Chapter 7 Notetaking Guide

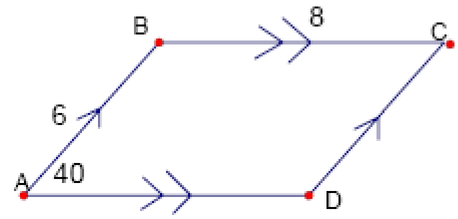
Notes 1: Ratios, Proportions, Similar Triangles

Ratios: Comparing numbers with division

- Ratios are like _____________.
- The ratio 1:4 means ___ part to __________
  and is equivalent to the fraction __________
  (because there are ___ parts altogether)

1.) Find each ratio. Express as ratio (a : b) and as a fraction in lowest terms.

a) AD : DC



b) m<A : m<D

c) AD : Perimeter of ABCD

2.) If x = 5, y = 10, and z = 3, find each ratio:

a) x to y   b) (x + z) to y   c) $\frac{x+y}{7z}$

Ratio Word Problems:

- attach an x to each part of the ratio
- write and solve an equation using the expression

3. The ratio of two complementary angles is 1 : 2. Find each angle.

4. The ratio of two supplementary angles is 4:1. Find each angle.

5. The ratio of the angles of a triangle is 2 : 3 : 7. Find each angle.

A. Solving Proportions

- Cross-multiply and set the products equal to each other
- Be sure to use FOIL when you are multiplying binomials together
- Solve for the variable

Solve for *x*:

1.) $\frac{2}{x}=\frac{3}{12}$

2.) $\frac{x}{3}=\frac{7}{5}$

3.) $\frac{x+3}{2}=\frac{4}{3}$

4.) $\frac{x+1}{2x-3}=\frac{x+5}{2x}$

B. Properties of Proportions

Complete:

5.) If $\frac{x}{2}=\frac{3}{7}$, then $7x=$ _____

6.) If $\frac{5}{x}=\frac{3}{2}$, then $3x=$ _____

7.) If $a:2=5:3$, then $3a=$ _____

8.) If $\frac{x}{y}=\frac{2}{9}$, then $\frac{y}{x}=$ _____

9.) If $\frac{x}{5}=\frac{y}{2}$, then $\frac{x}{y}=$ _____

10.) If $\frac{x}{3}=\frac{y}{4}$, then $\frac{x+3}{3}=$ _____

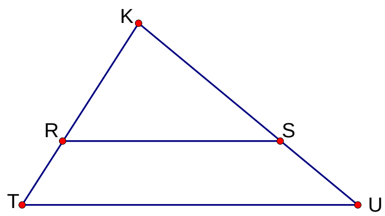
11.) For the given figure, it is given that: $\frac{KR}{RT} = \frac{KS}{SU}$. Solve for the missing lengths.

$KR = 6$, $KT = 10$, $KS = 8$

$RT =$ ____

$SU =$ ____

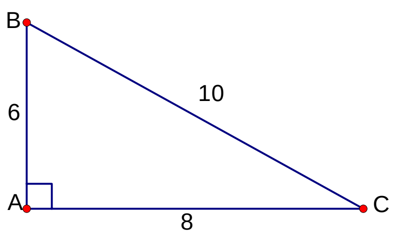
$KU =$ ____

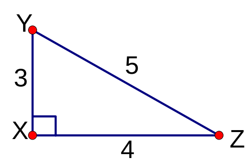


C. Similar Polygons

Similar polygons have the same _________ but not necessarily the same ________.

<u>Example of similar triangles</u>:





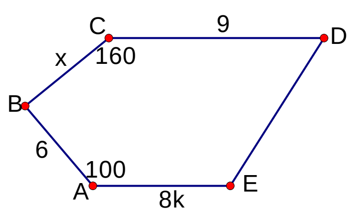
- Their corresponding angles are ____________________
- Their corresponding sides are in a _______________ _________________________
- This ratio is called a _____________ _______________ and in this case is _______
- We show that they are similar with this statement: ____________________

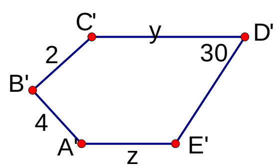
12.) $ABCDE \sim A'B'C'D'E'$

a) scale factor = _______

b) $m\angle A' =$ _____ , $m\angle D =$ _____
$m\angle C' =$ _____

c) $x =$ _____, $y =$ ______, $z =$ ______





<u>The figures are similar. Solve for the variables. (Hint: redraw the diagram as two figures)</u>

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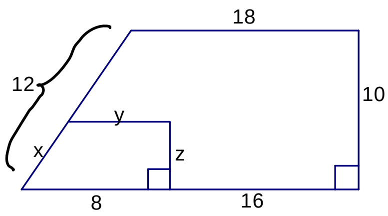

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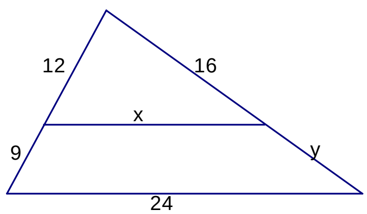


D. Algebra Practice: Reducing Irrational Numbers (radicals)

15.) $\sqrt{16}$

16.) $\sqrt{50}$

17.) $2\sqrt{48}$

18.) $5\sqrt{200}$

19.) $-6\sqrt{32}$

20.) $8\sqrt{120}$

<u>Solve for *x*, where *x* is positive:</u>

21.) $x^2 = 54$

22.) $x^2 + 9 = 25$

23.) $(2x)^2 + 8 = 120$

Notes #2: Similar Triangles (Sections 7.4 and 7.5)

Similar triangles have:

- _________________ corresponding angles
- sides that are in ___________________ ________________________

You can conclude that two triangles are similar if:

_________: two pairs of corresponding angles are congruent

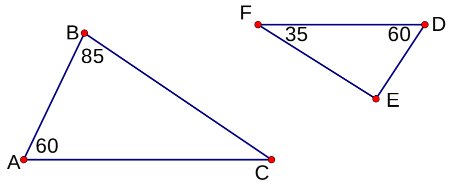
_________: all three pairs of sides are in the same proportion

_________: two pairs of sides are the same proportion and their *included* angles are congruent

<u>Are the triangles similar? If so, state the similarity and the postulate you used.</u>

- Re-draw the triangles in matching positions
- Mark congruent angles
- Test sides for a constant proportion: $\frac{small}{small} = \frac{medium}{medium} = \frac{large}{large}$
- Look for these patterns: AA~, SSS~, SAS~

1.)



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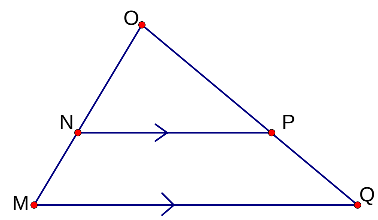

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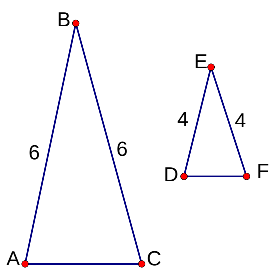

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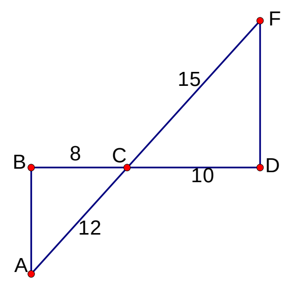

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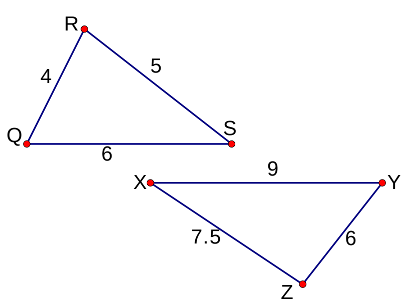

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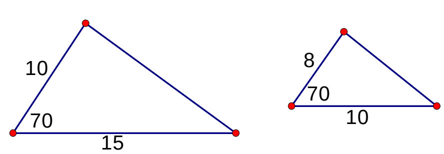


State whether the figures are *always*, *sometimes*, or *never* similar:

- do they *always, sometimes*, or *never* have the exact same shape?

7.) two squares

8.) two congruent triangles

9.) two rectangles

10.) two rhombuses

11.) two pentagons

12.) two regular octagons

Algebra Practice: Multiplying and Dividing Irrational Numbers

13.) $\left(2\sqrt{3}\right)\left(3\sqrt{6}\right)$

14.) $\left(4\sqrt{2}\right)\left(-5\sqrt{10}\right)$

15.) $\left(-2\sqrt{12}\right)\left(-3\sqrt{6}\right)$

16.) $\left(3\sqrt{8}\right)^2$

17.) $\left(-2\sqrt{5}\right)^2$

18.) $\frac{4\sqrt{6}}{2\sqrt{3}}$

19.) $\frac{12\sqrt{5}}{\sqrt{3}}$

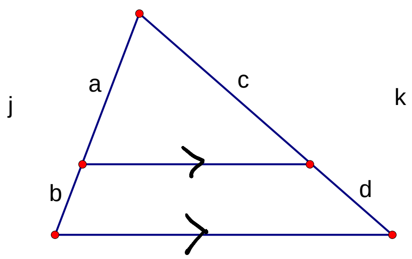
20.) $\frac{2}{\sqrt{6}}$

21.) $\frac{2\sqrt{3}}{\sqrt{2}}$

Notes #3: Proportional Lengths (Section 7.5)

A. Triangle Proportionality

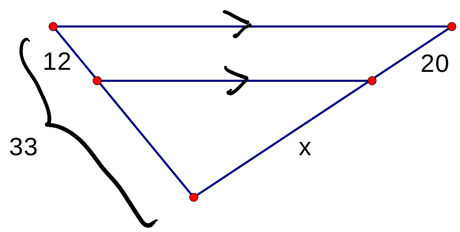
- **A parallel slice cuts a triangle's sides proportionally**



$\frac{a}{b} = \underline{\quad\quad}$, $\frac{a}{c} = \underline{\quad\quad}$ $\frac{d}{k} = \underline{\quad\quad}$, $\frac{j}{b} = \underline{\quad\quad}$

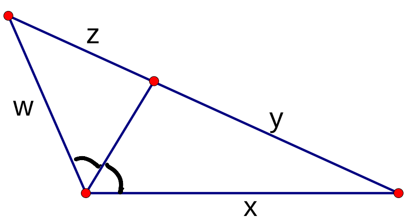
$\frac{a}{c} = \underline{\quad\quad}$, $\frac{a}{j} = \underline{\quad\quad}$

Example: Solve for x



B. Angle Bisector Proportionality

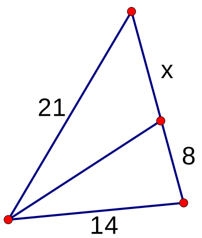
- **An angle bisector proportionally divides the opposite side**



$\frac{z}{y} = \underline{\quad\quad}$ $\frac{w}{z} = \underline{\quad\quad}$

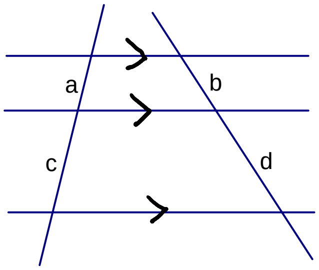
$\frac{x}{w} = \underline{\quad\quad}$

Example: Solve for x:



C. Parallel Line Proportionality

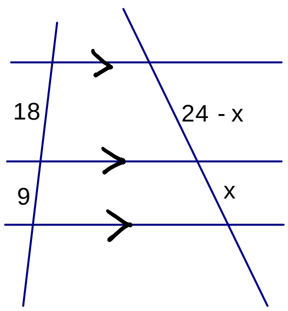
- **Parallel lines proportionally divide their transversals**



$\frac{a}{b} = \underline{\qquad}$ $\frac{a}{c} = \underline{\qquad}$

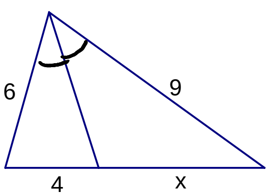
$\frac{d}{c} = \underline{\qquad}$

Example: Solve for x:

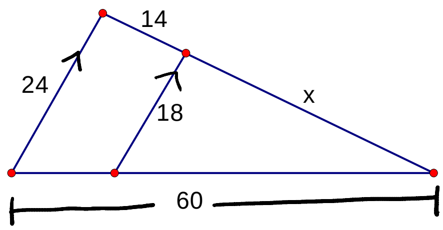


Solve for the variables:

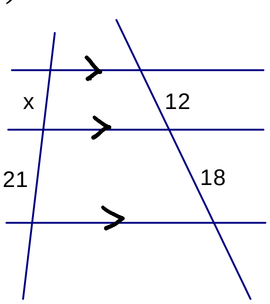
1.)



2.)



3.)



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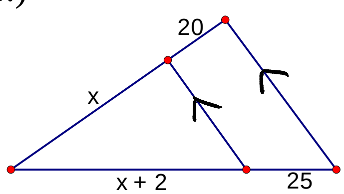

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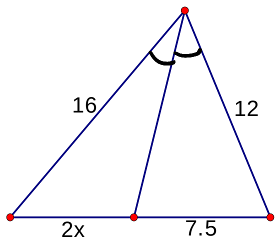

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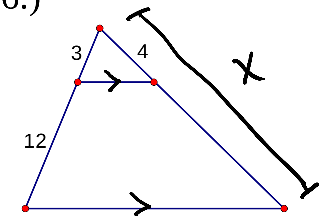


<u>Algebra Practice:</u> Adding and Subtracting Irrational Numbers

- Reduce all radicals
- Add like terms only

7.) $2\sqrt{5}+8\sqrt{5}$

8.) $-6\sqrt{8}+\sqrt{8}$

9.) $-2\sqrt{12}+5\sqrt{3}$

10.) $7\sqrt{18}-9\sqrt{2}$

11.) $4\sqrt{2}-6\sqrt{5}+9\sqrt{8}+7\sqrt{45}$

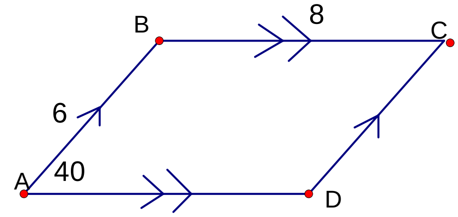
12.) $-7\sqrt{12}+3\sqrt{32}-\sqrt{8}+2\sqrt{300}$

13.) $-\sqrt{48}-8\sqrt{12}+5\sqrt{24}-2\sqrt{54}$

Classwork #4: Chapter 7 Review

Simplify each ratio:

1.) a) BC:CD b) m<B:m<C



c) CD: Perimeter of ABCD

2.) If x = 4, y = 6, z = 2 find each ratio:

a) x to y b) (x + z) to y c) $\frac{x+y}{7z}$

3.) $\frac{6a^2b^5}{12ab^7}$

4.) $\frac{2x+y}{z-x}$ for $x=-3, y=2, z=-1$

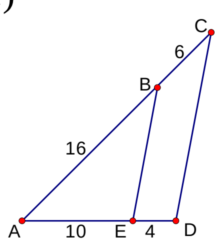
Write and equation and solve:

4.) The ratio of the angles of a triangle is 1:3:5. Find the angles.

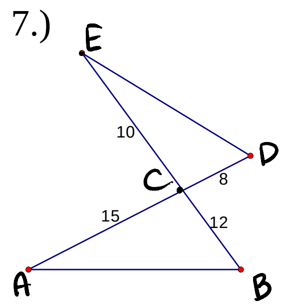
5.) The ratio of the angles of a pentagon is 6: 8: 9: 11: 11. Find the angles.

Are the triangles similar? If so, write a similarity statement and the postulate you used:

6.)



7.)



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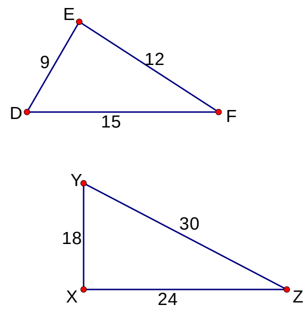

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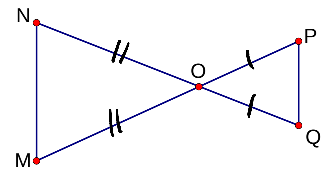
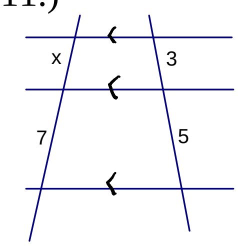


Solve for the variables:

10.) $\dfrac{x+1}{x+3}=\dfrac{x+4}{x+8}$

11.)



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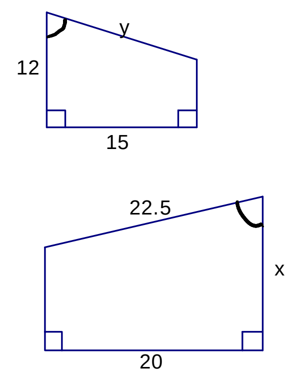

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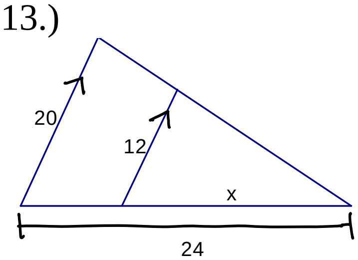

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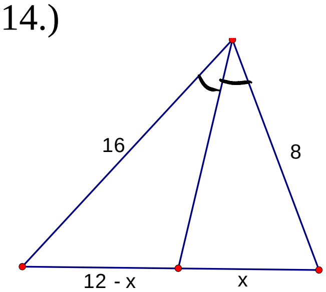

Simplify:

15.) a) $\left(-3\sqrt{6}\right)\left(5\sqrt{12}\right)$

16.) a) $8\sqrt{7}-5\sqrt{2}-5\sqrt{7}-3\sqrt{2}$

b) $\dfrac{6}{5\sqrt{2}}$

b) $3\sqrt{2}+8\sqrt{3}-5\sqrt{8}-3\sqrt{12}$

Are the figures sometimes, always, or never similar?

17.) two rectangles

18.) two equilateral triangles

19.) two hexagons