Write, Compare, and Order Ratios

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> ## Definition of a Ratio
> Comparisons of two numbers, measurements, or quantities.

Write, Compare, and Order Ratios

[Figure1]

Mintgrove Middle School has a total of 300 students. If the ratio of boys to girls is 31 to 44, how many more girls are there in the school?

In this concept, you will learn to write, compare and order ratios.

Ratios

A **ratio** is a comparison of two things or two quantities.

Let's look at an example where you are comparing ratios.

Imagine that there are 25 students in a class; 12 boys and 13 girls.

You could say that the ratio of boys to girls is 12 to 13. You could also write this ratio as $12 : 13$ or $\frac{12}{13}$.

You could also say that the ratio of boys to the total number of students can be written as 12 to 25 or $12 : 25$ or $\dfrac{12}{25}$ since the total number of students is $12 + 13 = 25.$

The ratio of girls to the total number of students can then be written as 13 to 25 or $13 : 25$ or $\dfrac{13}{25}$.

When you use ratios to compare, the order makes a difference. If you look at the previous three statements, comparing boys to girls, the number of boys is in **numerator**. When you compared the number of boys to the total number of students, the number of boys was in the numerator. When you compared the number of girls to the total number of students, the number of girls was in the numerator because it was first in the statement "The ratio of girls to the total number of students…"

This also shows that there are three different ways to write ratios. You can write them with a colon between the two values that you are comparing, you can write them using the word "to", and you can write them by putting the values in fraction form. You can choose which way you want to write a ratio and these ways are interchangeable too.

Now let's look at an example.

There are 32 red and yellow candies in a bag. There are 10 yellow candies. What is the ratio of red candies to total candies in the bag?

First, find the number of red candies by subtracting the number of yellow candies from the total.

$$32 - 10 = 22$$

Next, write the ratio of red candies to the total number of candies.

$$\dfrac{\text{red candies}}{\text{total candies}} = \dfrac{22}{32}$$

Then, simplify the fraction.

$$\dfrac{\text{red candies}}{\text{total candies}} = \dfrac{22}{32}$$
$$\dfrac{\text{red candies}}{\text{total candies}} = \dfrac{11}{16}$$

The answer is $\dfrac{11}{16}$.

The ratio of red candies in the bag is $\dfrac{11}{16}$.

You could also write this ratio as 11 to 16 or $11:16$.

You can also order ratios. When you have more than two ratios, you can write them in order from least to greatest or from greatest to least.

Let's look at an example.

Order the following ratios from least to greatest:

10 to 15, $\dfrac{16}{36}$, and $12:48$.

First, let's write them in the same form first of all. Let's work with fraction form.

$$10 \text{ to } 15 = \dfrac{10}{15} \qquad \dfrac{16}{36} \qquad 12:48 = \dfrac{12}{48}$$

Next, put the fractions in simplest form.

$$\dfrac{10}{15} = \dfrac{2}{3} \qquad \dfrac{16}{36} = \dfrac{4}{9} \qquad \dfrac{12}{48} = \dfrac{1}{4}$$

Then, get a common **denominator** so you can order these. The lowest common denominator of 3, 9, and 4 is 36.

$$\dfrac{2}{3} \times \dfrac{12}{12} = \dfrac{24}{36}$$

$$\dfrac{4}{9} \times \dfrac{4}{4} = \dfrac{16}{36}$$

$$\frac{1}{4} \times \frac{9}{9} = \frac{9}{36}$$

The order from least to greatest then is $\frac{1}{4}, \frac{4}{9}, \frac{2}{3}$ or $12:48, \frac{16}{36}, 10 \text{ to } 15$.

You can also compare ratios. This is when you have two or more ratios and you want to figure out which ones are larger and which ones are smaller.

Let's look at an example.

Mr. Collin's class has 30 total students. Of these, 12 are boys. Mrs. Peterson's class has 25 students. Of these, 11 are boys. Which class has a higher ratio of boys to total students?

First, find the ratio of boys to total students for both classes.

$$\text{Mr. Collin's class}: \frac{12}{30} \qquad \text{Mr. Peterson's class}: \frac{11}{25}$$

Next, simplify the ratio for Mr. Collin's class.

$$\frac{12}{30} = \frac{2}{5}$$

Then, compare the ratios the same way you compare fractions. Find a common denominator and compare the numerators. The least common denominator is 25.

$$\text{Mr. Collin's class}: \frac{2}{5}$$

$$\frac{2}{5} \times \frac{5}{5} = \frac{10}{25}$$

$$\text{Mr. Peterson's class}: \frac{11}{25}$$

The answer is that Mr. Peterson's class has the higher ratio of boys to total students.

Examples

Example 1

Earlier, you were given a problem about the Mintgrove Middle School's girls.

There are 300 students and the ratio of boys to girls is $31 : 44$.

First, since you don't know the exact number of either boys or girls, you can't set up the ratio right away. Therefore, let x be the number of girls; then the number of boys will be $300 - x$, since there are 300 students overall.

Next, set up the ratio by comparing the number of boys to the number of girls.

$$\frac{31}{44} = \frac{300 - x}{x}$$

Then, cross multiply.

$$\begin{aligned}
\frac{31}{44} &= \frac{300 - x}{x} \\
31x &= 44(300 - x) \\
31x &= 13200 - 44x
\end{aligned}$$

Then, simplify by adding $44x$ to both sides.

$$\begin{aligned}
31x &= 13200 - 44x \\
31x + 44x &= 13200 - 44x + 44x \\
75x &= 13200
\end{aligned}$$

Then, solve for x by dividing both sides by 75.

$$\begin{aligned}
75x &= 13200 \\
\frac{75x}{75} &= \frac{13200}{75} \\
x &= 176
\end{aligned}$$

The answer is 176.

There are 176 girls in the school.

Example 2

Write a ratio in simplest form to describe this situation. Marcy ate 14 cookies in 28 minutes. Write a ratio to compare cookies to minutes.

First, find the ratio of the number of cookies to time.

$$\frac{\text{number of cookies}}{\text{time}} = \frac{14}{28}$$

Next, simplify the ratio.

$$\frac{14}{28} = \frac{1}{2}$$

The answer is $\frac{1}{2}$.

You could also write this ratio as $14 : 28 \text{ or } 1 : 2$.

Example 3

Simplify the ratio.

$$\frac{7}{21}$$

First, find a number that divides into both 7 and 21.

Both 7 and 21 are divisible by 7.

Next, divide each of the numbers in the fraction by 7.

$$\frac{7}{21} = \frac{1}{3}$$

The answer is $\frac{1}{3}$.

Example 4

Simplify the ratio.

$$5 : 30$$

First, write the ratio as a fraction.

$$5 : 30 = \frac{5}{30}$$

Next, simplify the fraction. Both 5 and 30 are divisible by 5.

$$\frac{5}{30} = \frac{1}{6}$$

Then, rewrite the fraction as a ratio.

$$\frac{1}{6} = 1 : 6$$

The answer is $1 : 6$.

Example 5

Simplify the ratio.

$$24 \text{ to } 36$$

First, write the ratio as a fraction.

$$24 \text{ to } 36 = \frac{24}{36}$$

Next, simplify the fraction. Both 24 and 36 are divisible by 12.

$$\frac{24}{36} = \frac{2}{3}$$

Then, rewrite the fraction as a ratio.

$$\frac{2}{3} = 2 \text{ to } 3$$

The answer is 2 to 3.

Review

Look at each ratio. Then write it in the other two ways that it can be written.

1. 16 to 3.

2. 4 to 5.

3. 1:4.

4. $\frac{12}{1}$.

5. 6:11.

6. 33 to 100.

7. $\frac{4}{9}$.

8. 3 to 4.

9. 45 to 12.

10. 12:12.

Simplify each ratio and write your answer in fraction form.

11. 4 to 12.

12. 5:20.

13. 36 to 6.

14. 18:36.

15. 20 to 100.

Review (Answers)

To see the review answers, return to the Table of Contents and select 'Other Versions' or 'Resources'.

Vocabulary

Language: English ▾

Term	Definition
Denominator	The denominator of a fraction (rational number) is the number on the bottom and indicates the total number of equal parts in the whole or the group. $\frac{5}{8}$ has denominator 8.
Numerator	The numerator is the number above the fraction bar in a fraction.

1.0 REFERENCES

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