**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U3 CWK # 2 *Proportional Relationships***

In 6th and 7th grade you studied **proportional relationships** and represented these relationships in various ways. The problems given below will help you to review how ratio and proportion can help relate and represent mathematical quantities from a given situation.

**1.** Julie is picking teammates for her flag football team. She picks three girls for every boy.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Complete the table below to show the relationship of boys to girls on Julie’s team.

|  |  |
| --- | --- |
| Boys | Girls |
| 1 |  |
| 2 |  |
|  | 9 |
| 4 |  |

 | 1. Graph the girl to boy relationship for Julie’s team with boys on the *x*-axis and girls on the *y*-axis.
 |

1. Find the ratio of girls to boys for several different ordered pairs in the table.

$$\frac{number of girls}{number of boys}= $$

1. Fill in the boxes to show the relationship between girls and boys on Julie’s team.

**3 times**

 **=**

1. Use the equation and graph to determine how many girls would be on the team if Julie chose 10 boys to be on the team.
2. Use the equation and graph to determine how many boys are on the team if Julie chose 18 girls.

In the previous example the two quantities of interest are in a **proportional relation**.

Recall that when two quantities are proportionally related, the ratio of each *y* value to its corresponding *x* value is constant. This constant is called the **constant of proportionality** or **proportional constant**.

The ratio that related the number of boys to girls was 3. This is the proportional constant for this relationship.

1. Carmen is making homemade root beer for an upcoming charity fundraiser. The number of pounds of dry ice to the ounces of root beer extract (flavoring) is proportionally related. If Carmen uses 12 pounds of dry ice she will need to use 8 ounces of root beer extract.
2. Write a ratio/proportional constant that relates the number of pounds of dry ice to the number of ounces of root beer extract.
	1. Write a ratio/proportional constant that relates the number of ounces of root beer extract to the number pounds of dry ice.

Notice that the proportional constant depends on how you define your items.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Complete the table below to show the relationship between number ounces of root beer extract *x* and number of pounds of dry ice *y* needed to make homemade root beer.

|  |  |
| --- | --- |
| Ounces of Root Beer Extract(*x*) | Pounds of Dry Ice(*y*) |
| 0 |  |
|  | $$\frac{3}{2}=1.5$$ |
| 2 |  |
| 3 |  |
|  | 6 |
| 8 |  |

 | 1. Graph and label this relationship below.
 |

1. What is the proportional constant for this relationship?
2. Write an equation that shows the relationship between the number of ounces of root beer extract (*x)* and the number of pounds of dry ice *(y)* needed to make homemade root beer.

Every ratio has an associated rate. **Unit rate** is another way of interpreting the ratio’s proportional constant. The statement below describes how unit rate defines *y* and *x* in a proportional relationship.

If quantities *y* and *x* are in proportion then the **unit rate** of *y* with respect to *x* is the amount of *y* that corresponds to one unit of *x*. If we interchange the roles of *y* and *x*, we would speak of the unit rate of *x* with respect to *y*.

1. In the previous problem Carmen was making homemade root beer. Express the proportional constant as a unit rate.
2. What would the unit rate be if we interchanged the roles of *x* and *y*?

In the problem below use the properties of a proportional relationship to help you answer the question.

1. Doug is pouring cement for his backyard patio that is 100 square feet. The cement comes out of the truck at a constant rate. It is very important that he gets all the cement poured before 12:00 noon when it gets too hot for the cement to be mixed properly. It is currently 11:00 AM and he has poured 75 square feet of concrete in the last 3 hours. At this rate will he finish before noon?

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |
| --- | --- |
| Time elapsed (hours)***x*** | Amount of concrete poured (square feet)***y*** |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 (11:00AM) | 75 |
| 4 |  |

1. Fill in the missing items in the table if *x* represents the number of hours that have passed since Doug began pouring concrete and *y* represents the amount of concrete poured
 | 1. Graph the relationship below.
 |

1. What is the unit rate for this relationship? In other words, how many square feet of concrete can Doug pour in 1 hour.
2. Which equation given below best describes this relationship?

|  |  |
| --- | --- |
| 1. *y=25x*
 | 1. *y=75x*
 |
| 1. *x=25y*
 | 1. *y=11x*
 |

1. Will Doug finish the job in time? Justify your answer.
2. Vanessa is mixing formula for her baby. The graph given to the right describes the relationship between the ounces of water to the scoops of formula to make a properly mixed bottle.



1. Does the graph describe a proportional relationship? Justify your answer.
2. What is the unit rate for this relationship? Show on the graph how you can see the unit rate.
3. At a different location on the graph show and explain how you can find the unit rate.
4. Write an equation to relate the ounces of water to the scoops of formula.
5. How many scoops of formula must Vanessa use to make 9 ounce bottle for her baby?

Draw at (1, -4)