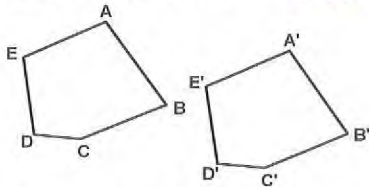


## ABCDEF $\cong$ A'B'C'D'E' Congruence

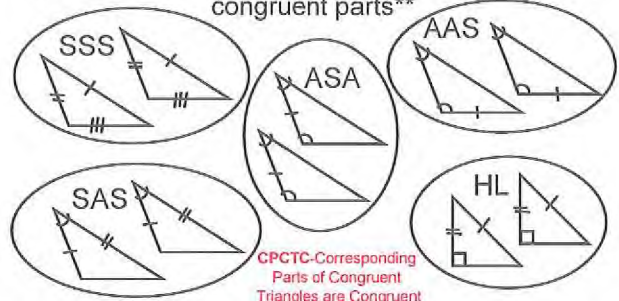


Two figures are congruent if they have the same shape and same size. Corresponding angles are congruent and corresponding sides are congruent.

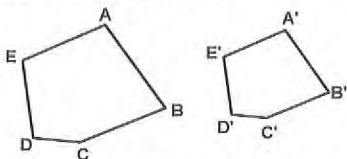
Two figures are congruent if and only if one figure can be obtained from the other figure by a sequence of rigid motions (translations, reflections, rotations).

## Triangle Congruence Theorems

\*\*help us to determine if two triangles are congruent using only three pair of corresponding congruent parts\*\*



## ABCDE $\sim$ A'B'C'D'E' Similarity



Two figures are similar if they have the same shape and a different size. Corresponding angles are congruent and corresponding sides are proportional.

Two figures are similar if and only if one figure can be obtained from the other figure by a sequence of similarity transformations (a rigid motion followed by a dilation).

## Dilation & Scale Factor

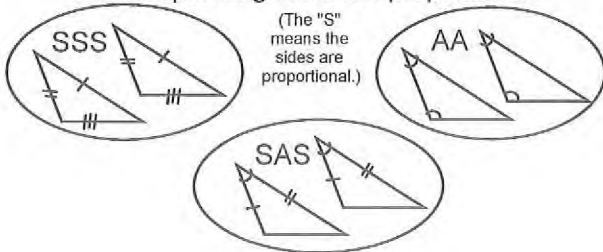
A **dilation** is a type of transformation that changes the size of a figure. The scale factor measures how much larger or smaller the new figure is. A dilation maps  $(x, y)$  to  $(kx, ky)$  where  $k$  is the scale factor.

scale factor greater than 1, the figure is made larger  
 scale factor between 0 and 1, figure made smaller  
 scale factor is 1, the figure does not change

$$\text{scale factor} = \frac{\text{NEW}}{\text{ORIGINAL}}$$

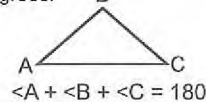
## Triangle Similarity Theorems

\*\*help us to determine if two triangles are similar even if we don't know for a fact that all pairs of corresponding angles are congruent and all pairs of corresponding sides are proportional\*\*

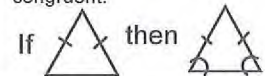


## Triangle Theorems

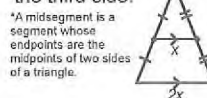
**Triangle Sum Theorem:** The sum of the angle measures inside of a triangle is 180 degrees.



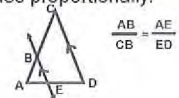
**Isosceles Triangle Theorem:** If two sides of a triangle are congruent, then the angles opposite those sides are congruent.



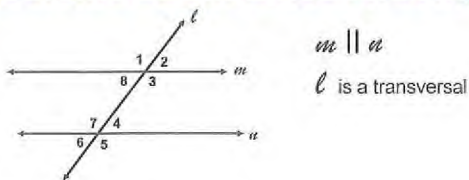
**Triangle Midsegment Theorem:** A midsegment is parallel to the third side of a triangle and is half as long as the third side.



**Triangle Proportionality Theorem:** If a line parallel to a side of a triangle intersects the other two sides, then it divides those sides proportionally.



## Theorems about Lines and Angles



$m \parallel n$   
 $l$  is a transversal

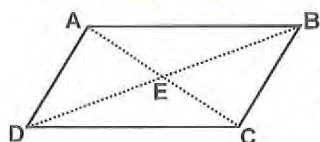
**Vertical Angles** are congruent.  
 $\angle 2 \cong \angle 8$     $\angle 1 \cong \angle 3$     $\angle 5 \cong \angle 7$     $\angle 4 \cong \angle 6$

**Same Side Interior Angles** are supplementary.  
 $\angle 3 + \angle 4 = 180$     $\angle 7 + \angle 8 = 180$

**Alternate Interior Angles** are congruent.  
 $\angle 3 \cong \angle 7$     $\angle 4 \cong \angle 8$

**Corresponding Angles** are congruent.  
 $\angle 1 \cong \angle 7$     $\angle 6 \cong \angle 8$     $\angle 2 \cong \angle 4$     $\angle 3 \cong \angle 5$

## Parallelograms



Opposite sides are congruent.  
 Opposite angles are congruent.  
 Consecutive angles are supplementary.  
 Diagonals bisect each other.

*A rectangle is a parallelogram with congruent diagonals. (In a rectangle, diagonals are congruent and they bisect each other.)*

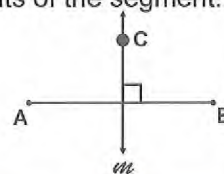
## Proofs

Proofs can be applied to many concepts throughout this unit. Remember, there is a **given** and there is **something to prove**.

Always begin with the given and be sure that every statement directly follows from the previous statement made. Every statement must also be justified by a reason.

## Perpendicular Bisector Theorem

If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.



line  $m$  is the perpendicular bisector of segment AB

Point C is the same distance from point A as it is from point B

## Medians of a Triangle

The point of concurrency for the medians of a triangle is called the centroid. (In other words, the medians of a triangle meet at a point called the centroid.)

## Constructions

You will need to refresh your memory on the steps to:

1. copy a line segment or an angle
2. bisect a line segment or an angle
3. construct a line parallel to a line through a given point
4. construct a line perpendicular to a given line
5. construct an equilateral triangle, regular hexagon, and a square inscribed in a circle