

Sec 3-5

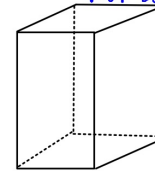
A polygon: Closed plane figure with at least three sides that are segments. Sides intersect only at their endpoints. No adjacent sides are collinear.

Closed plane figure

Not a Polygon

Why not?

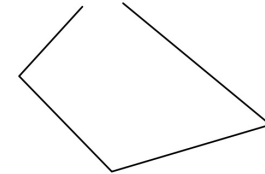
Because it's  
NOT a plane figure



Not a Polygon

Why not?

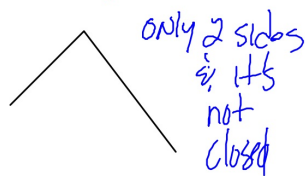
It's NOT closed



with at least three sides that are segments

Not a Polygon

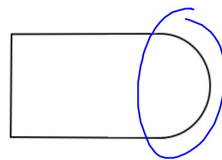
Why not?



only 2 sides  
& it's  
not  
closed

Not a Polygon

Why not?

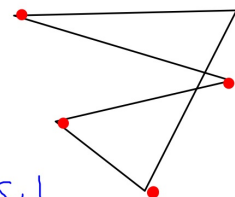


part is  
not a  
segment

Sides intersect only at their endpoints

Not a Polygon

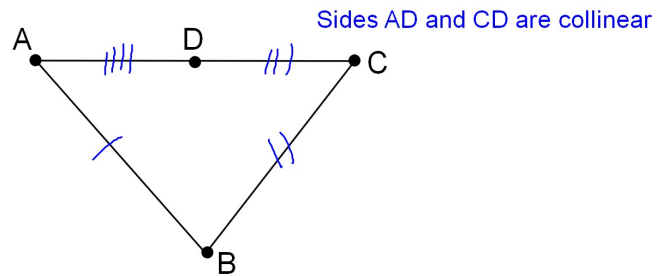
Why not?



Sides can't overlap

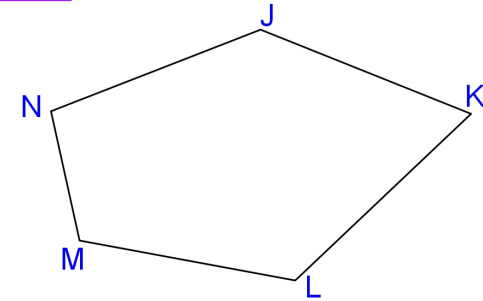
No adjacent sides are collinear

Why isn't  $\triangle ABCD$  considered a polygon?



Naming Polygons.

Name this polygon: JKLMN



How many different ways can you name this polygon?

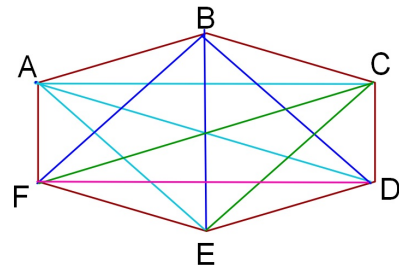
10

Diagonals of a Polygon:

Diagonal of a Polygon:

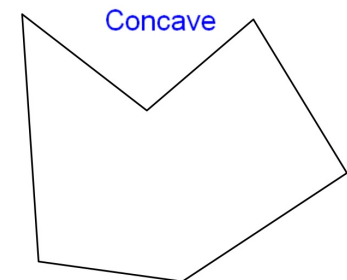
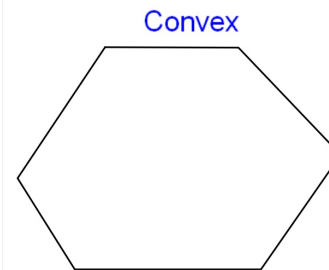
A segment that connects two nonconsecutive vertices.

How many diagonals  
can be drawn from  
vertex C? 3



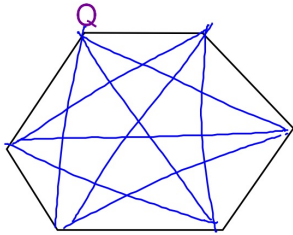
Concave and Convex Polygons:

Which polygon is concave and which is convex?



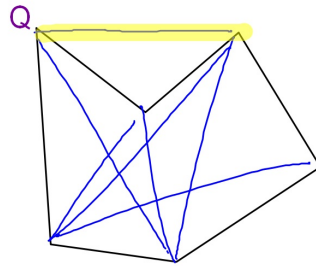
Draw all the diagonals from vertex Q in each polygon

Convex



No diagonals have points that all outside of the polygon

Concave



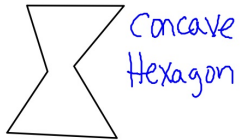
At least one diagonal has points that fall outside of the polygon.

Names of polygons:

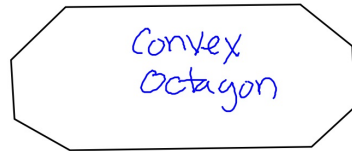
# sides	Name
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
9	Nonagon
10	Decagon
n	n-gon

Classify (name) each polygon by the number of sides and state if it is convex or concave.

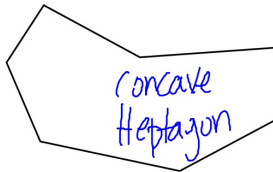
1.



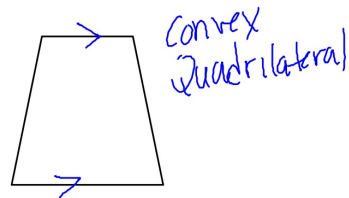
2.



3.



4.



### Polygon Angle-Sum Theorem

The sum of the measures of the interior angles of a an n-gon is  $(n - 2)180$   $n = \text{\# of sides}$

Find the sum of the interior angles of each polygon.

1. Heptagon

$$(7-2)(180) = 900^\circ$$

2. 25 - gon

$$(25-2)180 = 4140$$

3. If the sum of the interior angles of a polygon is  $4860^\circ$  find the number of sides.

$$\begin{aligned} \frac{(n-2)180}{180} &= \frac{4860}{180} \\ n-2 &= 27+2 \\ n &= 29 \end{aligned}$$

A regular polygon is both equilateral and equiangular.

All sides are congruent.

All angles are congruent

Find the measure of one interior angle of each regular polygon.

1. Decagon

$$\begin{aligned} 144^\circ & \leftarrow \\ \frac{(10-2)180}{10} &= 144 \end{aligned}$$

2. 25 - gon

$$\begin{aligned} \frac{(25-2)180}{25} &= 162.6^\circ \end{aligned}$$

If the measure of one interior angle of a regular polygon is  $156^\circ$  find the number of sides of the polygon.

$$\begin{aligned} n \cdot \frac{(n-2)180}{n} &= 156 \cdot n \\ (n-2)180 &= 156n \\ 180n - 360 &= 156n \\ -180n & \quad -180n \\ -360 &= -24n \\ \frac{-360}{-24} &= \frac{-24n}{-24} \\ 15 &= n \end{aligned}$$