Name_____

Write your questions here!

Do you remember hearing phrases such as "Miles per Hour" or "Dollars per Pound?" These are both unit rates. These rates are types of ***ratios***.

KEY CONCEPT *For Your Notebook*

Ratios

A **ratio** uses division to compare two quantities. You can write the ratio of two quantities a and b, where b is not equal to 0, in three ways.

a to b $\quad a:b \quad \frac{a}{b}$

Each ratio is read "the ratio of a to b." Ratios should be written in simplest form.

Example:

Mr. Sullivan has 15 Autobots and 12 Decepticons in his Transformer collection.

a. Find the ratio of Autobots to Decepticons.

b. Find the ratio of Decepticons to total Transformers.

Mr. Brust has been learning how to tie his brand new KEDS. Yesterday, he attempted to tie these pearly-white sneaks 18 times. He was successful 6 times!

Find the ratio of the number of times he was not successful to the total number of attempts.

PROPORTIONS A **proportion** is an equation that states that two ratios are equivalent. The general form of a proportion is given below.

READING
This proportion is read "*a* is to *b* as *c* is to *d*."

$$\frac{a}{b} = \frac{c}{d} \text{ where } b \neq 0, d \neq 0$$

If one of the numbers in a proportion is unknown, you can solve the proportion to find the unknown number. To solve a proportion with a variable in the numerator, you can use the same methods you used to solve equations.

Examples:

Solve the proportions:

$\frac{22}{6} = \frac{x}{15}$

$\frac{9}{2} = \frac{m}{12}$

$\frac{5}{13} = \frac{k-4}{39}$

$\frac{3r}{5} = \frac{36}{15}$

$\frac{7}{112} = \frac{c-3}{8}$

In the first four games of the season, a soccer team scored a total of ten goals. If this trend continues, how many goals will the team score in the eighteen remaining games of the season?

Now, summarize your notes here!

Practice 4.1

SOLVING PROPORTIONS. Solve the proportion.

1. $\frac{2}{5} = \frac{x}{3}$

2. $\frac{c}{8} = \frac{11}{4}$

3. $\frac{16}{7} = \frac{m}{21}$

4. $\frac{5}{8} = \frac{t}{24}$

5. $\frac{p}{20} = \frac{8}{4}$

6. $\frac{16}{48} = \frac{n}{36}$

WRITING AND SOLVING PROPORTIONS. Write the sentence as a proportion. Then, solve the proportion.

7. *b* is to 10 as 7 is to 2

8. 12 is to 18 as *d* is to 27

SOLVING PROPORTIONS. Solve the proportion.

9. $\frac{b}{0.5} = \frac{9}{2.5}$

10. $\frac{2.1}{7.7} = \frac{v}{8.8}$

11. $\frac{3a}{4} = \frac{36}{12}$

12. $\frac{6r}{10} = \frac{36}{15}$

13. $\frac{m+3}{8} = \frac{40}{64}$

14. $\frac{7}{112} = \frac{c-3}{8}$

4.1 Review Skillz

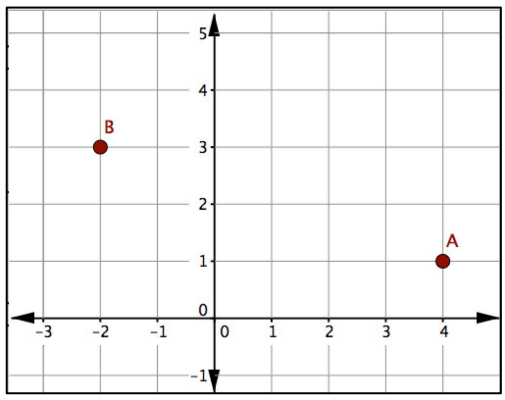
1. Solve:

$-8 - 3x = -20$

2. Simplify:

$-5x - 2(3x - 2)$

3. Describe how to move from Point A to Point B:



_____ units in the y direction

_____ units in the x direction

4. Solve:

$-18 + 2x = -20$

5. Simplify:

$-8 - 3x = -20$

6. Describe how to move from point C(-2, -1) to Point D(3, 1):

Application And Extension 4.1

1. Solve for x: $\frac{2}{3} = \frac{x+3}{6}$

2. Solve for m: $\frac{20}{32} = \frac{m+3}{8}$

3. ***Mountainous Snowboarding.*** One day, the ratio of skiers to snowboarders on the mountain at a ski resort was 13 : 10. The resort sold a total of 253 lift tickets during the day.

   a. Find the ratio of snowboarders on the mountain to all of the snowboarders and skiers on the mountain.

   b. Use the ratio from part (a) to find the number of lift tickets sold to snowboarders during the day.

4. ***Multiple Proportions.*** Suppose you know one proportion where 12 is to 72 as x is to 24 while at the same time, x is to 36 as y is to 81. Find y. (Hint: Solve for x first! Then, solve for y.)

5. ***Hobbies.*** Some model trains are built to $\frac{1}{87}$ of actual size. Suppose an actual boxcar is 480 inches long. How many ***inches*** long is the model?