



Exit Ticket Sample Solutions

Ms. Albero decided to make juice to serve along with the pizza at the Student Government party. The directions said to mix 2 scoops of powdered drink mix with a half gallon of water to make each pitcher of juice. One of Ms. Albero’s students said she will mix 8 scoops with 2 gallons of water to make 4 pitchers. How can you use the concept of proportional relationships to decide whether the student is correct?

| | | | | |
|---------------------------------------|---------------|---------------|---|---|
| Amount of Powdered Drink Mix (scoops) | 1 | 2 | 4 | 8 |
| Amount of Water (gallons) | $\frac{1}{4}$ | $\frac{1}{2}$ | 1 | 2 |

As long as the amount of water is proportional to the number of scoops of drink mix, then the second quantity, amount of water, can be determined by multiplying the first quantity by the same constant. In this case, if the amount of powdered drink mix is represented by x , and the gallons of water are represented by y , then $y = \frac{1}{4}x$. To determine any of the measures of water, you will multiply the number of scoops by $\frac{1}{4}$.

Problem Set Sample Solutions

- A cran-apple juice blend is mixed in a ratio of cranberry to apple of 3 to 5.
 - Complete the table to show different amounts that are proportional.

| | | | |
|---------------------|---|----|----|
| Amount of Cranberry | 3 | 6 | 9 |
| Amount of Apple | 5 | 10 | 15 |

- Why are these quantities proportional?

The amount of apple is proportional to the amount of cranberry since there exists a constant number, $\frac{5}{3}$, that when multiplied by any of the given measures for the amount of cranberry always produces the corresponding amount of apple. If the amount of cranberry is represented by x , and the amount of apple is represented by y , then each pair of quantities satisfies the equation $y = \frac{5}{3}x$. A similar true relationship could be derived by comparing the amount of cranberry to the amount of apple. In the case where x is the amount of apple and y is the amount of cranberry, the equation would be $y = \frac{3}{5}x$.

- John is filling a bathtub that is 18 inches deep. He notices that it takes two minutes to fill the tub with three inches of water. He estimates it will take 10 more minutes for the water to reach the top of the tub if it continues at the same rate. Is he correct? Explain.

Yes. In 10 more minutes, the tub will reach 18 inches. At that time, the ratio of time to height may be expressed as 12 to 18, which is equivalent to 2 to 3. The height of the water in the bathtub increases $1\frac{1}{2}$ inches every minute.

| | | | |
|-------------------------------|----------------|---|----|
| Time (minutes) | 1 | 2 | 12 |
| Bathtub Water Height (inches) | $1\frac{1}{2}$ | 3 | 18 |

Exit Ticket Sample Solutions

The table below shows the price, in dollars, for the number of roses indicated.

| | | | | | |
|-----------------|---|----|----|----|----|
| Number of Roses | 3 | 6 | 9 | 12 | 15 |
| Price (Dollars) | 9 | 18 | 27 | 36 | 45 |

1. Is the price proportional to the number of roses? How do you know?

The quantities are proportional to one another because there is a constant of 3 such that when the number of roses is multiplied by the constant, the result is the corresponding price.

2. Find the cost of purchasing 30 roses.

If there are 30 roses, then the cost would be $30 \times 3 = \$90$.

Problem Set Sample Solutions

In each table, determine if y is proportional to x . Explain why or why not.

1.

| | |
|-----|-----|
| x | y |
| 3 | 12 |
| 5 | 20 |
| 2 | 8 |
| 8 | 32 |

2.

| | |
|-----|-----|
| x | y |
| 3 | 15 |
| 4 | 17 |
| 5 | 19 |
| 6 | 21 |

3.

| | |
|-----|-----|
| x | y |
| 6 | 4 |
| 9 | 6 |
| 12 | 8 |
| 3 | 2 |

1. *Yes, y is proportional to x because the values of all ratios of $\frac{y}{x}$ are equivalent to 4. Each measure of x multiplied by this constant of 4 gives the corresponding measure in y .*

2. *No, y is not proportional to x because the values of all the ratios of $\frac{y}{x}$ are not equivalent. There is not a constant where every measure of x multiplied by the constant gives the corresponding measure in y . The values of the ratios are 5, 4.25, 3.8, and 3.5.*

3. *Yes, y is proportional to x because a constant value of $\frac{2}{3}$ exists where each measure of x multiplied by this constant gives the corresponding measure in y .*

4. Kayla made observations about the selling price of a new brand of coffee that sold in three different-sized bags. She recorded those observations in the following table:

| | | | |
|------------------|--------|--------|--------|
| Ounces of Coffee | 6 | 8 | 16 |
| Price in Dollars | \$2.10 | \$2.80 | \$5.60 |

- a. Is the price proportional to the amount of coffee? Why or why not?

Yes, the price is proportional to the amount of coffee because a constant value of 0.35 exists where each measure of x multiplied by this constant gives the corresponding measure in y .

- b. Use the relationship to predict the cost of a 20 oz. bag of coffee.

20 ounces will cost \$7.

Exit Ticket Sample Solutions

The table below shows the relationship between the side lengths of a regular octagon and its perimeter.

| Side Lengths, s (inches) | Perimeter, P (inches) |
|-------------------------------|----------------------------|
| 1 | 8 |
| 2 | 16 |
| 3 | 24 |
| 4 | 32 |
| 9 | 72 |
| 12 | 96 |

Complete the table.

If Gabby wants to make a regular octagon with a side length of 20 inches using wire, how much wire does she need? Justify your reasoning with an explanation of whether perimeter is proportional to the side length.

$$20(8) = 160$$

Gabby would need 160 inches of wire to make a regular octagon with a side length of 20 inches. This table shows that the perimeter is proportional to the side length because the constant is 8, and when all side lengths are multiplied by the constant, the corresponding perimeter is obtained. Since the perimeter is found by adding all 8 side lengths together (or multiplying the length of 1 side by 8), the two numbers must always be proportional.

Problem Set Sample Solutions

- Joseph earns \$15 for every lawn he mows. Is the amount of money he earns proportional to the number of lawns he mows? Make a table to help you identify the type of relationship.

| | | | | |
|-----------------------|----|----|----|----|
| Number of Lawns Mowed | 1 | 2 | 3 | 4 |
| Earnings (\$) | 15 | 30 | 45 | 60 |

The table shows that the earnings are proportional to the number of lawns mowed. The value of each ratio is 15. The constant is 15.

- At the end of the summer, Caitlin had saved \$120 from her summer job. This was her initial deposit into a new savings account at the bank. As the school year starts, Caitlin is going to deposit another \$5 each week from her allowance. Is her account balance proportional to the number of weeks of deposits? Use the table below. Explain your reasoning.

| | | | | |
|----------------------|-----|-----|-----|-----|
| Time (in weeks) | 0 | 1 | 2 | 3 |
| Account Balance (\$) | 120 | 125 | 130 | 135 |

Caitlin's account balance is not proportional to the number of weeks because there is no constant such that any time in weeks can be multiplied to get the corresponding balance. In addition, the ratio of the balance to the time in weeks is different for each column in the table.

$$120:0 \text{ is not the same as } 125:1.$$



3. Lucas and Brianna read three books each last month. The table shows the number of pages in each book and the length of time it took to read the entire book.

| | | | |
|------------------|-----|-----|-----|
| Pages Lucas Read | 208 | 156 | 234 |
| Time (hours) | 8 | 6 | 9 |

 |

| | | | |
|--------------------|-----|-----|-----|
| Pages Brianna Read | 168 | 120 | 348 |
| Time (hours) | 6 | 4 | 12 |

- a. Which of the tables, if any, represent a proportional relationship?

The table shows Lucas's number of pages read to be proportional to the time because when the constant of 26 is multiplied by each measure of time, it gives the corresponding values for the number of pages read.

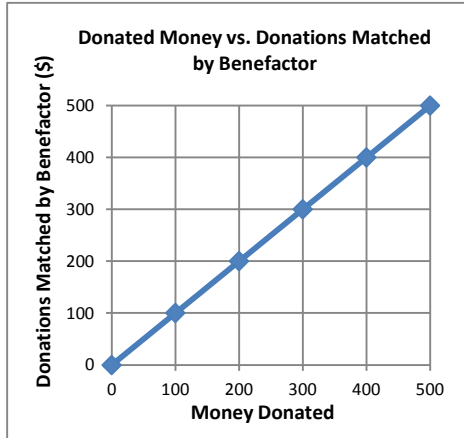
- b. Both Lucas and Brianna had specific reading goals they needed to accomplish. What different strategies did each person employ in reaching those goals?

Lucas read at a constant rate throughout the summer, 26 pages per hour, whereas Brianna's reading rate was not the same throughout the summer.

Problem Set Sample Solutions

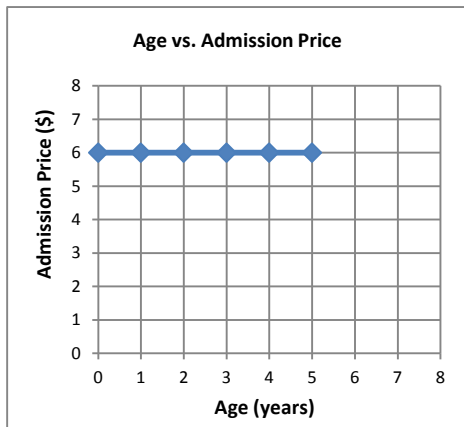
1. Determine whether or not the following graphs represent two quantities that are proportional to each other. Explain your reasoning.

a.



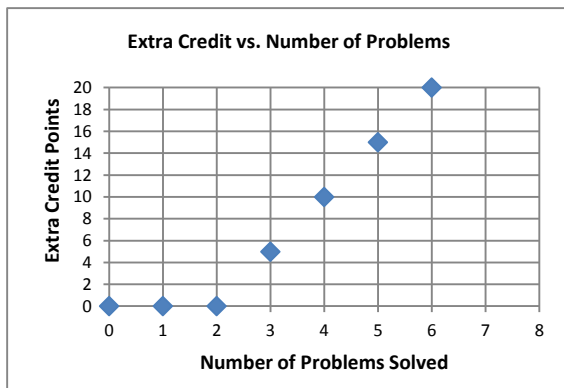
This graph represents two quantities that are proportional to each other because the points appear on a line, and the line that passes through the points would also pass through the origin.

b.



Even though the points appear on a line, the line does not go through the origin. Therefore, this graph does not represent a proportional relationship.

c.

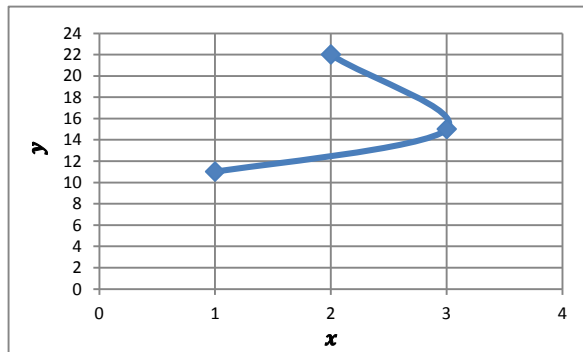


Even though it goes through the origin, this graph does not show a proportional relationship because the points do not appear on one line.

2. Create a table and a graph for the ratios 2: 22, 3 to 15, and 1: 11. Does the graph show that the two quantities are proportional to each other? Explain why or why not.

This graph does not because the points do not appear on a line that goes through the origin.

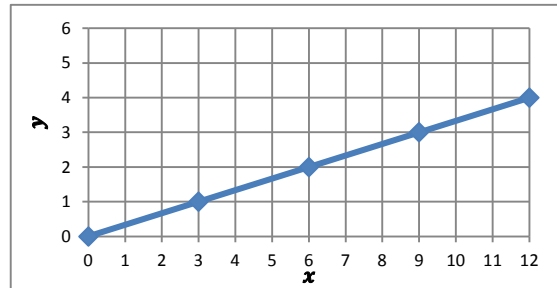
| x | y |
|-----|-----|
| 2 | 22 |
| 3 | 15 |
| 1 | 11 |



3. Graph the following tables, and identify if the two quantities are proportional to each other on the graph. Explain why or why not.

a.

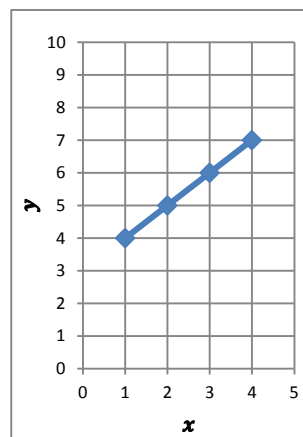
| x | y |
|-----|-----|
| 3 | 1 |
| 6 | 2 |
| 9 | 3 |
| 12 | 4 |



Yes, because the graph of the relationship is a straight line that passes through the origin.

b.

| x | y |
|-----|-----|
| 1 | 4 |
| 2 | 5 |
| 3 | 6 |
| 4 | 7 |



No, because the graph does not pass through the origin.

Exit Ticket Sample Solutions

Susan and John are buying cold drinks for a neighborhood picnic. Each person is expected to drink one can of soda. Susan says that if you multiply the unit price for a can of soda by the number of people attending the picnic, you will be able to determine the total cost of the soda. John says that if you divide the cost of a 12-pack of soda by the number of sodas, you will determine the total cost of the sodas. Who is right, and why?

Susan is correct. The table below shows that if you multiply the unit price, say 0.50, by the number of people, say 12, you will determine the total cost of the soda. I created a table to model the proportional relationship. I used a unit price of 0.50 to make the comparison.

Susan

| | | | | |
|---------------------------------|---|------|---|----|
| Number of People | 2 | 3 | 4 | 12 |
| Total Cost of Soda (in dollars) | 1 | 1.50 | 2 | 6 |

I used the same values to compare to John. $\frac{\text{total cost}}{12 \text{ people}} = ?$

The total cost is \$6, and there 12 people. $\frac{6}{12} = \frac{1}{2}$, which is \$0.50 or the unit price, not the total cost.

Problem Set Sample Solutions

For each of the following problems, define the constant of proportionality to answer the follow-up question.

1. Bananas are \$0.59/pound.

- a. What is the constant of proportionality, or k ?

The constant of proportionality, k , is 0.59.

- b. How much will 25 pounds of bananas cost?

25 lb. ($\$0.59/\text{lb.}$) = \$14.75

2. The dry cleaning fee for 3 pairs of pants is \$18.

- a. What is the constant of proportionality?

$\frac{18}{3} = 6$, so k is 6.

- b. How much will the dry cleaner charge for 11 pairs of pants?

$6(11) = 66$

The dry cleaner would charge \$66.

3. For every \$5 that Micah saves, his parents give him \$10.

- a. What is the constant of proportionality?

$\frac{10}{5} = 2$, so k is 2.

- b. If Micah saves \$150, how much money will his parents give him?

$$2(\$150) = \$300$$

4. Each school year, the seventh graders who study Life Science participate in a special field trip to the city zoo. In 2010, the school paid \$1,260 for 84 students to enter the zoo. In 2011, the school paid \$1,050 for 70 students to enter the zoo. In 2012, the school paid \$1,395 for 93 students to enter the zoo.

- a. Is the price the school pays each year in entrance fees proportional to the number of students entering the zoo?

| Number of Students | Price (\$) | |
|--------------------|------------|------------------------|
| 84 | 1,260 | $\frac{1260}{84} = 15$ |
| 70 | 1,050 | $\frac{1050}{70} = 15$ |
| 93 | 1,395 | $\frac{1395}{93} = 15$ |

- b. Explain why or why not.

The price is proportional to the number of students because the ratio of the entrance fee paid per student was the same.

$$\frac{1260}{84} = 15$$

- c. Identify the constant of proportionality and explain what it means in the context of this situation.

The constant of proportionality (k) is 15. This represents the price per student.

- d. What would the school pay if 120 students entered the zoo?

$$120 \text{ students } (\$15 \text{ per student}) = \$1800$$

- e. How many students would enter the zoo if the school paid \$1,425?

$$\frac{1425}{15} = 95 \text{ students}$$