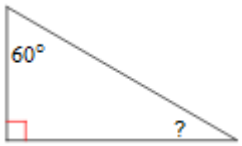
10.1 Triangle Basics

All angles in a triangle add up to _____.

1. Find the measure of each missing angle.

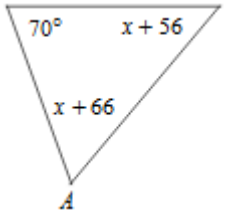
a)

b)

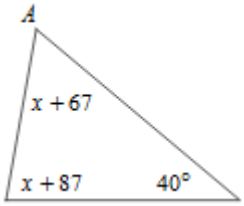


2. Find $m\angle A$

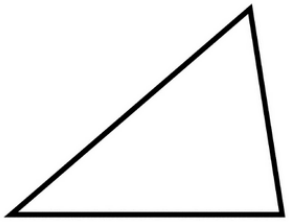
a)



c)



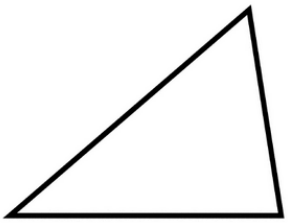
Triangle Inequality Conjecture:



3. State whether the given three numbers could be the measures of the sides of a triangle.

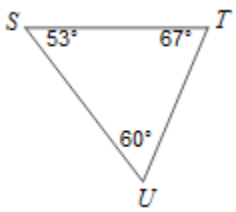
a) 4, 10, 12 b) 12, 22, 8 c) 10, 6, 17 d) 11, 7, 19 e) 9, 12, 3 f) 4, 9, 6

Side-Angle inequality Conjecture:

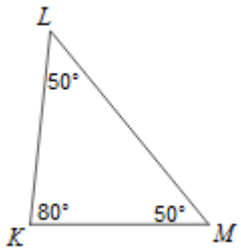


4. Order the sides of each triangle from shortest to longest:

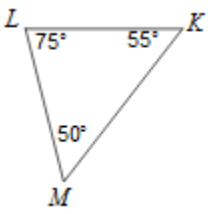
a)



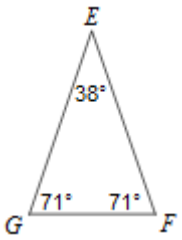
b)



c)

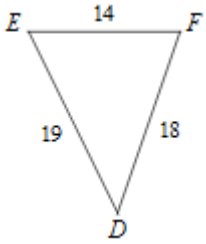


d)

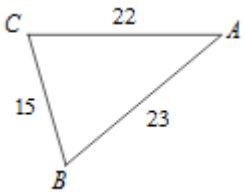


5. Order the angles in each triangle from smallest to largest.

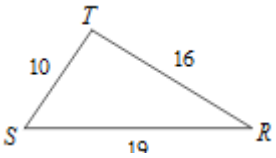
a)

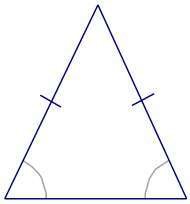
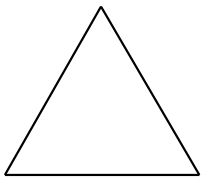


b)



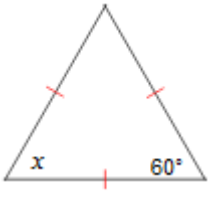
c)



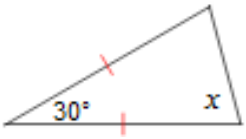
Isosceles Triangles	Equilateral Triangles
	

6. Use the properties of Equilateral and Isosceles Triangles to find the value of x in each triangle below:

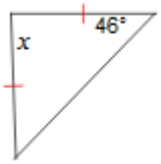
a)



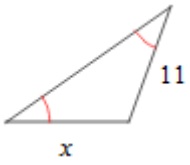
b)



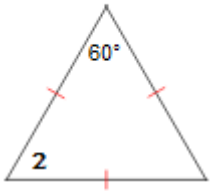
c)



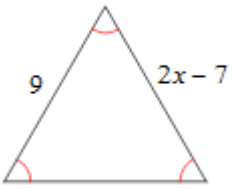
d)



e) $m\angle 2 = x + 69$



f)



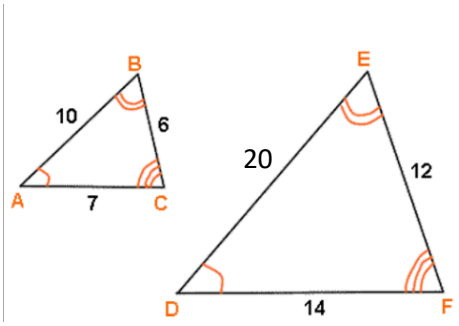
10.2 Similarity

1) Solve each proportion.

a) $\frac{8}{3} = \frac{x}{8}$ b) $\frac{2}{5} = \frac{n}{6}$ c) $\frac{6}{5} = \frac{7}{x}$ d) $\frac{8}{4} = \frac{6}{3x}$

e) $\frac{x+1}{4} = \frac{1}{12}$ f) $\frac{x-4}{2} = \frac{2x}{x-6}$

Examine the two triangles below. What are their similarities? What are their differences?

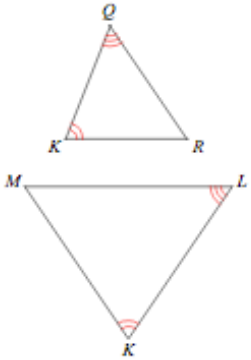


If two shapes are **similar,** then this means that _____

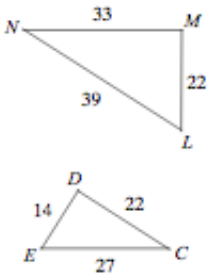
_____.

2) Identify corresponding sides and corresponding angles of each figure.

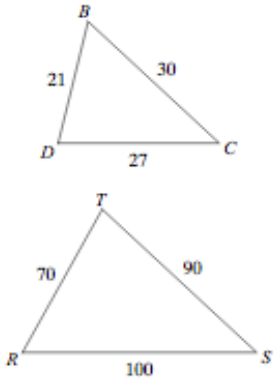
a. $\triangle KLM \sim \triangle KQR$



b. $\triangle LMN \sim \triangle EDC$

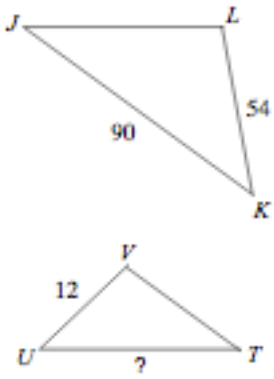


c. $\triangle RST \sim \triangle BCD$

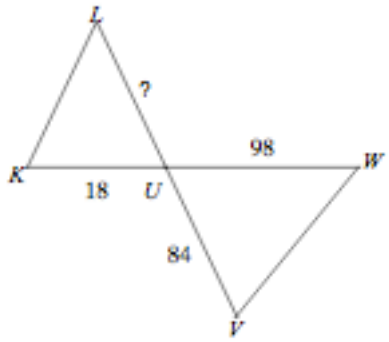


3) Given that the two figures are similar, find the missing length.

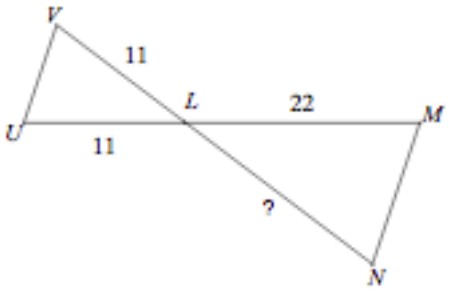
a. $\triangle JKL \sim \triangle TUV$



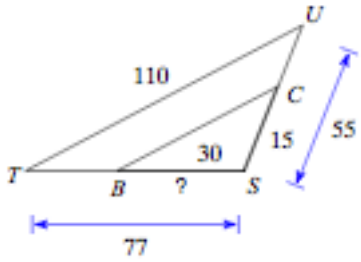
b. $\triangle UVW \sim \triangle UKL$



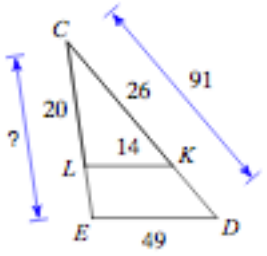
c. $\triangle LMN \sim \triangle LUV$



d.



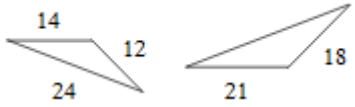
e.



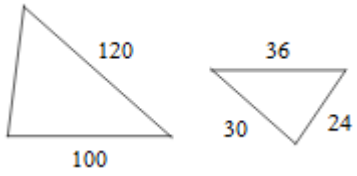
Scale Factor	
Enlargement	
Reduction	

4) The polygons in each pair are similar. Find the scale factor of the polygon on the right to the polygon on the left. Then state if it is an enlargement or a reduction.

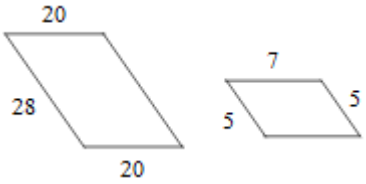
a)



b)



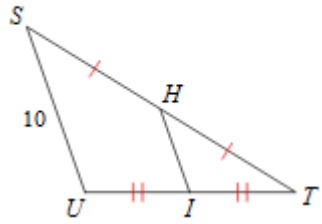
c)



5) Find the length indicated.

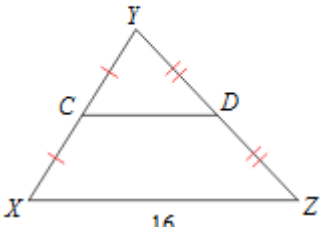
a)

Find HI



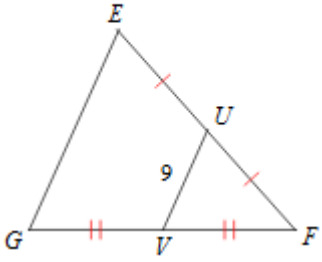
b)

Find CD



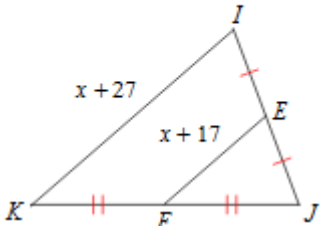
c)

Find EG



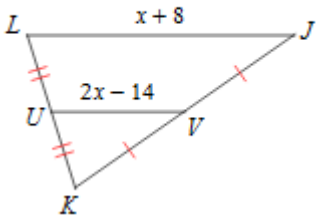
d)

Find EF



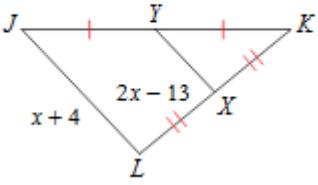
e)

Find VU



f)

Find JL

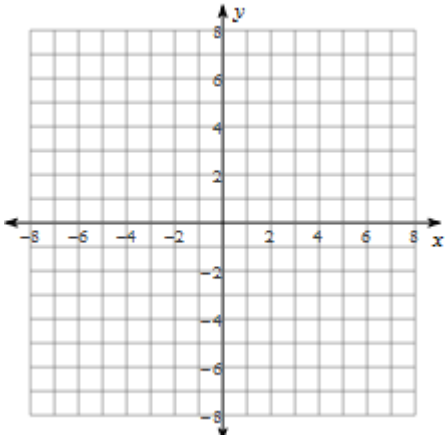


A **dilation** is a type of transformation that takes a figure and either enlarges it or reduces it based on a scale factor. The original figure is called the _____ and the figure after you have dilated is called the _____. Dilations happen around a point of dilation.

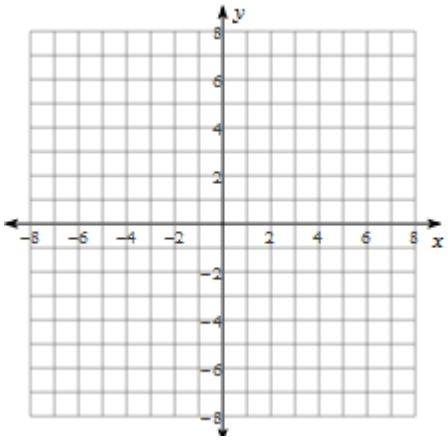
In order to perform a dilation, you can take each x and y coordinate and multiply it by the scale factor.

6) Use the origin as the center of dilation. Plot the preimage using the points given, then use the scale factor to find the coordinates of the vertices of the image, and plot them.

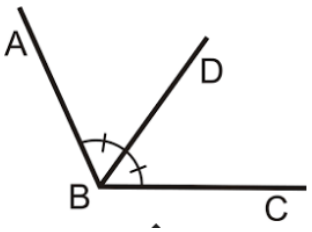
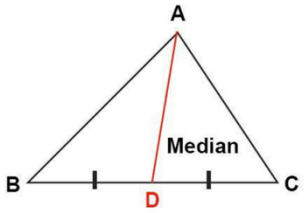
a) $M(0,4), N(3,4), L(3,0); k = 2$



b) G(2, 8), H(6, 6), I(4, 2), k(-2, 2); k=$\frac{1}{2}$



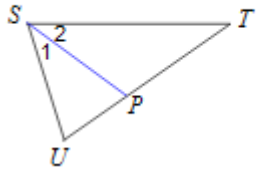
10.3 Other Similarities

Angle Bisector	Median
	

1) Find the indicated measurement given that the segment is an angle bisector.

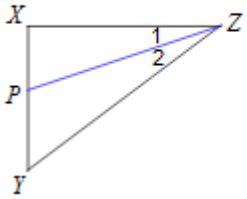
a)

Find $m\angle UST$ if $m\angle 2 = 36°$.



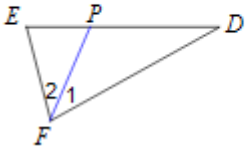
b)

$m\angle XZY = 36°$. Find $m\angle 2$.



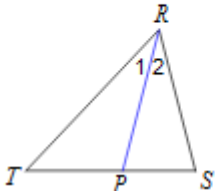
d)

Find x if $m\angle 2 = 9x + 2$ and $m\angle 1 = 8x + 6$.



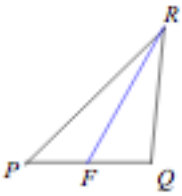
e)

$m\angle 1 = 5x + 4$ and $m\angle TRS = 11x + 3$. Find x.

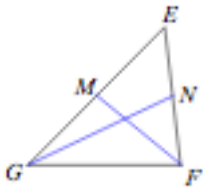


2) Find the indicated measurement given that the segment is a median.

a) Find FQ if $PQ = 10$

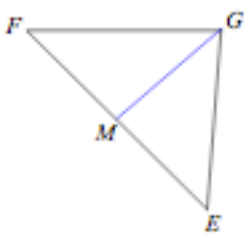


b) Find MG if $EG = 1$

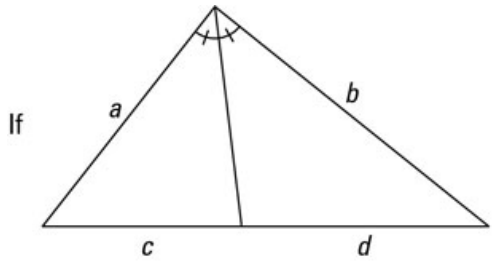


c) Find x if $GF = 2x - 1$ and $CF = \frac{x+5}{2}$

c) Find x if $FE = 2x + 4$ and $ME = 2x - 2$

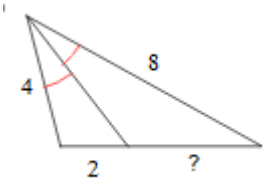


Angle Bisector Similarity: An angle bisector in a triangle divides the triangle into two similar triangles.

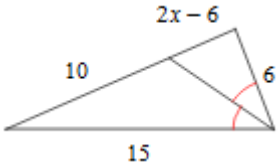


3) Find the indicated length.

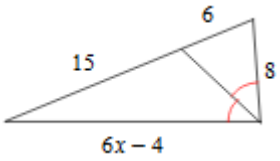
a)



b)



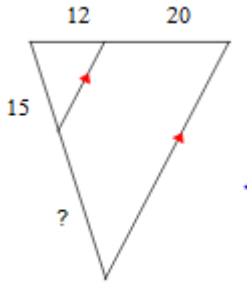
c)



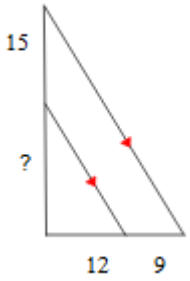
Parallel Line Similarity: A line parallel to one side of the triangle splits the triangle into two similar triangles.

3) Find the missing length indicated.

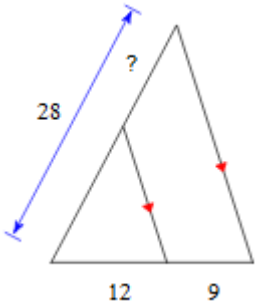
a)



b)

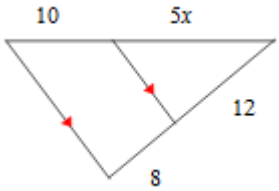


c)

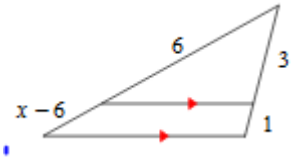


4) Solve for x.

a)



b)



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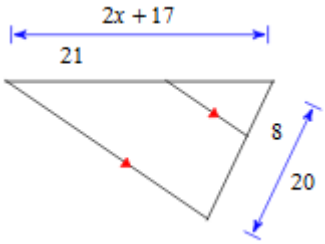
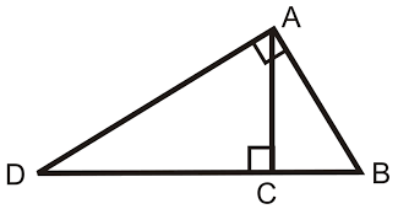
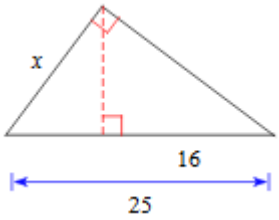


Right Triangle Similarity: The altitude (height) of a right triangle splits the triangle into a set of 3 similar triangles.

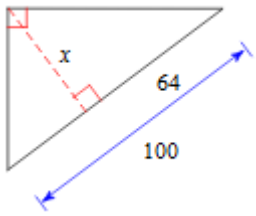


4) Find the missing length indicated.

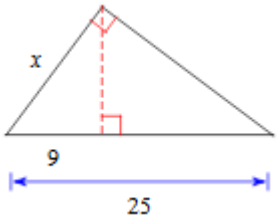
a)



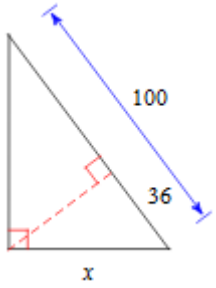
b)



c)

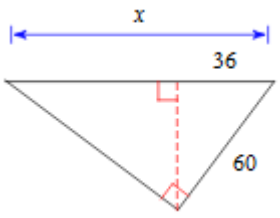


d)



e)

f)



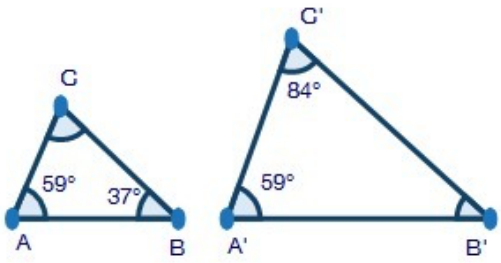
10.4 Proving Triangle Similarity

If two shapes are **similar,** then this means that _____

_____.

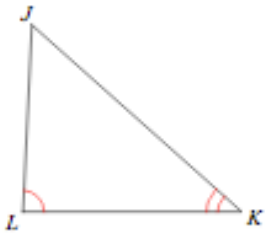
If we want to know if two triangles are similar, then we will be looking to show these two things. Luckily, we don't have to show that every single angle is congruent and that every single side is proportional to show that two shapes are similar. If we can show some of the sides are proportional and some of the angles are congruent, then we can infer that the rest of the sides and angles would follow suit.

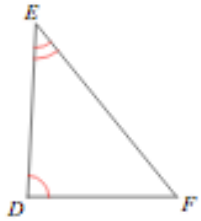
There are three different ways that we can show similarity:

Angle-Angle Similarity Theorem	I should use it when…	

1) State if the triangles are similar or not. Then complete the similarity statement.

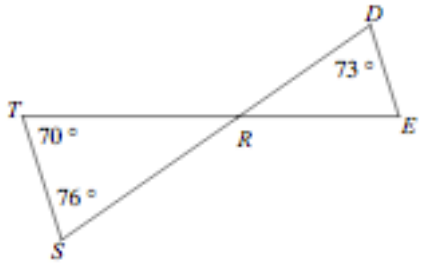
a.





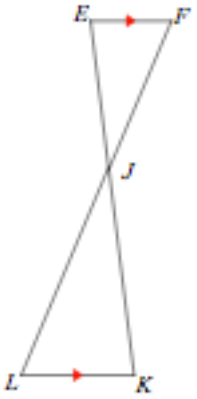
$\triangle LKJ \sim$ _____

b.

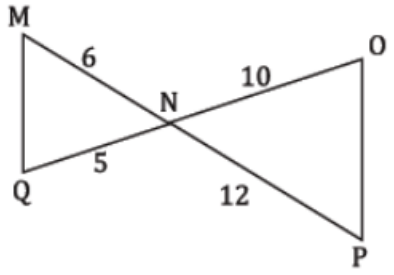


$\triangle RST \sim$ _____

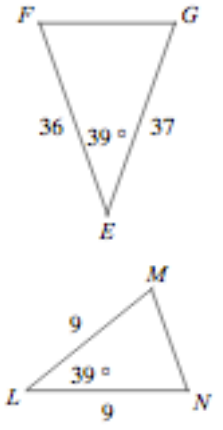
c.



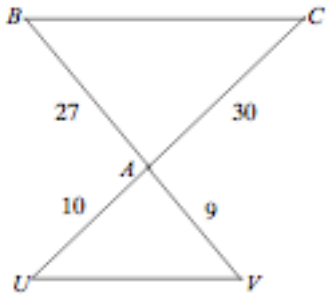
$\triangle JKL \sim$ _____

Side-Angle-Side Similarity Theorem	I should use it when…	

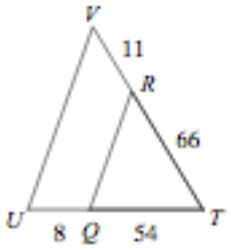
2) State if the triangles are similar or not. Then complete the similarity statement.

a. 

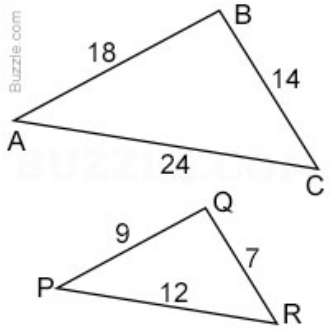
$\triangle EFG \sim$ _____

b. 

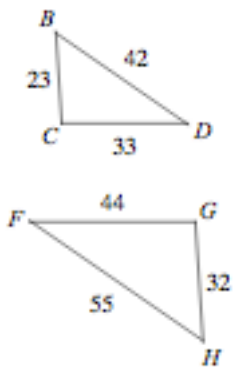
$\triangle ABC \sim$ _____

c. 

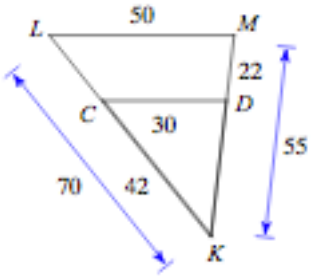
$\triangle TUV \sim$ _____

Side-Side-Side Similarity Theorem	I should use it when…	

3) State if the triangles are similar or not. Then complete the similarity statement.

a. 

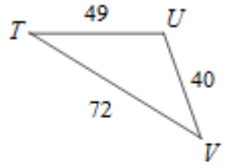
$\triangle FGH \sim$ _____

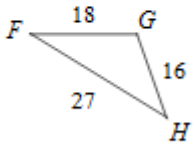
b. 

$\triangle KLM \sim$ _____

4) State if the triangles are similar or not. State how you know and complete the similarity statement.

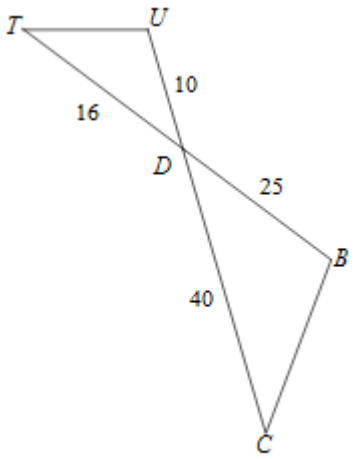
a)





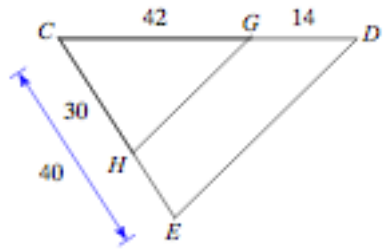
$\triangle TUV \sim$ _____

b)



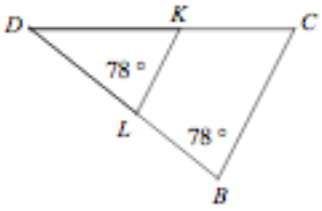
$\triangle DCB \sim$ _____

c)



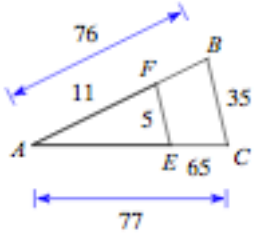
$\triangle CDE \sim$ _____

d)



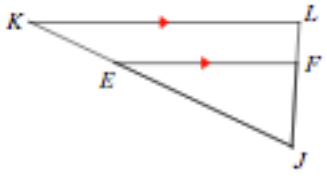
$\triangle DCB \sim$ _____

e)



$\triangle ABC \sim$ _____

f)



$\triangle JKL \sim$ _____

10.5 Two-Column Proofs and Application Problems

Two Column Proofs

Sometimes you will be asked to give a more formal proof, which is traditionally done in a two-column format. The left column is where you state what you know, and the right column is where you state how you know it.

Important Properties	
Addition or Subtraction	
Multiplication or Division	
Substitution	
Reflexive	
Commutative	
Transitive	
Vertical Angles	
Corresponding Angles	
Alternate Interior Angles	

Questions to ask yourself when writing a similarity two-column proof:

1) What do I know before I start any of the math? (This is your given information)

2) Can I show that any of the angles are congruent?

- If yes, how?

3) Can I show that the side lengths are proportional?

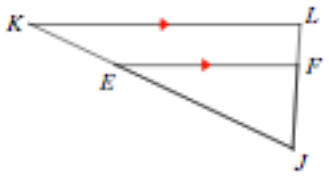
- Once you set up the fractions, what are the **names** of the sides you used?

4) What similarity theorem fits the situation? Write the similarity statement and how you know.

We are going to use the informal proofs to write two-column proofs. **Nothing different is happening than what you did in 10.4;** you are doing the same thing and then justifying each step that you took.

The first thing that you should list in any two-column proof is the _____ information.

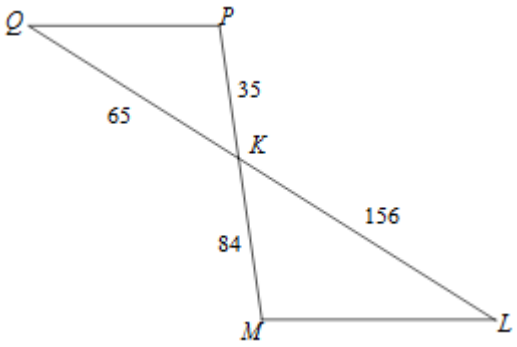
1) Prove that the two triangles are similar.



$\triangle JKL \sim$ _____

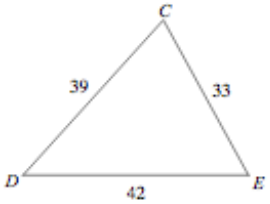
Statement	Reason

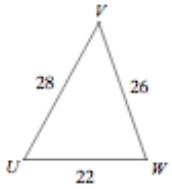
2) Prove that the two triangles are similar.



Statement	Reason

3) Prove that the two triangles are similar.





$\triangle EDC \sim$ _____

Statement	Reason

Application Problems

1) A tree 24 feet tall casts a shadow 12 feet long. Brad is 6 feet tall. How long is Brad's shadow?

2) A tree with a height of 4m casts a shadow 15 m long on the ground. How high is another tree that casts a shadow which is 20 m long?

3) A girl 160 cm tall, stands 360 cm from a lamp post at night. Her shadow is 90 cm long. How high is the lamp post?

Big idea of word problems: