Ratios

Objective 1 Understand the meaning of a Ratio

What is a ratio? We use ratios to compare two quantities. For example, the ratio of 3 to 4 can be written as $\frac{3}{4}$ or 3:4.

We often see ratios used in recipes. For example, suppose your recipe requires 4 cups of powdered mix to create a serving for 12 people. In this case you would have a ratio of $\frac{4}{12}$.

If we reduce this ratio we get $\frac{1}{3}$ which means that our recipe requires 1 cup of powdered mix to create a serving for 1 person.

Note: When we write a ratio, we do not include the units. When we do include the units, we call this a rate. Rates will be covered in the following section.

Example 1: Write the ratio of $\frac{6}{5}$ to $\frac{12}{25}$ as a reduced ratio comparing two whole numbers.

$$\frac{\frac{6}{5}}{\frac{12}{25}} = \frac{6}{5} \div \frac{12}{25} = \frac{6}{5} \cdot \frac{25}{12} = \frac{\cancel{6}^{1}}{\cancel{5}_{1}} \cdot \frac{\cancel{25}^{5}}{\cancel{12}_{2}} = \boxed{\frac{5}{2}}$$

$$\frac{\frac{6}{5}}{\frac{12}{25}} = \frac{25\left(\frac{6}{5}\right)}{25\left(\frac{12}{25}\right)} = \frac{\cancel{30}^{5}}{\cancel{12}_{2}} = \boxed{\frac{5}{2}}$$

Here we are using the clearing fractions technique using the LCD of 25.

Example 2: Write each ratio as a reduced ratio comparing two whole numbers.

a) 0.4 to 4

$$\frac{0.4}{4} \quad \text{LCD}=10$$

$$\frac{10(0.4)}{10(4)}$$

$$\frac{4}{40}$$

$$\frac{\overset{1}{\cancel{4}}}{\cancel{40}_{10}}$$

$$\boxed{\frac{1}{10}}$$

b) 4.8 to 0.8

c) 0.12 to 0.4

Example 3: Write the ratio as a reduced ratio comparing two whole numbers.

$\frac{8}{5}$ to 0.3

Sometimes a ratio can provide us with useful information in everyday situations and also provide us with some statistical information.

Example 4: Candice drove her hybrid vehicle 480 miles on 10 gallons of gas. What is the ratio of miles to gallons for Candice's hybrid?

Example 5: At a certain high school there are 425 female students and 375 male students.

a) What is the ratio of female students to male students?

b) Based on your reduced ratio in part a), theoretically in a classroom of 32 students, how many should be female?

c) What is the ratio of female students to the total student population.

Answer the following homework questions.

In Exercises 1 - 12, write each ratio as a reduced ratio comparing two whole numbers.

1) 7 to 8

2) 75 to 50

3) 0.5 : 5

4) 3.5 : 0.7

5) $\frac{7}{9}$ to $\frac{18}{21}$

6) $\frac{10}{27}$ to $\frac{15}{54}$

7) 1.2 to 3.4

8) 0.204 to 0.6

9) 2.1 to 0.03

10) 0.04 to 12

11) $2\frac{1}{2}$ to $\frac{3}{4}$

12) $3\frac{3}{4}$ to $2\frac{2}{3}$