon, the interior angles will have different values, but they still must add to S as indicated by the above formula.	$\theta_{int} = \frac{(n - 2) \times 180^\circ}{n}$	 $\theta_{int,x} = \frac{(3 - 2) \times 180^\circ}{3}$ $\theta_{int,x} = 60^\circ$
The sum of exterior angles of ANY polygon	$S_{ext} = 360^\circ$	
The measure of each exterior angle of a REGULAR polygon.	$\theta_{ext} = \frac{360^\circ}{n}$	 $\theta_{ext} = \frac{360^\circ}{3} = 120^\circ$

Relationship between interior and exterior angle of ANY polygon.	$\theta_{int} + \theta_{ext} = 180^\circ$	
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Triangles

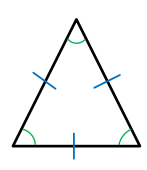
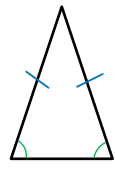
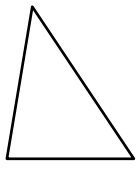
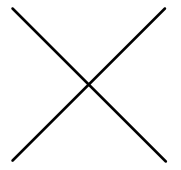
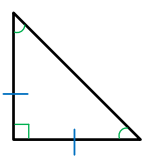
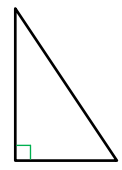
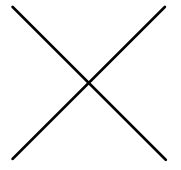
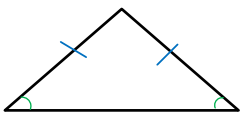
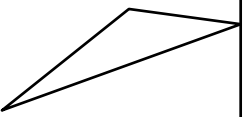
Triangles are classified according to the following two criteria:

1. Side Lengths

- **Equilateral**
 - All three sides have equal length. This implies all angles are 60°
- **Isosceles**
 - Two sides have equal length. This implies two angles are the same.
- **Scalene**
 - No sides have same length. This implies all three angles are different.


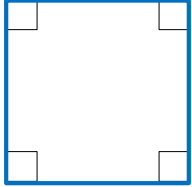
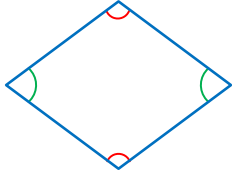
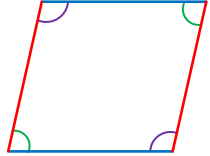

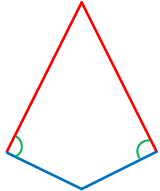
2. Interior Angles

- **Acute**
 - All interior angles are acute.
- **Right**
 - One interior angle are Right.
- **Obtuse**
 - One interior angle are obtuse.

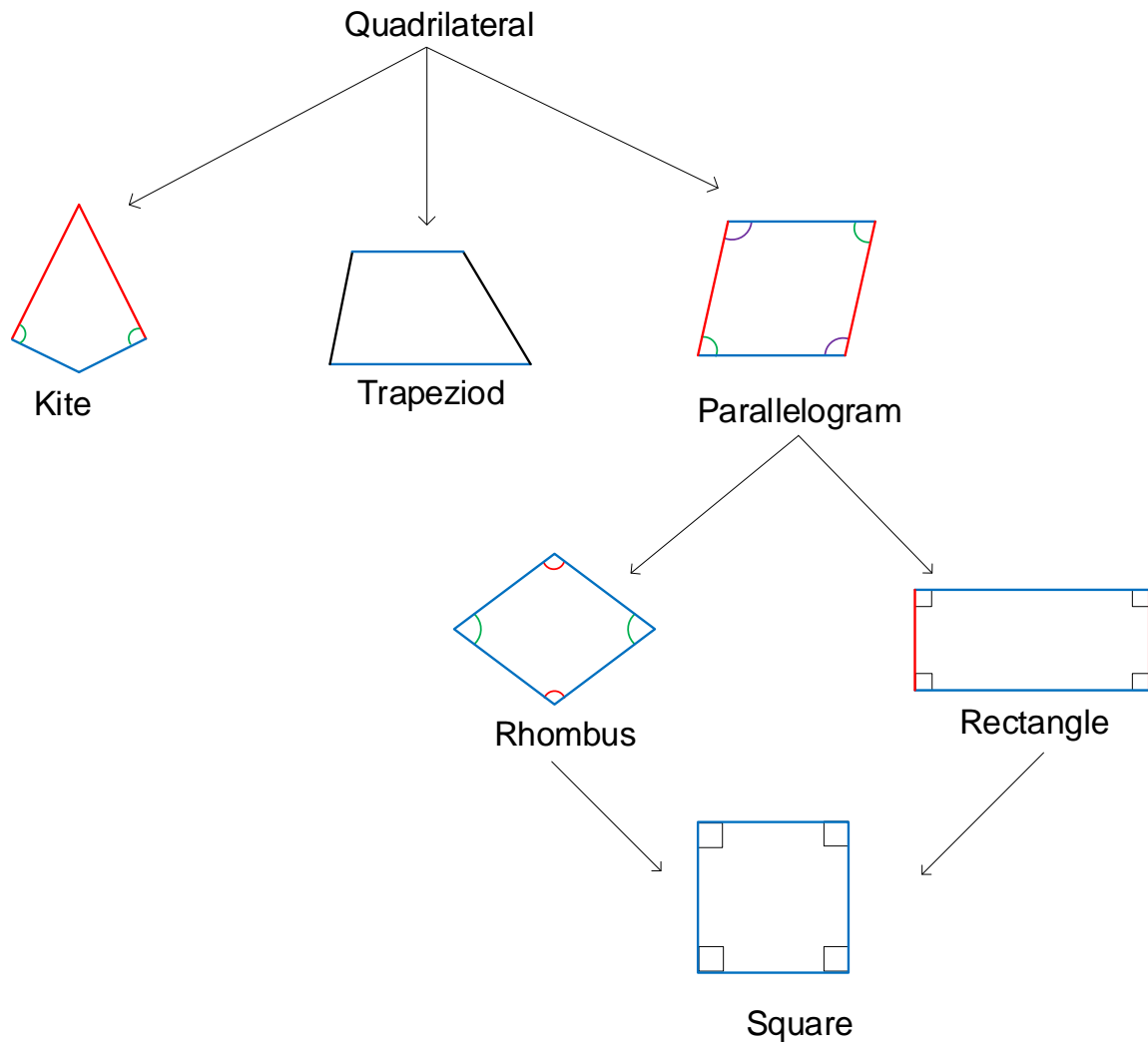
	Equilateral	Isosceles	Scalene
Acute			
Right			
Obtuse			

Quadrilaterals

We can list four special types of quadrilaterals.

Rectangle	<ul style="list-style-type: none">• Opposite sides are parallel• Opposite sides are equal length• All right angles	
Square	<ul style="list-style-type: none">• All sides are equal length.• All right angles	
Rhombus (Diamond)	<ul style="list-style-type: none">• All sides are equal length• Opposite sides are parallel• Opposite angles are equal	
Parallelogram	<ul style="list-style-type: none">• Opposite sides are parallel and congruent• Opposite angles are congruent• Consecutive angles are supplementary• Diagonals bisect each other	
Trapezoid	<ul style="list-style-type: none">• Two opposite sides are parallel	
Kite	<ul style="list-style-type: none">• Adjacent sides are equal length• Angles where the two sides meet are equal	

The figure below shows the relationship between the different types of quadrilaterals.



Some Observations:

- A Square is a Rectangle.
- A Square is a Rhombus.
- A Square, Rectangle, and Rhombus are all Parallelograms.