This worksheet is about graphing and understanding real-world proportional relationships. It continues to ask students to draw connections between slope and the constant of proportionality. It also provides students the change to solve multi-step word problems involving ratios and percents (both of which were taught in basic math).

Graphing and understanding real-world proportional relationships

The most important thing to teach students about doing ANY real-world is to a picture or chart or table or graph. In this homework charts and tables are often part of final answers but even when they are not, students need charts/tables as part of their work.

Sample problem:

A new self-serve frozen yogurt store opened this summer that sells its yogurt at a price based upon the total weight of the yogurt and its toppings in a dish. Each member of Isabelle's family weighed their dish. Isabelle's dad had 12.5 ounces and paid $5, her mom had 10 ounces and paid $4, her younger sister had 5 ounces and paid $2, and Isabelle had 8 ounces and paid $3.20.

- Does everyone pay the same cost per ounce? How do you know?
    - Yes, it costs $0.40 per ounce. If we divide each cost value by its corresponding weight, it will give the same unit price (or unit rate) of 0.40. Since we want to compare cost per ounce, we can use the unit (cost per ounce) to determine that we want to divide each cost value by each corresponding weight value.
- Isabelle's brother takes an extra long time to create his dish. When he puts it on the scale, it weighs 15 ounces. If everyone pays the same rate in this store, how much will his dish cost? How did you calculate this cost?
    - $6. Guide students to notice that if you multiply the number of ounces by the constant (cost per ounce), it will give you the total cost. Take a moment to have students confer that this would be true for the values they found.

Practice Problem:

In the back of a recipe book, there is a list that provides easy conversions to use while cooking.

.5 cups = 4 ounces

1 cup = 8 ounces

1.5 = 12 ounces

2 cups = 16 ounces

Construct a table. Is the number of ounces proportional to the number of cups? How do you know?

Sample problem:

Which Team Will Win the Race?

You have decided to run in a long distance race. There are two teams that you can join. Team A runs at a constant rate of 2.5 miles per hour. Team B runs 4 miles the first hour and then 2 miles per hour after that. Create a table for each team showing the distances that would be run for times of 1, 2, 3, 4, 5, and 6 hours. Using your tables, answer the questions that follow:

Team A	
Time (hrs)	Distance (miles)
1	2.5
2	5
3	7.5
4	10
5	12.5
6	15

Team B	
Time (hrs)	Distance (miles)
1	4
2	6
3	8
4	10
5	12
6	14

- For which team is distance proportional to time? Explain your reasoning.
    - *Team A since all the ratios comparing distance to time are equivalent. The equivalent ratio is 2.5. Every measure of time can be multiplied by 2.5 to give the corresponding measures of distance.*

- Explain how you know the distance for the other team is not proportional to time.
    - *In team B the ratios are not equivalent. The ratios are 4, 3, 8/3, 2.5, 12/5, and 14/6. Therefore, every measure of time cannot be multiplied by a constant to give each corresponding measure of distance.*
- If the race were 2.5 miles long, which team would win? Explain.
    - *Team B would win because more distance was covered in less time.*
- If the race were 3.5 miles long, which team would win? Explain.
    - *Team B would win because more distance was covered in less time.*
- If the race were 4.5 miles long, which team would win? Explain.
    - *Team A would win because more distance was covered in less time*
- For what length race would it be better to be on Team B than Team A? Explain.
    - *If the race were less than 10 miles, Team B is faster because more distance would be covered in less time.*
- Using this relationship, if the members on the team ran for 10 hours, how far would each member run on each team?
    - *Team A = 25 miles Team B = 22 miles*
- Will there always be a winning team, no matter what the length of the course? Why or why not?
    - *No, there would be a tie (both teams win) at 4 hours.*
- If the race were 12 miles long, which team should you choose to be on if you wish to win? Why would you choose this team?
    - *Team A because they would finish in 4.8 hours compared to Team B in 5 hours*
- How much sooner would you finish on that team compared to the other team?
    - *2 hours*

Practice Problem:

Brandon came home from school and informed his mother that he had volunteered to make cookies for his entire grade level. He needed 3 cookies for each of the 96 students in 7^{th} grade. Unfortunately, he needed the cookies for an event at school on the very next day! Brandon and his mother determined that they can fit 36 cookies on two cookie sheets. ***Make sure students to make a chart to organize the data from the problem.***

a. Is the number of cookies proportional to the number of sheets used in baking? What is the constant of proportionality? Create a table that shows data for the number of sheets needed for the total number of cookies needed.
b. It took 2 hours to bake 8 sheets of cookies. If Brandon and his mother begin baking at 4:00 pm, when will they finish baking the cookies?