

Name _____

Date _____

Proportional Relationships

Ms. Alberro 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. Alberro'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?

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

Amount of Cranberry			
Amount of Apple			

- b. Why are these quantities proportional?
2. 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 ten more minutes for the water to reach the top of the tub if it continues at the same rate. Is he correct? Explain.

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

1. A cran-apple juice blend is mixed in a ratio of cranberry to apple of 3 to 5.

- a. Complete the table to show different amounts that are proportional.

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

- b. 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 $y = \frac{3}{5}x$.

2. 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 ten 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