

5.4 Proportional Reasoning

RATIO A ratio is a comparison of two quantities written as a rational number.
We can write ratios in three ways: _____

We encounter ratios all the time in everyday life. For example:

1. The teacher-student ratio in the first grade is 1 to 25
2. The ratio of males to females in this class is 1 : 8
(Does this tell us the class size? _____)
3. My car gets 35 miles per gallon.

If there are 5 girls and 7 boys in our kindergarten class, what is

The ratio of boys to girls? _____ (part to part)

The ratio of girls to boys? _____ (part to part)

The ratio of boys to the entire class? _____ (part to whole)

The ratio of the entire class to girls? _____ (whole to part)

One-ninth of the student body at the local high school are non-swimmers.

What **fraction** of the student body are non-swimmers? _____

What **fraction** of the student body are swimmers? _____

What is the **ratio** of non-swimmers to swimmers? (simplify) _____

What is the **ratio** of swimmers to non-swimmers? (simplify) _____

What is the **ratio** of non-swimmers to the entire student body? (simplify) _____

How **many** students are non-swimmers? _____

How **many** students are thus swimmers? _____

PROPORTIONS

Two ratios are called “proportional” if and only if the fractions representing them are equal.

Example: Are $\frac{2}{3}$ and $\frac{8}{12}$ proportional? That is, does $\frac{2}{3} = \frac{8}{12}$? _____

PROPERTY OF PROPORTIONS (an equation involving ratios)

If a, b, c and d are real numbers, then the proportion $\frac{a}{b} = \frac{c}{d}$ if and only if

Justify the “cross product” method of solving proportions –

Many times in a proportion, one of the terms is missing. We use the above property to find it.

$$\frac{3}{15} = \frac{c}{60}$$

$$\frac{-5}{42} = \frac{35}{d}$$

At basketball practice, Molly made 27 out of 45 shots and Kelley made 24 out of 40. Which player appears to be the better shooter?

David bought 4 CD's for \$64, how much would it have cost him to buy 7 CD's?

The next problem we will solve using two different methods.

Which is a better buy: \$15.00 for 7 tickets or \$21.00 for 10 tickets?

Scaling Strategy

(Cost for a common number of tickets)

Unit-Rate Strategy

(Cost per one ticket (or unit))

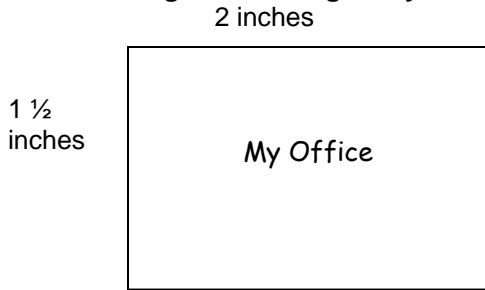
LCM(7,10) = _____

Ann, Bill, and Casey make \$1600 for painting a house. Ann worked 25 hours, Bill worked 35 hours and Casey worked 40 hours. They divided the money in proportion to the number of hours worked. How much did each earn?

SCALE DRAWINGS

The SCALE is the ratio of the size of the drawing to the size of the object.

The following is a drawing of my office where 1 inch represents 7 feet. Find the dimensions of my office.



A candle is 30in. long. After burning for 12 min. the candle is 25 in. long. How long will it take for the whole candle to burn at the same rate?

In a photograph of a father and his daughter, the daughter's height is 2.3 cm. and the father's height is 5.8 cm. If the father is actually 188 cm tall, how tall is the daughter?

Some Properties of Proportions

$$\frac{a}{b} = \frac{c}{d} \text{ if and only if } \frac{b}{a} = \frac{d}{c}$$

$$\frac{a}{b} = \frac{c}{d} \text{ if and only if } \frac{a}{c} = \frac{b}{d}$$

**** Be Careful of Units with Ratios and Proportions****

Suppose a 10-in. pizza costs \$4. For you to find the price x of a 14-in pizza, is it correct to set up the

proportion $\frac{x}{4} = \frac{14}{10}$? Why?