

Name: _____

Date: _____

SOLVING RATIO PROBLEMS USING ALGEBRA
N-GEN MATH[®] 7



In the last lesson we reviewed how to solve equations that involve fractions. Because ratios can be expressed as fractions, it is often easy to use algebra to help solve problems involving ratios. Let's look at an example.

Exercise #1: A bleacher is filled with fans of the home team and fans of the away team. The ratio of the number of home team fans to away team fans is 5 to 2. There are 26 away fans.

- (a) What is the ratio of home team fans to away team fans in terms of a fraction? (b) Let h represent the total number of home team fans in the bleacher. Fill in the missing part of the equation below:

$$\frac{5 \text{ home team fans}}{2 \text{ away team fans}} = \frac{h}{\quad}$$

- (c) Solve the equation in (b) to determine how many home team fans there are in two ways:

Just by multiplying both sides:

By cross multiplying:

We didn't have to cross multiply in this problem. Let's look at one where it may make more sense to cross multiply.

Exercise #2: Jim and Mike are playing a card game where they record points. The ratio of Jim's points to Mike's points is 4 to 3. Jim scores 32 points. Let m represent the number of points Mike scored. Set up an equation that can be used to find the value of m . Solve it by cross multiplying.



Any equation where two fractions are set equal to each other is known as a **proportion**. We will be working with many **proportions** in the next few lessons.

Exercise #3: In a cafeteria, the ratio of kids who bought their lunch to all kids was 2 to 7. There are 16 total students who bought their lunch.

(a) Make sure you understand this ratio. Fill in the blanks below:

For every _____ kids in the cafeteria _____ kids bought their lunch.

(b) Let t represent the total number of students in the cafeteria. Set up a **proportion** to find the value of t and solve it.

(c) How many students did not buy their lunch (brought it)?

(d) What is the ratio of kids who bought their lunch to kids who didn't buy their lunch? Reduce to simplest form. Explain why this ratio should make sense given the original ratio.

Exercise #4: In a library, the ratio of students with younger siblings to those without younger siblings was 4:3. There were 42 students without younger siblings. Let y be the number of students with younger siblings. Set up a **proportion** to solve for y . Then, find the total number of students.

Number of students with younger siblings = _____

Total number of students in the class = _____



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SOLVING RATIO PROBLEMS USING ALGEBRA
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FLUENCY

1. Solve each of the following equations without using cross multiplication.

(a) $\frac{x}{4} = 7$

(b) $\frac{y}{20} = \frac{7}{4}$

(c) $\frac{c}{30} = \frac{11}{5}$

2. Solve each of the following equations by using cross multiplication.

(a) $\frac{10}{m} = \frac{5}{2}$

(b) $\frac{2}{7} = \frac{8}{y}$

(c) $\frac{12}{c} = \frac{3}{2}$

USING YOUR MATH

3. In a hand of cards, the ratio of black cards to red cards was 5 to 3. If the hand contained 15 black cards, which of the following proportions could be solved to find the number of red cards, r ?

(1) $\frac{15}{r} = \frac{5}{3}$

(3) $\frac{r}{15} = \frac{3}{8}$

(2) $\frac{r}{15} = \frac{5}{3}$

(4) $\frac{15}{r} = \frac{5}{8}$

4. James has a jar full of just pennies and nickels. The ratio of pennies to nickels is 8 to 3. Which of the following is the ratio of nickels to the number of all the coins?

(1) 3 to 11

(4) 3 to 8

(2) 5 to 8

(4) 8 to 11



5. Students in Ms. Castillo's art classes could choose to make a sculpture or paint a picture as their final project. The ratio of those who chose to make a sculpture to those that chose to paint a picture was 3 to 7. There were 24 students who chose to make a sculpture. Let p be the number of students who chose to paint a picture.

(a) Set up a proportion that will allow you to solve for the value of p . Solve the proportion to find the number of students that chose to paint a picture.

(b) What is the total number of students?

(c) What is the ratio of the number of students who painted pictures to the total number of students. State in simplest form.

6. A holiday decoration involves blue and white lights. The ratio of blue lights to white lights is 3 to 2. The box the decoration came in stated that the number of blue lights was 114 but didn't give the number of white lights or the total number of lights.

(a) What is the ratio of the number of blue lights to the total number of lights? Explain.

(b) If the total number of lights is represented by the variable t , create a proportion that you can use to solve for t and solve it.

