

Review

1. Simplify: $|-8| - 4(9 - 12) + 3^2$
2. Translate into an equation, then ***solve***. “The product of a number x and four plus two equals -14 ”. What is the number?
3. What is LCM and GCF of 8 and 12?

Review

1. Simplify: $|-9| - 4^2 - (-4 - 9)$
2. Translate into an equation, then ***solve***. “The quotient of a number x and three less than two equals -9 ”. What is the number?
3. If $a(b) < 0$, what is known about the values of a and b ?

Review

1. Simplify: $|-6| - 5^2 - (-3 - 5)$
2. $\sqrt{8}$ is between what two consecutive integers?
3. Write \$700 billion (the government buyout) in scientific notation?
4. Translate then solve: “The quotient of a number x and negative two is less than negative four”

Ratios

Objective

- Define a ratio
- Express ratios 3 different ways
- Expressing ratios as a model diagram
- Identify unacceptable forms of a ratio
- Explain the difference between rates and unit rates
- Given a rate, create a unit rate
- Identify between unit rates, rates, and ratios.

Ratio

Definition: A comparison of two values. Can be expressed 3 ways:

Ratios

Create ratios for the following:

1. The number of blocks left in the school day to the number of total blocks in a day.
2. The number of female students to male students in the class.
3. The number of complete months left in the school to the total number of months in a year.

Expressing Ratios as Model Diagrams

Draw a whole rectangle.

Divide the rectangle into total number of parts.

Shade and identify the parts.

The number of blocks left in the school day to
the number of total blocks in a day.



Model Diagram

Show a model diagram representing:

The number of complete months left in the school to the total number of months in a year.

Are there other ratios you can create based upon the diagram?

Ratios

Create ratios and model diagrams (first two only) for the following:

1. There are 8 boys and 12 girls in a class. What is the ratio of boys to girls in the class?
2. What is the ratio of girls to total students in the class?
3. There are 306 8th graders and 39 teachers. What is the teacher to student ratio?

Unacceptable Ratios

Can the ratio of $\frac{14}{5}$ be simplified? Explain.

Example

Driving to Washington DC this past weekend, I traveled the 400 miles in 8 hours. What was my speed? Be sure to write the units of measurement.

Rates/Unit Rates

Rates are ratios with different units of measurement. For example, coming to school you most likely drove by a sign that listed, “\$2.59/gal” This is a rate because the numerator has a unit of measurement of dollars (\$) and the denominator has a unit of measurement of gallons.

$$\frac{\$}{\text{Gallons}}$$

Rates/Unit Rates

- **Unit Rates** are rates (ratios with different units of measurement) with a denominator of 1.
- Unit Rates can be recognized because it can be expressed using the word “per”.
 - Example: \$2.59 per gallon (\$2.59 for 1 gallon of gas!)
 - I drove to Washington DC this weekend, and traveled 65 mph. (What is the unit rate? What are the units of measurement?)

Creating Unit Rates

1. Write a fraction bar and fill in the units of measurements
2. Determine if the units of measurement can be converted to the same unit (always choose the smaller of the units) 8 inches to 2 feet
3. Fill in the values
4. Divide the bottom into the top.
5. Express the result over 1, as a unit rate.
6. Don't forget the units of measurement.

Rates/Unit Rates

Create a Unit Rate, given the following:

12 cookies for \$3.

4 cookies per dollar.

Unit Rate

Create unit rates given the following:

1. I traveled 390 miles in 6 hours. What was my speed as a unit rate?
2. I filled my car with 16 gallons of gas before I left, and I paid \$40. What was the price of gas?
3. I worked 12 hours this weekend and made \$144 dollars. What was my hourly wage?

Practice

Which are Unit Rates? Rates? Improper rates/ratios?

$$\frac{\$10}{4 \text{ hours}}$$

$$\frac{9 \text{ inches}}{3 \text{ feet}}$$

65 mph

$$\frac{5 \text{ m}}{300 \text{ cm}}$$

$$3\frac{2}{3}$$

\$5 per square inch

Sample problems

There are two schools, one has 256 students and 16 teachers. The other has 96 students and only 6 teachers. Do they have the same student to teacher ratio?

Review

1. Simplify: $24 \div \frac{1}{2} - 2(4 - 3)$
2. What is the value of n in:
 $2,560,000 = 2.56 \times 10^n$
3. What is the Prime Factorization of 200?
4. Between what two integers is $\sqrt{39}$?
5. Which of the following statements is **false**?
 - a. $(-5)(-5)(-5) = 3(-5)$
 - b. $5(2 - 1) = 5(2) - 5(1)$
 - c. $5 + (2 - 1) = (5 + 2) - 1$
 - d. $-5 + 5 = 5 + (-5)$

Another one

A friend worked a total of 32 hours this past week and earned \$192 dollars. What was his hourly wage (dollars per hour)?

I worked only 14 hours, and earned \$90.

Comparison Shopping

The school sells a Dansani water bottle for \$1.00. At BJ's Wholesale, you can buy 24 bottles for \$5.69. Compare the two prices. What is the unit price (cost per bottle) for BJ's water? How much profit does the school make PER bottle of water if they buy it from BJ's?

Student Fundraiser

Because so many students do not come prepared for class with a writing utensil, I have decided to charge a nickel for every pencil I give out. I bought 144 pencils (a gross) for \$6.49. Am I going to lose or make money? What is the unit price (cost per pencil)?

Comparison Shopping

I have decided to stock vending machines in schools and sell Oreo Cookies. A package of cookies will cost 65¢

I bought 12 packages for \$3.69. What is the unit price (cost per package) at this rate. How much will I make if I sell all 12 packages. Approximately, how many packages must I sell to make \$20.00?

Proportions

Proportions are 2 equivalent (equal) ratios.

$$\frac{2}{3} = \frac{6}{9}$$

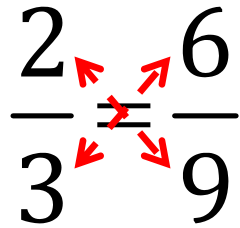
Proportions

To determine if two ratios are “proportional” or make a proportion:

1. Cross products must be equal or
2. One ratio can be made into the other by multiplying a common factor to the numerator and denominator, or
3. Their unit rates are equal.

Proportions

Cross products must be equal

$$\frac{2}{3} = \frac{6}{9}$$


$$2(9) = 3(6)$$

$$18 = 18$$

Proportions

Show the cross products for the following:

$$\frac{3}{7} = \frac{6}{14}$$

$$\frac{1.2}{3} = \frac{6}{15}$$

Proportions

One ratio can be made into the other by multiplying a common factor to the numerator and denominator

$$\frac{5 \times 6}{12 \times 6} = \frac{30}{72}$$

Proportions

Find the common factor to make the two ratios proportional.

$$\frac{7}{12} = \frac{35}{60}$$

$$\frac{0.5}{1.4} = \frac{4.5}{12.6}$$

Proportions

Their unit rates are equal

$$\frac{4}{12} = \frac{0.2}{0.6}$$

$$\frac{4}{12} = 12 \overline{) 4.00} \begin{array}{r} 0.33 \\ \hline \end{array}$$

$$\frac{0.2}{0.6} = 0.6 \overline{) 0.200} \begin{array}{r} 0.33 \\ \hline \end{array}$$

Proportions

Find their unit rates.

$$\frac{5}{8} = \frac{6}{9.6}$$

Proportions

Algebraic representation of a proportion:

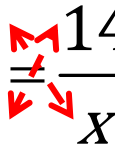
$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc$$

Proportions

To find the missing value in a proportion:

Utilize the cross products rule and solve for the missing value.

$$\frac{2}{5} = \frac{14}{x}$$


$$2x = 5(14)$$

$$2x = 70$$

$$x = 35$$

Proportions

Find the missing value:

$$1. \quad \frac{3}{5} = \frac{x}{25}$$

$$2. \quad \frac{1.2}{x} = \frac{3}{4}$$

Proportions

If I can buy 6 cookies for \$8.16, how much could I buy 10 cookies for?

(Use a proportion)...

1. Set up two fraction bars.
2. Write in the units of measurement (make sure the SAME units are in the same spots on the fractions- numerator/numerator; denominator-denominator)
3. Write in the values.
4. Use cross products and equations to solve.

Proportions

$$\frac{\text{cookies}}{\$} = \frac{\text{cookies}}{\$}$$
$$\frac{6 \text{ cookies}}{\$8.16} = \frac{10 \text{ cookies}}{\$x}$$

$$6x = 10(8.16)$$

$$6x = 81.6$$

$$x = \frac{81.6}{6}$$

$$x = \$13.60$$