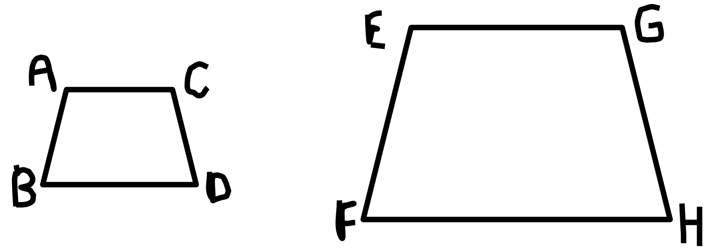
Lesson 7-2 Similar Polygons

Similar Polygons have the **<u>same</u>** shape but can be **<u>different</u>** sizes.



▱ABCD ~ ▱EFGH

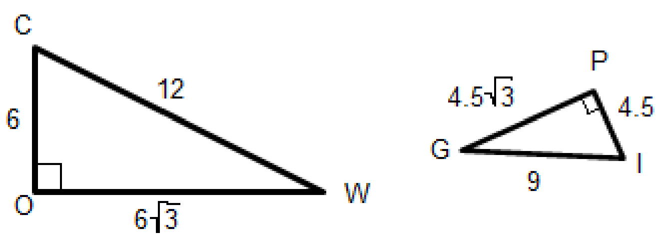
(1) Corresponding angles are ______________________.

(2) Measures of corresponding sides are __________________.

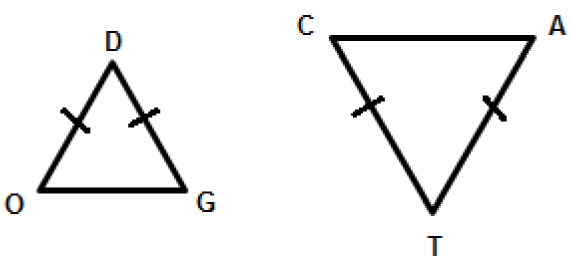
a. All the proportions of corresponding sides are equal to each other.

Ex1) Determine whether the pair of triangles is similar. Justify your answer. If not enough information, write "not enough info"

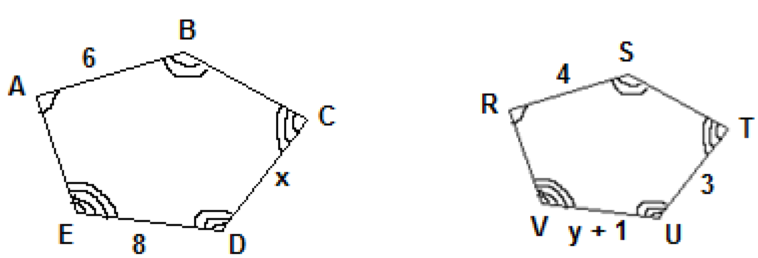
a)



b)



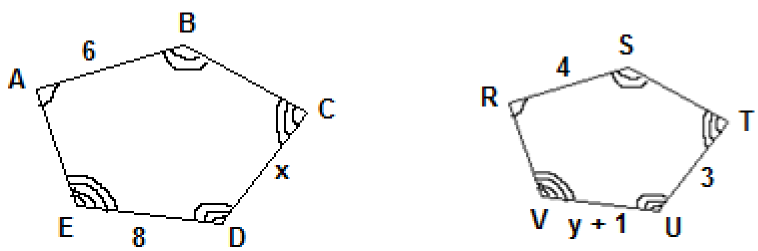
Ex2) The two polygons <u>are</u> similar. Write a similarity statement, Then find *x, y,* and *UT.*



A **Scale factor** is the ratio of the corresponding sides of similar figures.

Ex3) An architect prepared a 12-inch model of a skyscraper to look like an actual 1100-foot building. What is the scale factor of the model compared to the actual building?

Ex4) Refer to example 2. Find the scale factor of polygon *RSTUV* to polygon *ABCDE*.



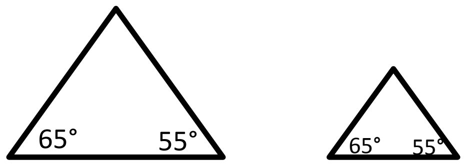
Enlargements and Reductions using scale factors:

Ex5) Rectangle *WXYZ* is similar to rectangle *PQRS* with a scale factor of 1.5. If the length and width of *PQRS* are 10 meters and 4 meters, respectively, what are the length and width of rectangle *WXYZ*?

Ex6) Triangle *ABC* is similar to triangle *XYZ* with a scale factor of $\frac{2}{3}$. If the sides of ΔABC are 6, 8, and 10 inches, what are the lengths of the sides of ΔXYZ

Lesson 7-3 Similar Triangles

Two triangles are similar if their angles are the same:

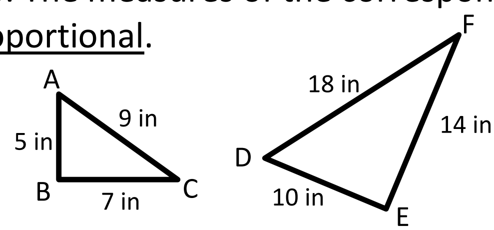


Are these triangles similar?

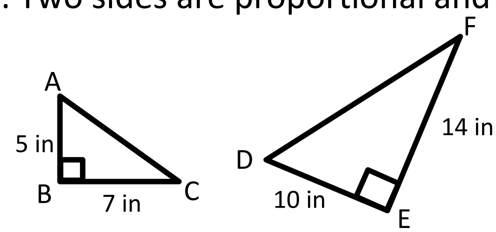
How many angles do you need to prove similarity?

Similar Triangle Tests:

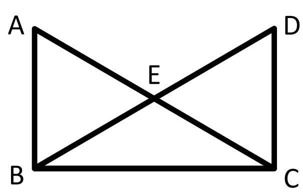
- AA: Two pairs of angles are congruent.
- SSS: The measures of the corresponding sides of two triangles are proportional.



- SAS: Two sides are proportional and the included angles are congruent.



Ex1)



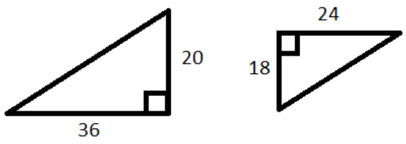
Given: AB || DC

Prove: $\Delta BAE \sim \Delta DCE$

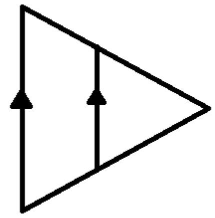
1) AB || DC	1)
2) $\angle ABE \cong \angle CDE$	2)
3) $\angle AEB \cong \angle DEC$	3)
4) $\Delta BAE \sim \Delta DCE$	4)

Ex2) Determine whether each pair of triangles is similar. Justify your answer.

a)

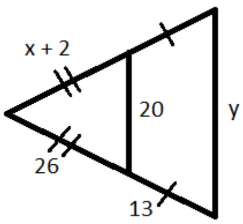


b)



Ex3) Each pair of triangles is similar. Find x and y.

a)



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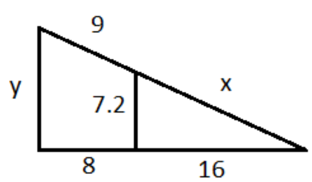
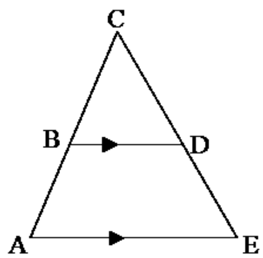


Lesson 7-4: Parallel Lines and Proportional Parts

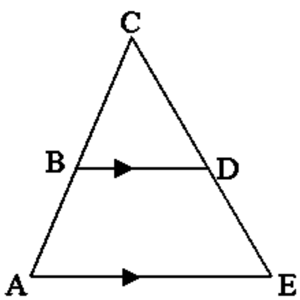
AE ∥ BD



$\Delta ACE \sim \Delta BCD$

$$\frac{BC}{AC} = \frac{CD}{CE}$$

Triangle Proportionality Theorem

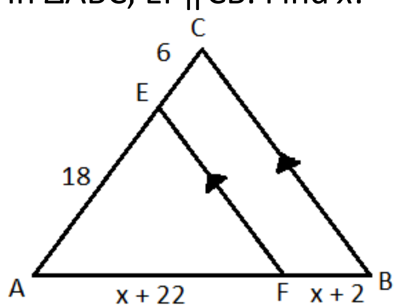


If BD ∥ AE, then

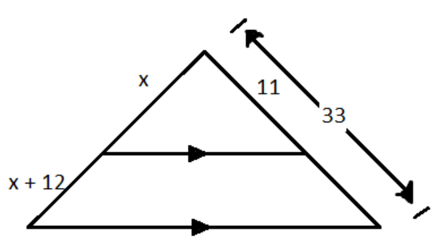
$$\frac{CB}{BA} = \frac{CD}{DE}$$

*The **converse** is also true.

Ex1) In ΔABC, EF||CB. Find *x*.

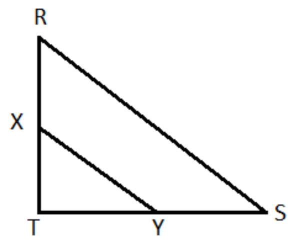


Ex2) Find *x*.



Ex3) In triangle HKM, HM = 15, HN = 10, and HJ is twice the length of JK. Determine whether NJ||MK. Explain.

If X and Y are midpoints of RT and ST, then XY is a **midsegment** of the triangle.

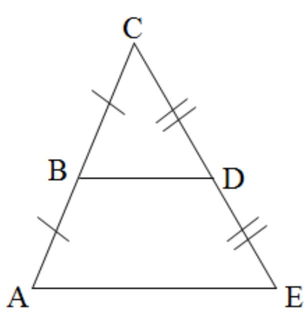


<u>Triangle Midsegment Theorem</u>: A midsegment is…

(1) parallel to the third side

(2) half the length of the 3^{rd} side.

ex4)

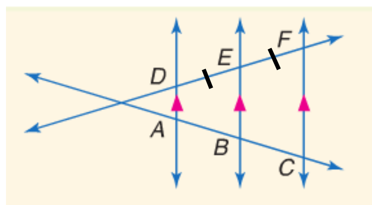


BD = 5, find AE

$\angle CBD = 55°$

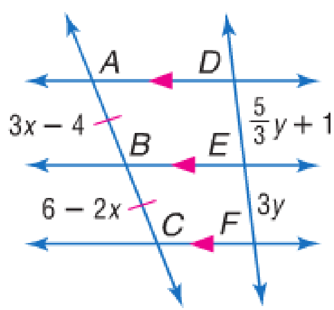
Find $\angle CAE$=

Corollary:



If three or more parallel lines cut off congruent segments On one transversal, then they cut off congruent segments on EVERY transversal.

Ex5) Find x and y.



Lesson 7.5: Parts of Similar Triangles

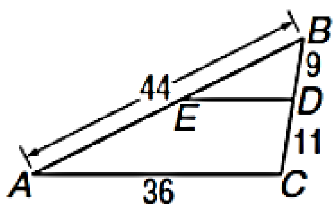
Proportional Perimeters Theorem

If two triangles are similar, then the perimeters are proportional to the corresponding sides.

If $\Delta ABD \sim \Delta RST$, then $\frac{perimeter\ of \Delta ABD}{perimeter\ of \Delta RST} = \frac{AB}{RS} = \frac{BC}{ST} = \frac{AC}{RT}$

Ex1) Using the triangles above, if AB = 5, RS = 12, ST = 35, RT = 37, find the perimeter of ΔABD.

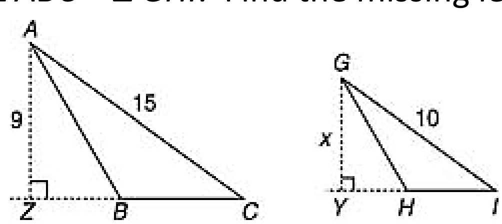
Ex2) Find the perimeter of ΔBDE



Other Special Similarity Theorems:

If two triangles are similar, their corresponding parts and perimeters are similar AND so are their **altitudes, angle bisector, and medians!**

Ex1) 3. Δ *ABC*~ Δ *GHI*. Find the missing length, *x.*



Lesson 9.5: Dilations

Earlier in the year we studies 3 types of transformations:

1)

2)

3)

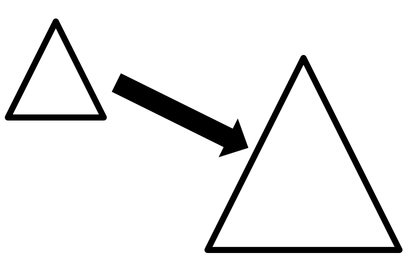
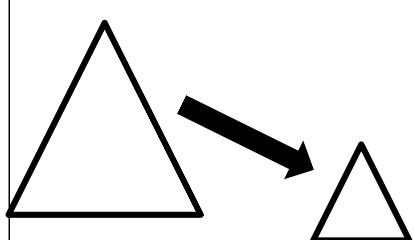
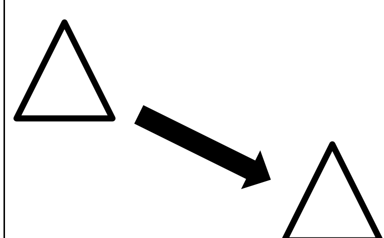
There were all **congruence transformations** because they produce images that are congruent to the original figure.

A **dilation** is a type of transformation that may change the size of the figure. In a dilation, the sides of the pre-image are multiplied by a scale factor. Dilated images are always <u>similar</u> to their pre-images so we call a dilation a **similarity transformation.**

<u>We use *r* to represent the scale factor.</u>

$$r = \frac{image}{pre-image}$$

Three types of dilations…

ENLARGEMENT	REDUCTION	CONGRUENCE TRANSFORMATION
		
$\lvert r \rvert > 1$	$\lvert r \rvert < 1$	$\lvert r \rvert = 1$
Ex) r =	Ex)r =	Ex)r =

In a dilation, the length of a segment on the preimage and the corresponding segment on the image are related as follows:

$$A'B' = |r|(AB)$$

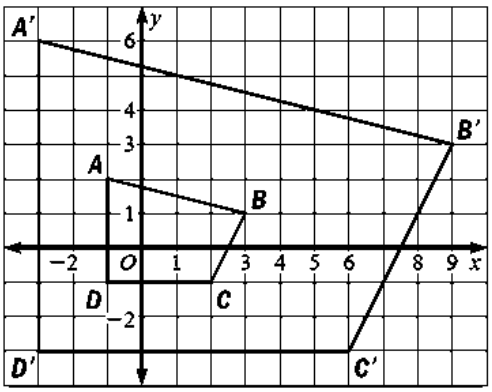
Ex 1: If AB = 12 and r = 2, then $A'B'$ = _____

Ex 2: If AB = 36 and r = -1/3 then $A'B'$ = _____

Ex 3: If $A'B'$ = 20 and r = -2 then AB = ______

Ex 4: If $A'B'$ =18 and r = 2/3 then AB = ______

Ex 5: Determine the scale factor for the dilation. Then determine whether the dilation is an *enlargement, reduction,* or *congruence transformation.*



On the coordinate plane, if P(x, y) is the pre-image of a dilation centered at the origin with a scale factor *r*, then the image is P'(   )

Ex 5: r = -3 V(-2, 4) → ___________

Ex 6: r = 2/3 U(9, -6) → ___________

Ex 7: If M(-6, 9) → M'(-2, 3) after a dilation centered at the origin, what is r? ________

Ex 8: Draw ΔQRS and its image after a dilation centered at the origin in which r = -2.

$Q(-1, -1), R(0, 2), S(2, 1)$