

## CHAPTER 8: RATIOS

A **ratio** is simply a comparison of two numbers. Ratios can be written in three different ways. Let's look at a quick example and show you the different ways of writing ratios.

**EXAMPLE 1**

There are 10 boys and 12 girls in a math class. Write the ratio of boys to girls in three different ways.

**SOLUTION TO EXAMPLE 1**

First, since boys were listed first in the ratio, the number of boys will be listed first. If the girls were listed first, their number would have been listed first. These are the labels that make sense to me and you probably won't find them in any books.

1.	Fraction	$\frac{10 \text{ boys}}{12 \text{ girls}}$
2.	Colon	10 boys: 12 girls
3.	Words	10 boys to 12 girls

When it comes to working with ratios, fractions is the easiest method to use. This being said, when you write a ratio as a fraction, you can use some of the properties of fractions with the ratio. For example, we can simplify the ratio  $\frac{10 \text{ boys}}{12 \text{ girls}}$  as if it were a fraction. Divide the numerator and denominator by

2.  $\frac{10 \div 2}{12 \div 2} = \frac{5}{6}$ . These are **equivalent ratios**.

### Solving Proportions

A **proportion** is an equation that states that two ratios are equivalent.

To solve proportions, we start by putting two ratios equal to each other. Then we use a technique called cross-multiplication to re-write the equation.

$$\frac{a}{b} = \frac{c}{d} \rightarrow ad = bc$$

Let's take a look at an example and see how to apply the cross-multiplication.

# MATHEMATICS COMPETENCY EXAM STUDY GUIDE – PART A

### EXAMPLE 2

Solve the proportion.  $\frac{n}{16} = \frac{15}{24}$

#### SOLUTION TO EXAMPLE 2

1.	Apply the cross-multiplication.	$n \cdot 24 = 24n$ $16 \cdot 15 = 240$
2.	Write the equation and solve.	$24n = 240$ $\frac{24n}{24} = \frac{240}{24}$  $n = 10$

Here's an example from the math competency exam.

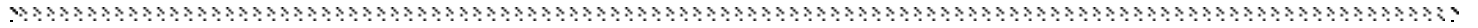
### EXAMPLE 3

To obtain a certain shade of pink, a painter must mix 7 parts red paint with 3 parts white paint. If the painter uses 28 gallons of red paint, how many gallons of white paint are needed?

#### SOLUTION TO EXAMPLE 3

1.	Create our proportion. When writing your proportion make sure you put the same items in the numerator and the same items in the denominator. In this problem, I put the red pain in the numerator.	$\frac{7 \text{ red}}{3 \text{ white}} = \frac{28 \text{ red}}{x \text{ white}}$
1.	Apply the cross-multiplication.	$7 \cdot x = 7x$ $3 \cdot 28 = 84$
2.	Write the equation and solve.	$7x = 84$ $\frac{7x}{7} = \frac{84}{7}$  $x = 12$

∴The painter will need 12 cans of white paint.



## TRY-THESE – Proportions

1.  $\frac{h}{15} = \frac{20}{75}$

2.  $\frac{13}{10} = \frac{52}{x}$

3.  $\frac{78}{m} = \frac{18}{12}$

4.  $\frac{g}{39} = \frac{4}{12}$

5.  $\frac{2.4}{32} = \frac{y}{16}$

6.  $\frac{4.5}{6} = \frac{a}{20}$

7 A marathoner can run 1 mile in 7.56 minutes. How long will it take him to complete a marathon (26.2 miles)?

