

## New Unit 7- Similarity

### AGENDA

- Check and go over Bridge
- Notes - Algebra review
  
- HW
- Complete Problem Set
- CR - Due 2/16

List the perfect squares:

$1^2 \underline{\hspace{1cm}} \quad 4^2 \underline{\hspace{1cm}} \quad 7^2 \underline{\hspace{1cm}} \quad 10^2 \underline{\hspace{1cm}} \quad 13^2 \underline{\hspace{1cm}}$

$2^2 \underline{\hspace{1cm}} \quad 5^2 \underline{\hspace{1cm}} \quad 8^2 \underline{\hspace{1cm}} \quad 11^2 \underline{\hspace{1cm}} \quad 14^2 \underline{\hspace{1cm}}$

$3^2 \underline{\hspace{1cm}} \quad 6^2 \underline{\hspace{1cm}} \quad 9^2 \underline{\hspace{1cm}} \quad 12^2 \underline{\hspace{1cm}} \quad 15^2 \underline{\hspace{1cm}}$

**Simplifying Square Root Radicals**

If a square root radical is not a perfect square, such as  $\sqrt{50}$ , there is a way to simplify the radical.

Rule:  $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$  and  $\sqrt{a} \cdot \sqrt{b} = \sqrt{a \cdot b}$  so  $\sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2}$

If a square root radical is not a perfect square, such as  $3\sqrt{50}$ , there is a way to simplify the radical.

Rule:  $c\sqrt{a \cdot b} = c\sqrt{a} \cdot \sqrt{b}$  and  $c\sqrt{a} \cdot \sqrt{b} = c\sqrt{a \cdot b}$  so

$3\sqrt{8} = 3\sqrt{4 \cdot 2} = 3 \cdot 2\sqrt{2} = 6\sqrt{2}$

Express in simplest radical form:

1.  $\sqrt{12}$

2.  $\sqrt{48}$

3.  $\sqrt{50}$

4.  $\sqrt{32}$

5.  $7\sqrt{45}$

6.  $2\sqrt{90}$

**Dividing Radicals (for this unit)**

A. Simplify the radical expression

B. Cancel common factors in the numerator & denominator

Example:  $8\sqrt{48} \div 4\sqrt{3} = \frac{8\sqrt{48}}{4\sqrt{3}} = 2\sqrt{\frac{48}{3}} = 2\sqrt{16} = 2 \cdot 4 = 8$

Or

$$8\sqrt{48} \div 4\sqrt{3} = \frac{8\sqrt{48}}{4\sqrt{3}} = \frac{8\sqrt{16 \cdot 3}}{4\sqrt{3}} = \frac{8 \cdot 4\sqrt{3}}{4\sqrt{3}} = \frac{32\sqrt{3}}{4\sqrt{3}} = 8$$

7.  $\frac{8\sqrt{2}}{40\sqrt{2}} = \frac{8}{40} = \frac{1}{5}$       $\frac{3}{2} = \frac{12}{8}$       $\sqrt{\frac{144}{64}} = \frac{\sqrt{144}}{\sqrt{64}} = \frac{12}{8} = \frac{3}{2}$

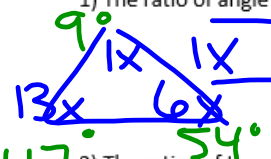
9.  $\sqrt{\frac{48}{3}} = \sqrt{16} = 4$      10.  $\frac{\sqrt{72}}{\sqrt{2}} = \sqrt{\frac{72}{2}} = \sqrt{36} = 6$

11.  $\frac{\sqrt{40}}{\sqrt{90}} = \sqrt{\frac{40}{90}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$       $\sqrt{\frac{18}{81}} = \sqrt{\frac{2}{9}} = \frac{\sqrt{2}}{3}$

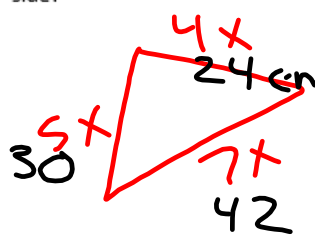
**RATIOS**

- A ratio compares two numbers by division, ex: 1/2, 3:5, 8 to 3
- An extended ratio compares several numbers, ex: 8:3:2
- If you know 2 numbers are in a certain ratio, say 4:2, you can represent the 2 numbers as  $2x$  and  $4x$

1) The ratio of angle measures in a triangle is 1:6:13. What is the measure of the largest angle?


117.   $1x + 6x + 13x = 180^\circ$       $20x = 180$       $x = 9$      **TOTAL 6x**

2) The ratios of the side lengths of a triangle is 4:7:5, and its perimeter is 96 cm. What is the length of the shortest side?

117.   $4x : 7x : 5x$       $4x + 7x + 5x = 96 \text{ cm}$       $16x = 96$       $x = 6$

3) The ratio of consecutive angles in a parallelogram are 7:2. What is the measure of the smaller angle?

40°



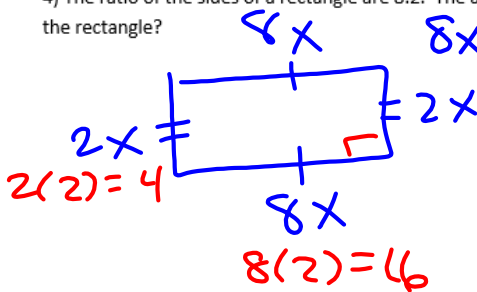
$$2x + 7x = 180$$

$$9x = 180$$

$$x = 20$$

140°

4) The ratio of the sides of a rectangle are 8:2. The area of the rectangle is  $64\text{ft}^2$ . What is the length of each side of the rectangle?



$8x : 2x$

$A = bh$

$64 = (8x)(2x)$

$64 = 16x^2$

$\sqrt{4} = \sqrt{x^2}$

$2 = x$

5) The ratio of boys to girls in the sophomore class is 150:190. How many students are in the sophomore class?

150x : 190x

PART : PART

WHOLE 340x

6) The ratio of freshman to the student population is 340:800. How students are not freshman?

340x : 800x

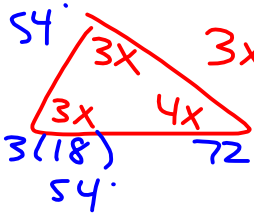
FRESH POP

340x + \_\_\_\_\_ = 800x

460x ← TOTAL

7) What would be the best (most specific) name for the shape that has the following ratios for its ANGLES.

a) 3 : 4 : 3 ISOSCELES

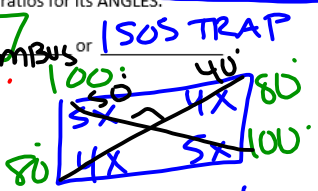


$$3x + 3x + 4x = 180$$

$$10x = 180$$

$$x = 18$$

b) 4 : 5 : 4 : 5 RHOMBUS or ISOS TRAP



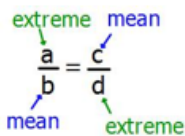
$$5x + 4x + 5x + 4x = 360$$

$$18x = 360$$

$$x = 20$$

**PROPORTIONS**

A proportion states that two ratios are equal. The product of the means equals the product of the extremes.



**Cross Products Property**

In a proportion, if  $\frac{a}{b} = \frac{c}{d}$  and  $b$  and  $d \neq 0$ , then  $ad = bc$ .



$$\frac{3}{9} = \frac{1}{3} = \frac{4}{12} \quad \frac{3}{9} = \frac{4}{12}$$

$$\frac{1}{3} = \frac{1}{3}$$

Is each of the following a true proportion?

~~$\frac{2}{3} = \frac{6}{8}$~~   $(2)(8) \neq (3)(6)$   
 $16 \neq 18$   
**NO**

~~$\frac{6}{3} = \frac{12}{8}$~~  9)  $\frac{6}{3} = \frac{12}{8}$   
 $\frac{3}{2} = \frac{3}{2}$   
**SHOW RATIOS**  
 =

$6 \cdot 8 \stackrel{?}{=} 4 \cdot 12$   
 $48 = 48$

**Solve the following Proportions:**

~~10)  $\frac{x-5}{3} = 9$~~

$$1(x-5) = 3(9)$$

$$x-5 = 27$$

$$x = 33$$

~~11)  $\frac{4y-1}{6} = \frac{5y}{8}$~~

$$6(5y) = 8(4y-1)$$

$$30y = 32y - 8$$

$$+8 \qquad +8$$


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$$30y + 8 = 32y$$

$$-30y \qquad -30y$$


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$$8 = 2y$$

$$4 = y$$

Solve the following Proportions:

~~10)  $\frac{x-5}{3} = 9$~~

$$1(x-5) = 3$$

$$x-5 = 27$$

$$x = 33$$

11)  $\frac{4y-1}{6} = \frac{5y}{8}$

~~12)  $\frac{2y}{9} = \frac{8}{4y}$~~

$$(2y)(4y) = (9)(8)$$

$$8y^2 = 72$$

$$\sqrt{y^2} = \sqrt{9}$$

$$y = \pm 3$$

$$-\frac{6}{9} = -\frac{8}{12}$$

$$-\frac{2}{3} = -\frac{2}{3}$$

~~13)  $\frac{z-4}{5} = \frac{20}{z-4}$~~

14)  $\frac{x-7}{4} = \frac{11}{2x+4}$

$$(z-4)(z-4) = (5)(20)$$

$$z^2 - 4z - 4z + 16 = 100$$

$$z^2 - 8z + 16 = 100$$

$$z^2 - 8z - 84 = 0$$

$$(z+6)(z-14) = 0$$

$$z+6=0 \quad | \quad z-14=0$$

$$z = -6$$

$$z = 14$$

84 · 1

42 · 2

21 · 4

14 · 6

$$a=1 \quad b=-8 \quad c=-84$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Problem Set 7.0**

1) The ratio of the lengths sides of a quadrilateral is 2:3:5:7. The perimeter is 85 feet. What is the length of the largest side? Can this quadrilateral be a parallelogram?

2) The base and height of a parallelogram are in the ratio of 2:3 respectively. The area of the parallelogram ( $A=bh$ ) is  $54 \text{ in}^2$ . Find the height of the parallelogram.

3) An 18 in. stick breaks into 3 pieces. The ratio of the length of the pieces is 1:4:5. Which of these is not a length of one of the pieces? A) 1.8 in. B) 3.6 in. C) 7.2 in. D) 9 in.

4) During the 2003 NFL season, the Dallas Cowboys won 10 of their 16 regular games. What is the ratio of wins to losses in simplest form?

5) What would be the best (most specific) name for the shape that has the following ratios for its SIDES.

a)  $3 : 4 : 3$  \_\_\_\_\_ b)  $\sqrt{5} : \sqrt{5} : \sqrt{5} : \sqrt{5}$  \_\_\_\_\_ or \_\_\_\_\_

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Are the following true proportions. Show or explain your reasoning.

6)  $\frac{5}{9} = \frac{30}{54}$

7)  $\frac{8}{18} = \frac{12}{27}$

8)  $\frac{20}{28} = \frac{5}{6}$

9) Which of the following is equivalent to:  $\frac{3}{5} = \frac{x}{y}$

A)  $\frac{3}{y} = \frac{5}{x}$

b)  $3x = 5y$

c)  $\frac{x}{3} = \frac{y}{5}$

D)  $\frac{3}{5} = \frac{y}{x}$

Solve the following Proportions:

10)  $\frac{7}{9} = \frac{x}{x-10}$

11)  $\frac{x}{2} = \frac{5}{x-3}$

12)  $\frac{7}{x+5} = 10$

13)  $\frac{x}{3} = \frac{4}{x+1}$