Learn About

Using Algebra: Proportions

A **proportion** is a statement that two ratios are equal, for example $\frac{2}{3} = \frac{6}{9}$. Many proportions have missing numbers that are represented by letters, such as $\frac{2}{3} = \frac{6}{a}$. Finding the missing number in a proportion is a strategy used to solve some problems.

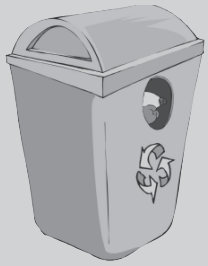
To find a missing number in a proportion, follow these steps:

- Write the cross products.
- Set the cross products equal to one another.
- Solve for the missing number.

A proportion is used to solve this problem. Find the missing number in the proportion.

Shane crushes aluminium cans before putting them in the recycling bin. He can crush six cans in one minute. At this rate, how many cans will Shane crush in 15 minutes?

$$\frac{1}{6} = \frac{15}{y}$$



Write the cross products and set them equal to one another. Then solve for the missing number.

$$\frac{1}{6} = \frac{15}{y}$$

6×15

$1 \times y$

$1 \times y = 6 \times 15$

$y = 90$

At this rate, Shane will crush 90 cans in 15 minutes.

A proportion is a statement that two ratios are equal. For example, $\frac{2}{3} = \frac{6}{9}$. To find a missing number in a proportion, write the cross products and set them equal to one another. Then solve for the missing number.

Look at the answer choices for each question. Read why each answer choice is correct or not correct.

1. According to the scale on the map, 1 centimetre = 500 kilometres. The distance on the map from Fran's town to Melbourne is 2.4 centimetres. How far is Fran's town from Melbourne?

Ⓐ 208 km

This answer is not correct because the proportion to solve the problem is $\frac{1}{500} = \frac{2.4}{y}$. To find the missing number, 500 is multiplied by 2.4 to get 1200, not divided by 2.4 to get approximately 208.

Ⓑ 760 km

This answer is not correct because the proportion to solve the problem is $\frac{1}{500} = \frac{2.4}{y}$. This becomes $y = 500 \times 2.4$, and $500 \times 2.4 = 1200$, not 760.

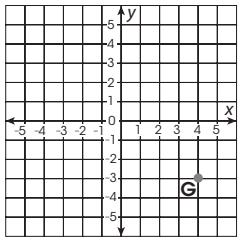
● 1200 km

This answer is correct because the proportion to solve the problem is $\frac{1}{500} = \frac{2.4}{y}$. This becomes $y = 500 \times 2.4$, and $500 \times 2.4 = 1200$.

Ⓓ 12,000 km

This answer is not correct because the proportion to solve the problem is $\frac{1}{500} = \frac{2.4}{y}$. This becomes $y = 500 \times 2.4$, and $500 \times 2.4 = 1200$, not 12,000.

2. Point *G* on the coordinate grid shows the location of the map in Fran's classroom. Which coordinate pair shows the location of point *G*?



Ⓐ $(^{-}3, 4)$

This answer is not correct because point G is 4 units to the right of the origin and 3 units down. The coordinate pair $(^{-}3, 4)$ represents 3 units to the left of the origin and 4 units up.

Ⓑ $(^{-}4, 3)$

This answer is not correct because point G is 4 units to the right of the origin and 3 units down. The coordinate pair $(^{-}4, 3)$ represents 4 units to the left of the origin and 3 units up.

Ⓒ $(3, 4)$

This answer is not correct because point G is 4 units to the right of the origin and 3 units down. The coordinate pair (3, 4) represents 3 units to the right of the origin and 4 units up.

● $(4, ^{-}3)$

This answer is correct because point G is 4 units to the right of the origin and 3 units down.

Lesson 2

Read the passage.
Then do Numbers 1–5.

Paper Savers

Mr Green's students were discussing ways for the school to use less paper. They wanted to determine if paper could be saved on the printing of the school directory. Last year, the directory had 10 students listed on each page. The school had 240 students. So each student received a 24-page directory. The same number of students attend the school this year. The class suggested that 20 students could be listed on each page. That would mean that only $\frac{1}{2}$ as many pages would be used in this year's directory. Someone then suggested listing 40 students on each page. Then only $\frac{1}{4}$ of the original number of pages would be needed. Also, if the number of students listed on a page were doubled to 80, only $\frac{1}{8}$ of the original number of pages would be needed.

1. If the class suggested doubling the number of students on the page again, what fraction of the original number of pages would be needed?

Ⓐ $\frac{1}{2}$
Ⓑ $\frac{1}{10}$
Ⓒ $\frac{1}{12}$
Ⓓ $\frac{1}{16}$

2. Suppose that this year's directory is printed with 20 students listed per page. Which expression can help you find how many pages per student directory will be saved over last year's version?

Ⓐ $24 - (\frac{1}{16} \times 24)$
Ⓑ $24 - (\frac{1}{8} \times 24)$
Ⓒ $24 - (\frac{1}{4} \times 24)$
Ⓓ $24 - (\frac{1}{2} \times 24)$

Lesson 17

Read the passage.
Then do Numbers 1–5.

Seeing the Sea Life

Sam's class is studying sea life in their current science unit. To learn more about freshwater and saltwater animals and reptiles, the class is going on an excursion to the Seaside Aquarium. There are 26 students and 2 teachers who will go on the excursion. The students will be away from school for 7 hours. Their bus trip will take approximately 15 minutes each way, not including a stop for lunch.

Tickets to the aquarium are $5.75 per person. The bus will cost $98. The group intends to stop on the way back for lunch at a restaurant. Each meal will cost $4.50.

1. Which equation can help you find how much all the aquarium tickets will cost?

Ⓐ $28 \times \$5.75 = c$
Ⓑ $26 \times \$5.75 = c$
Ⓒ $28 \times \$4.50 = c$
Ⓓ $26 \times \$4.50 = c$

2. If the cost of the bus is divided equally among everyone, how much will each student and each teacher have to pay for the bus? Round to the nearest cent, if necessary.

Ⓐ $9.00
Ⓑ $4.50
Ⓒ $3.77
Ⓓ $3.50

Self-Assessment 2
Lessons 6–10

Answer these questions after you have completed Lessons 6–10. Before you begin, re-read what you wrote in Self-Assessment 1.

FOCUS on Using Algebra, Book F

Name _____ Date _____

1. Rate your work in Lessons 6–10. Circle your answer.

   successful somewhat successful needs improvement

2. Did any of the questions give you trouble? _____
   If so, what kind of trouble did you have?

   _____

   _____

   Is this the same kind of trouble you had in Lessons 1–5? _____

3. Did you find the questions easier or more difficult than those in Lessons 1–5?

   _____

   Why do you think this is so?

   _____

   _____

4. Did you meet the goal you set for yourself for Lessons 6–10? _____
   Why or why not?

   _____

   _____

5. What is your goal for Lessons 11–15?

   _____

   _____

Cut along the dotted line.