NAME ____________________ SYLLABUS

Date __________ Period__________ GEOMETRY H

Unit 5 Syllabus: Similarity

Day	Topic	
1	Ratios and Proportions and Similar Polygons	
2	Proving Triangles Similar	
3	Review of Sq. Roots and Geometric Means	
4	Quiz	
5	7.4 – Similarity in Right Triangles	
6	7.5 – Proportions in Triangles	
7	Review	Review Sheets
8	Test	To Be Determined

Unit 5, Day 1: Ratio's/Proportions & Similar Polygons

1. If $\frac{x}{y}=\frac{5}{7}$, complete each statement below.

a) $\frac{y}{x}=\frac{}{}$ b) $\frac{x+y}{y}=\frac{}{}$ c) $\frac{7}{y}$ d) $7x=$

2. Solve each proportion below. Verify your answer is correct.

a) $\frac{9}{24}=\frac{12}{x}$ b) $\frac{5}{x-3}=\frac{10}{x}$ c) $\frac{3-4x}{1+5x}=\frac{1}{2+3x}$

3. A **ratio** is a ____________________________ of two quantities. Written in three ways…
   a. x to y
   b. x:y
   c. $\frac{x}{y}$, when $y\neq 0$ (why?)

4. Setting two ratios equal to each other is called a _________________________.

Form 1:

$\frac{a}{b}=\frac{c}{d}$

Form 2:

$a:b=c:d$

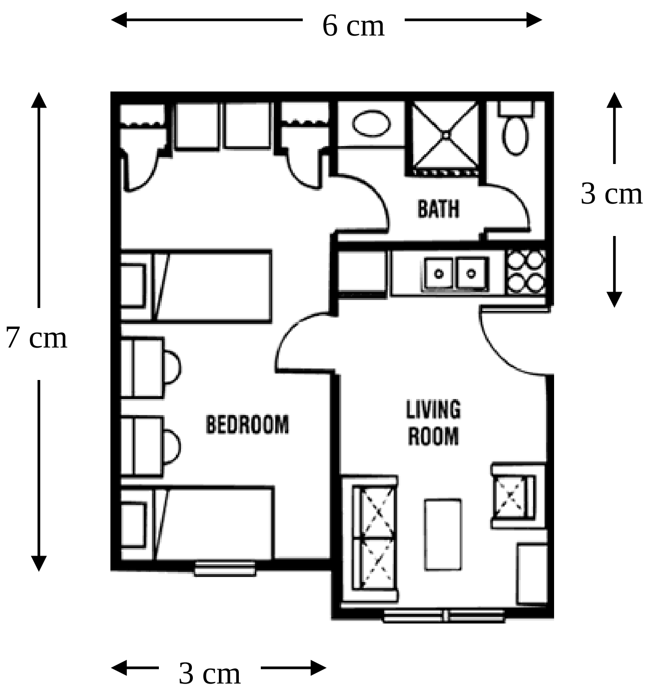
means:

extremes:

Properties: a) $ad=bc$ b) $\frac{b}{a}=\frac{d}{c}$ c) $\frac{a}{c}=\frac{b}{d}$ d) $\frac{a+b}{b}=\frac{c+d}{d}$

5. The most efficient way to solve a proportion is through ________________________________.

6. Useful applications of proportions: Floor plans, scaled drawings, and maps!

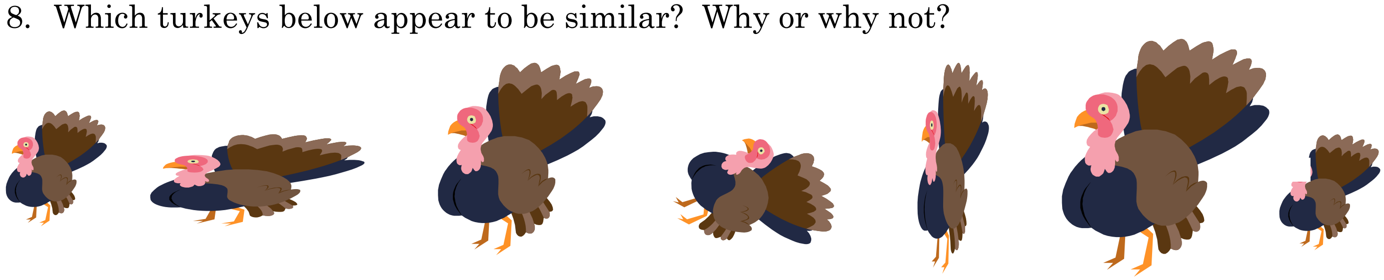


7. Figures that have the same shape, but a different size are called ______________________.

   a. _____ is the symbol for similar.

   b. $\Delta ABC \sim \Delta DEF$ is read "triangle ABC is _________________ to triangle DEF"

8. Which turkeys below appear to be similar? Why or why not?



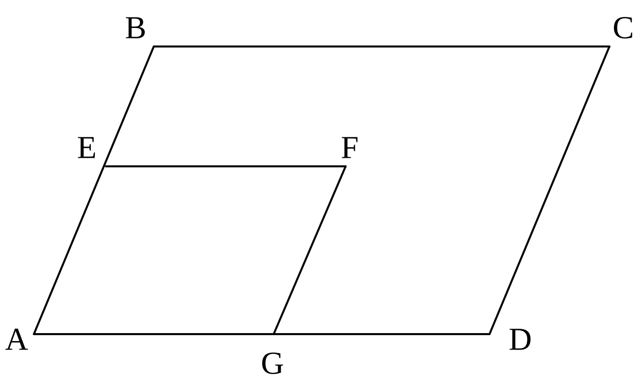
9. Two polygons are similar if two conditions are met:

   a. Corresponding angles are __________________________.

   b. Corresponding sides are ___________________________.

10. In the space below, compare and contrast the words "congruent" and "similar."

11. The two figures shown below are similar. Complete congruence and proportion statements below.



a) $\angle F \cong$ _____

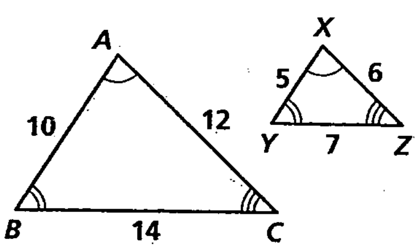
b) $\angle D \cong$ _____

c) $\dfrac{EF}{BC} = \dfrac{AE}{\quad}$

d) $\dfrac{AG}{FG} = \dfrac{\quad}{CD}$

12. <u>Directions</u>: Determine if the following figures are similar. If they are, write a similarity statement and give the similarity ratio. If they are not, explain why.

1.



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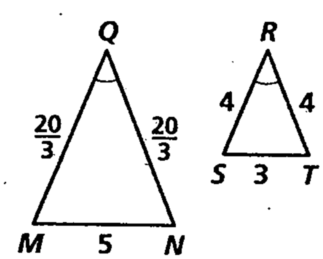

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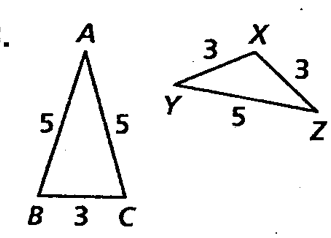

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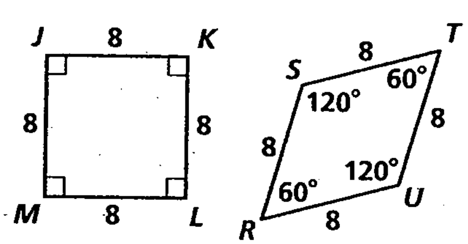
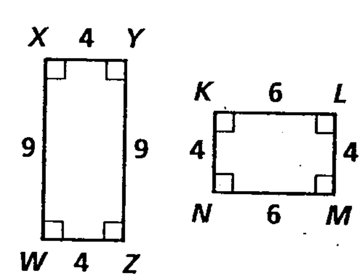
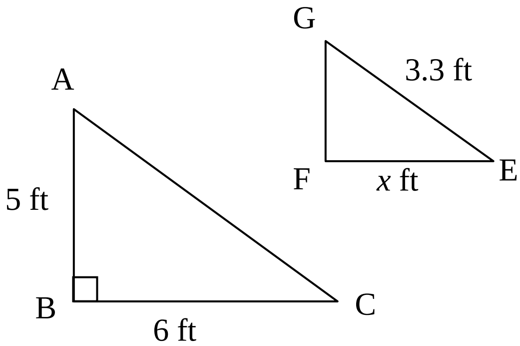
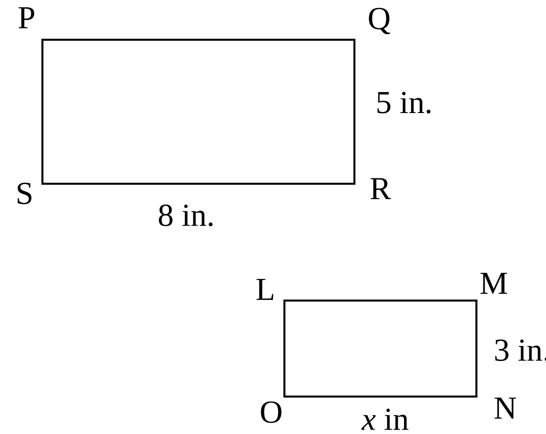


5.



<u>Directions</u>: Each pair of polygons below is similar. Find the values of the variables.





Closure:

1) A student made a drawing on a normal 8.5 x 11 sheet of paper. He wanted to "blow it up" to poster size – he decided that he would enlarge the picture by 5 times. Determine the size of side lengths and angles of the poster.

2) Use the example above to make a generalization about how enlarging (or shrinking) an image will affect the side lengths and the angles…

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NOTES

GEOMETRY H

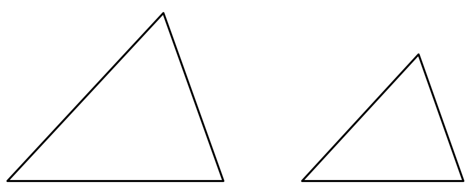
Unit 5, Day 2: Proving Triangles Similar (S. 7-3, p. 382)

13. Name the 5 ways ("shortcuts") that we learned to prove that triangles are **congruent**.

14. Name both conditions that must be met in order to prove that two polygons are **similar**.

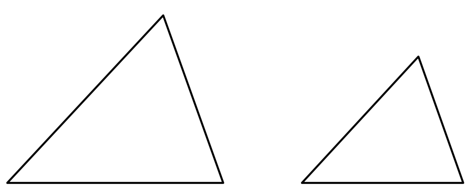
15. Just like we had "shortcuts" for congruence, we have "shortcuts" for similarity.

a. **Angle-Angle Similarity Postulate (AA ~)**: If two angles of one triangle are similar to two angles of another triangle, then the triangles are similar

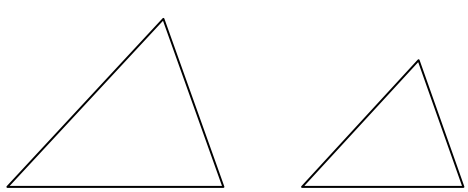


Why are two angles sufficient (not all 3)?

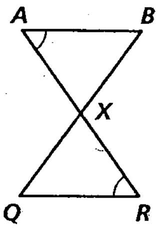
b. **Side-Angle-Side Similarity Theorem (SAS ~):** If an angle of one triangle is congruent to an angle of another triangle and two ________________________ sides are proportional, then the triangles are similar.

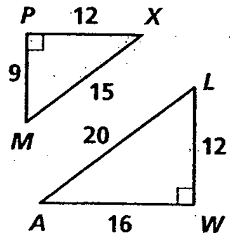


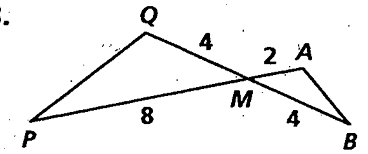
c. **Side-Side-Side Similarity Theorem (SSS ~):** If the corresponding sides of two triangles are ________________________, then the triangles are similar.

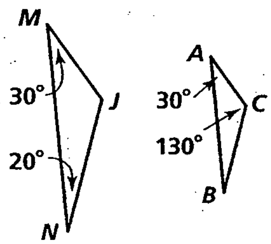


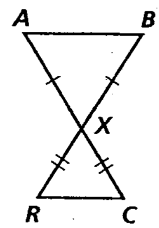
Directions: Determine if the triangles are similar. If they are, determine which postulate or theorem you would use to prove them similar.

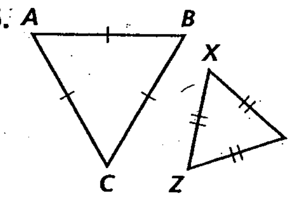
1. 

2. 

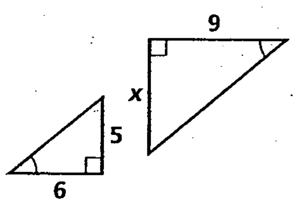
3. 

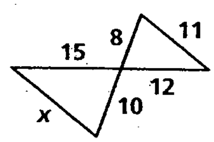
4. 

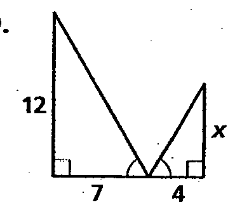
5. 

6. 

Directions: Solve for x

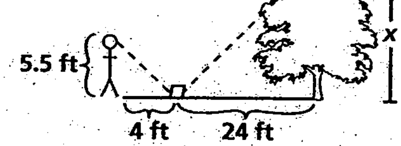
7. 

8. 

9. 

INDIRECT MEASUREMENT

13. Natasha places a mirror on the ground 24 ft from the base of an oak tree. She walks backward until she can see the top of the tree in the middle of the mirror. At that point, Natasha's eyes are 5.5 ft above the ground, and her feet are 4 ft from the image in the mirror. Find the height of the oak tree.



Wrap Up What are the three ways to prove that two triangles are similar?

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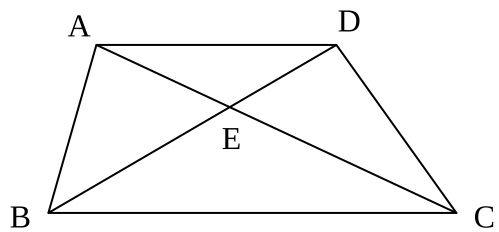
HOMEWORK!

GEOMETRY H

Unit 5, Day 2: Worksheet 7-3 (Note: there is also book work!)

1. **Given**: $ABCD$ is a trapezoid **Prove**: $\Delta AED \sim \Delta CEB$

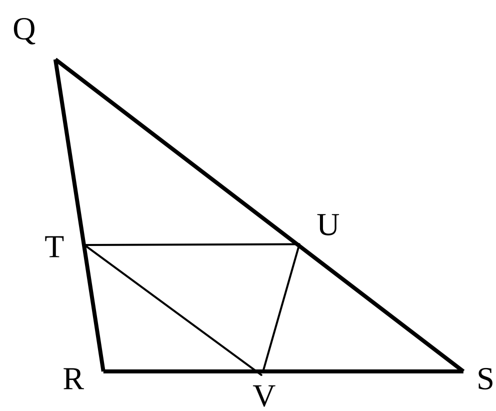


2. Given: T is the midpoint of $\overline{QR}$

U is the midpoint of $\overline{QS}$

V is the midpoint of $\overline{RS}$

Prove: $\Delta QRS \sim \Delta VUT$



Unit 5, Day 3: Square Roots & The Geometric Mean

18. Simplify each square root below (do NOT approximate!)

a) $\sqrt{9}$ b) $\sqrt{16}$ c) $\sqrt{8}$ d) $\sqrt{12}$

e) $\sqrt{18}$ f) $\sqrt{40}$ g) $\sqrt{10}$ h) $\sqrt{50}$

19. Solve for x in each proportion below. Assume x is always positive.

a) $\frac{3}{x} = \frac{x}{12}$ b) $\frac{5}{x} = \frac{x}{10}$ c) $\frac{32}{x} = \frac{x}{2}$ d) $\frac{8}{x} = \frac{x}{2}$

20. During day 1 we looked at proportions: What are the means and the extremes?

a. A proportion where the <u>means</u> are the same occur frequently in geometry. For any two positive numbers a and b, the geometric mean of a and b is…

21. Find the geometric mean of the numbers below. Simplify but do not approximate.

a. 8 and 2 b. 8 and 5 c. 3 and 12

22. The geometric mean of two numbers is 6. One of the numbers is 9, what is the other?

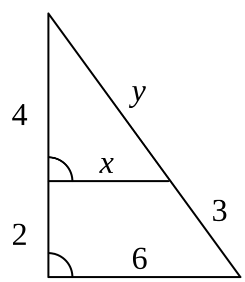
23. The geometric mean of two numbers is $5\sqrt{3}$. One of the numbers is 5, what is the other?

Quiz Review: Unit 5, Days 1, 2, and 3!

1. If $\frac{a}{b} = \frac{5}{6}$, find each of the following:

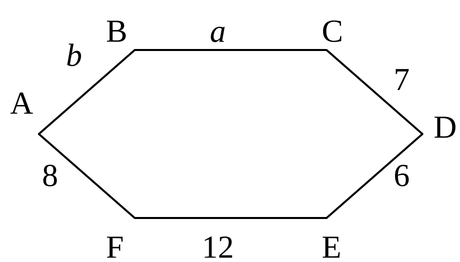
   a. $\frac{a+b}{b}$ b. $\frac{6}{5}$ c. $6a$

2. Find x and y in the figure below. (Hint: You might want to redraw the two triangles).



3. Review the proofs from the worksheet 7-3 homework.

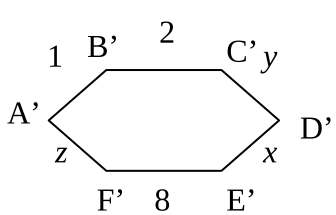
4. Use the two figures below to find the information to the right. Figure not to scale!



The scale factor is ________________.

$a =$ ____________ $b =$ ____________

$x =$ _________ $y =$ _________ $z =$ _________

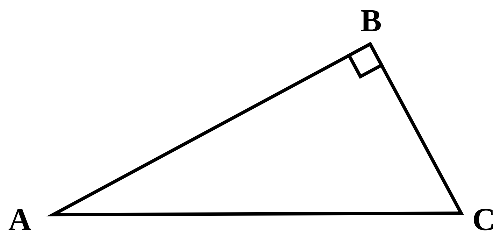


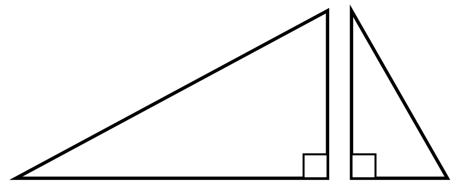
Perimeters: ABCDE = ____________

A’B’C’D’E = ____________

Unit 5, Day 5: Similarity in Right Triangles

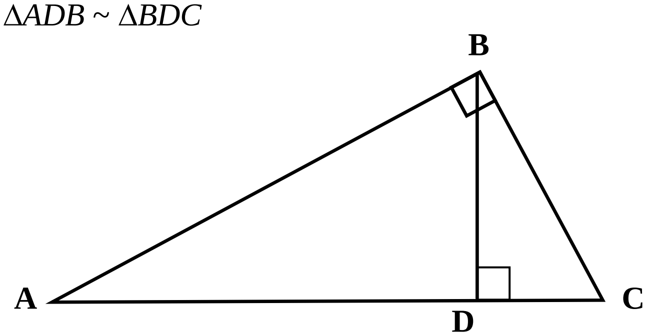
24. Look at ΔABC below. Draw the altitude to the hypotenuse. How many Δ's are there now?





25. Given: Right ΔABC with $\overline{BD}$ as the altitude to the hypotenuse, as drawn.

Prove: $\Delta ABC \sim \Delta ADB \sim \Delta BDC$



$\Delta ABC \sim \Delta ADB$	$\Delta ABC \sim \Delta BDC$	$\Delta ADB \sim \Delta BDC$

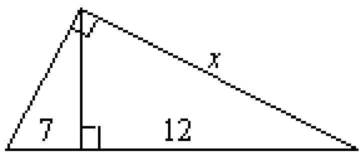
Remember, once two triangles are similar, their sides are all proportional.

Directions: Redraw the similar triangles and write a proportion to find the variables.

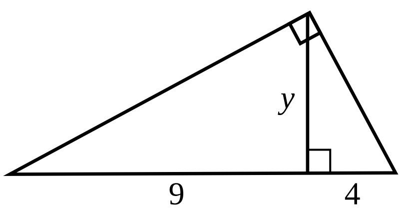
Hint: Use the words S.L. (short leg), L.L. (long leg), and H (hypotenuse)

Decide which triangles to use (left, right, or whole).

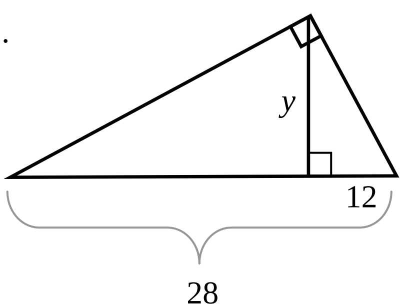
1.



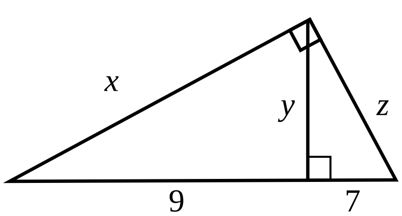
2.



3.



4.



Closure: Describe the similar triangles that are created from drawing altitude to hypotenuse.

NAME ____________________ **NOTES**

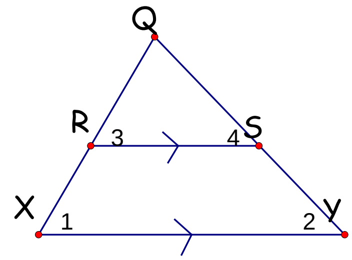
Date __________ Period__________ GEOMETRY H

Unit 5, Day 6: Proportions in Triangles (S 7-5, p. 398)

1. **Side-Splitter Theorem:** If a line is ______________ to one side of a triangle and intersects the other two sides, then it divides those sides ____________________.

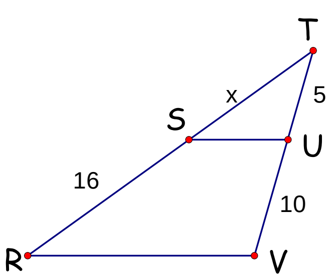
Given: ΔQXY *with* $\overleftrightarrow{RS} \parallel \overleftrightarrow{XY}$

Prove: $\dfrac{XR}{RQ} = \dfrac{YS}{SQ}$

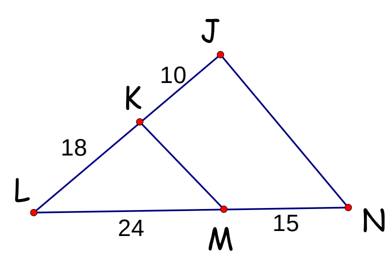


Statements	Reasons
1.	1.
2.	2. Corresponding Angles Postulate
3. $\Delta QXY \sim \Delta QRS$	3.
4. $\dfrac{XQ}{RQ} = \dfrac{YQ}{SQ}$	4.
5.	5. Segment Addition Postulate
6.	6. Substitution
7.	7. A Property of Proportions

Example #1: Find the value of *x*.



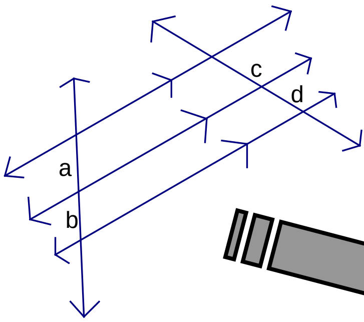
Example #2: Determine whether $\overline{KM} \parallel \overline{JN}$

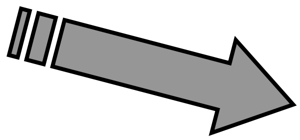


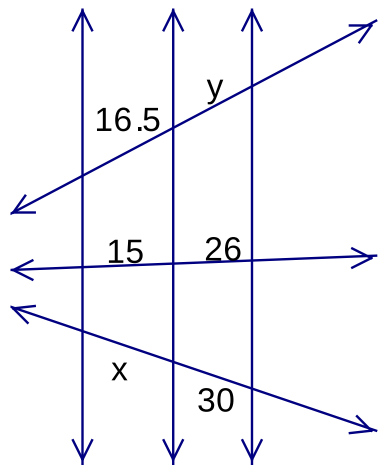
2. Corollary to Side-Splitter Theorem

If three parallel lines intersect two transversals, then the segments intercepted on the transversals are ______________________.

Example #3: Solve for x and y

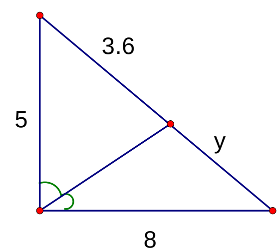






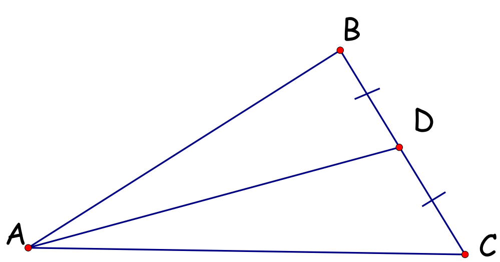
3. **Triangle-Angle-Bisector Theorem:** If a ray bisects an angle of a triangle, then it divides the opposite side into two segments that are proportional to the other two sides of the triangle.

Example #4: Find the value of *y*.



4. A student claims that $AB = AC$ below. Describe and correct the student's error.

"By Triangle angle bisector theorem $\frac{BD}{CD} = \frac{AB}{AC}$. Because BD=CD, it follows that AB=AC."



Closure:

Compare the Midsegment Theorem (from unit 4) and the Side-Splitter Theorem.

How are they related and how are they different?

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HOMEWORK!

GEOMETRY H

Unit 5, Day 7: Unit 5 Review

1. Find the value of x.

a. $\frac{4}{x} = \frac{2}{7}$

b. $x:3 = 12:4$

c. $\frac{x+3}{2} = \frac{2x-1}{3}$

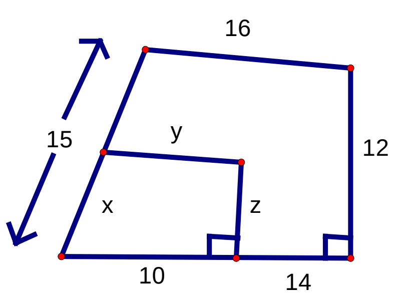
2. Complete each statement below:

a. If $3x = 8y$, then $\frac{x}{y} = \frac{?}{?}$

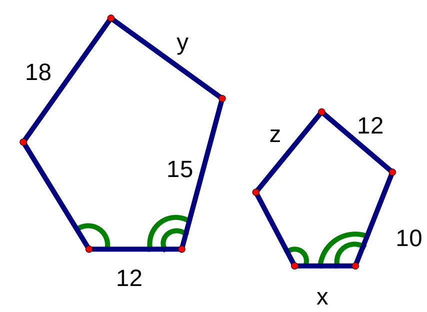
b. If $\frac{a}{7} = \frac{b}{13}$, then $\frac{a}{b} = \frac{?}{?}$

3. Assume the figures below are similar. Find the missing values.

a.

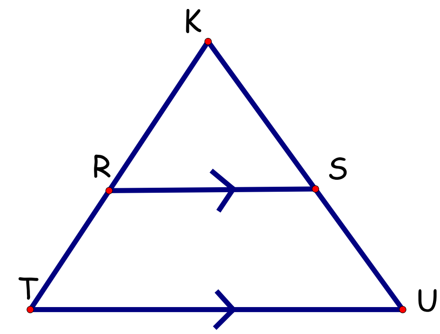


b.



4. Find the geometric mean between 16 and 25

5. Use the diagram for the following (these are 3 separate problems):

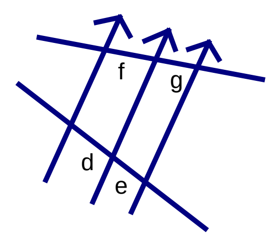


a. KR=12, RT=9, KS=16. Find KT, SU, and KU

b. RT=2, KS=9, and KU=12. Find KR, KT, and SU.

c. RT=9, KT=36, and KU=48. Find KR, KS, and SU.

6. Tell whether the proportion is correct for the diagram shown. If its false, explain why!



a. $\frac{d}{f} = \frac{g}{e}$

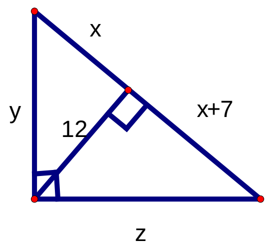
b. $\frac{f}{g} = \frac{e}{d}$

c. $\frac{g}{f} = \frac{e}{d}$

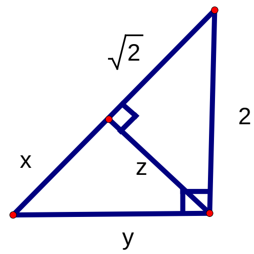
d. $\frac{d}{f} = \frac{e}{g}$

7. Determine which triangles you need to use (left, right or whole), then show all proportions and solve for each variable

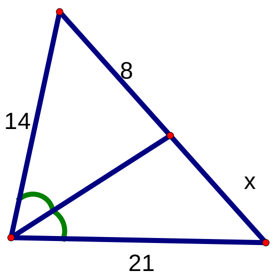
a.



b.



8.



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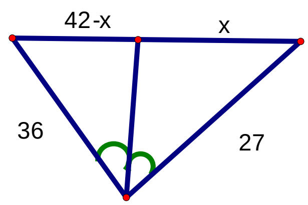
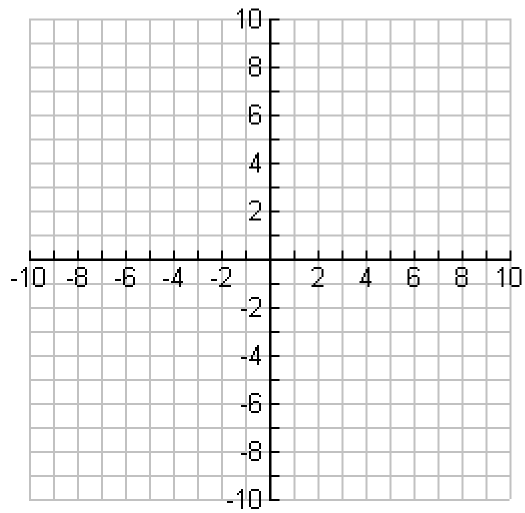


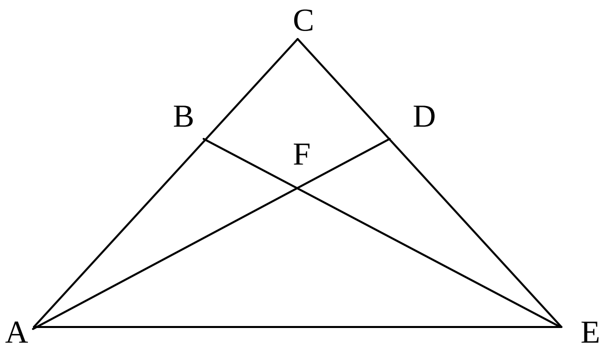
10. Graph $\triangle ABC$ *and* $\triangle TBS$ with vertices A(-2,-8), B(4,4), C(-2,7), T(0,-4) , and S(0,6).

Prove: $\triangle ABC \sim \triangle TBS$

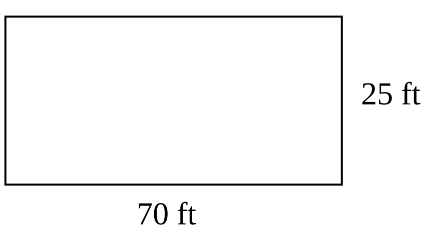


11. Given: ΔACE and ΔAFE are both isosceles triangles with base AE

Prove: $\Delta ABF \sim \Delta EDF$

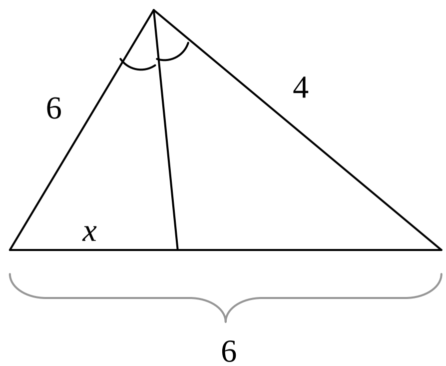


12 . For the rectangle below, find the ratio of the smaller side to the larger side. Then draw another similar rectangle that is created using a **scale factor** of one-half.

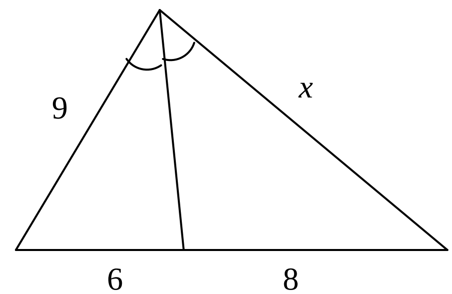


13. Solve for the variables in the problems below.

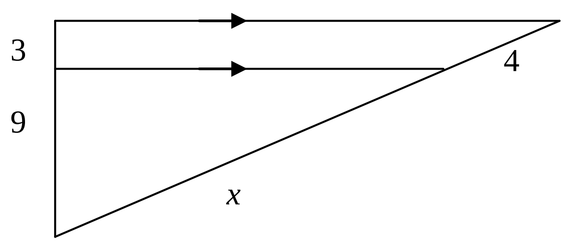
a)



b)



c)



d)