

Lesson 4: Comparing Proportional Relationships

Let's compare proportional relationships.

4.1: What's the Relationship?

The equation $y = 4.2x$ could represent a variety of different situations.

1. Write a description of a situation represented by this equation. Decide what quantities x and y represent in your situation.
2. Make a table and a graph that represent the situation.

4.2: Comparing Two Different Representations

1. Elena babysits her neighbor's children. Her earnings are given by the equation $y = 8.40x$, where x represents the number of hours she worked and y represents the amount of money she earned.

Jada earns \$7 per hour mowing her neighbors' lawns.

- a. Who makes more money after working 12 hours? How much more do they make? Explain your reasoning by creating a graph or a table.

- b. What is the rate of change for each situation and what does it mean?

- c. Using your graph or table, determine how long it would take each person to earn \$150.

2. Clare and Han have summer jobs stuffing envelopes for two different companies.

Han earns \$15 for every 300 envelopes he finishes.

Clare's earnings can be seen in the table.

number of envelopes	money in dollars
400	40
900	90

a. By creating a graph, show how much money each person makes after stuffing 1,500 envelopes.

b. What is the rate of change for each situation and what does it mean?

c. Using your graph, determine how much more money one person makes relative to the other after stuffing 1,500 envelopes. Explain or show your reasoning.

3. Tyler plans to start a lemonade stand and is trying to perfect his recipe for lemonade. He wants to make sure the recipe doesn't use too much lemonade mix (lemon juice and sugar) but still tastes good.

Lemonade Recipe 1 is given by the equation $y = 4x$ where x represents the amount of lemonade mix in cups and y represents the amount of water in cups.

Lemonade Recipe 2 is given in the table.

lemonade mix (cups)	water (cups)
10	50
13	65
21	105

- a. If Tyler had 16 cups of lemonade mix, how many cups of water would he need for each recipe? Explain your reasoning by creating a graph or a table.

- b. What is the rate of change for each situation and what does it mean?

- c. Tyler has a 5-gallon jug (which holds 80 cups) to use for his lemonade stand and 16 cups of lemonade mix. Which lemonade recipe should he use? Explain or show your reasoning.

Are you ready for more?

Han and Clare are still stuffing envelopes. Han can stuff 20 envelopes in a minute, and Clare can stuff 10 envelopes in a minute. They start working together on a pile of 1,000 envelopes.

1. How long does it take them to finish the pile?
2. Who earns more money?

Lesson 4 Summary

When two proportional relationships are represented in different ways, we compare them by finding a common piece of information.

For example, Clare's earnings are represented by the equation $y = 14.5x$, where y is her earnings in dollars for working x hours.

The table shows some information about Jada's pay.

time worked (hours)	earnings (dollars)
7	92.75
4.5	59.63
37	490.25

Who is paid at a higher rate per hour? How much more does that person have after 20 hours?

In Clare's equation we see that the rate of change (how many dollars she earns every hour) is 14.50.

We can calculate Jada's rate of change by dividing a value in the earnings column by the value in the same row in the time worked column. Using the last row, the rate of change for Jada is 13.25, since $490.25 \div 37 = 13.25$. An equation representing Jada's earnings is $y = 13.25x$. This means she earns \$13.25 per hour.

So Clare is paid at a higher rate than Jada. Clare earns \$1.25 more per hour than Jada. After 20 hours of work, she earns \$25 more than Jada because $20 \cdot (1.25) = 25$.