Slope and Unit Rate

Objective Interpret the slope of the graph of a proportional relationship as the unit rate of change.	**Materials** Graph paper

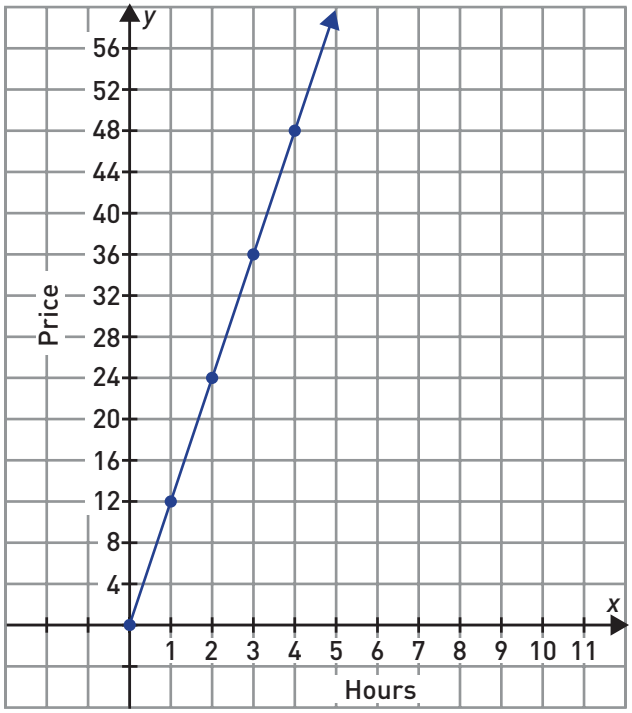
With this activity, students will continue their work on proportional thinking. Their developing understanding will include connections to their previous work with fractions, geometric similarity, graphing, rates of change, ratios, and proportions. At this point, students should be able to describe a proportional relationship in words, in a table, as a graph, or with an equation. This activity focuses on the important connection between unit rate and slope. After students make this connection, they will be asked to compare different representations of proportional relationships. They will apply what they have learned about slope and unit rate to solving, graphing, and interpreting real-world situations involving proportional relationships.

Step by Step

30–45 minutes

1 Identify the slope of a graph.

- This graph shows the total price for different numbers of hours of pet-sitting.
- The *slope* of the graph describes how much the value of *y* changes on the graph for every increase of 1 unit in the value of *x*.
- Have the student put a pencil point on (2, 0) and then move up to intersect the graph. Ask: *What is the value of y on the graph when x is 2?* (24)
- Have the student put a pencil point on (3, 0) and then move up to intersect the graph. Ask: *What is the value of y on the graph when x is 3?* (36)
- Ask: *How much does y change when x increases by 1 unit (from 2 to 3)?* (36 − 24 = 12) *What is the slope of the graph?* (12)



2 Identify the unit rate.

- Have the student identify what the *x*-axis represents and what the *y*-axis represents. Lead the student to understand that the *x*-axis represents the number of hours of pet-sitting, and the *y*-axis represents the total cost of pet-sitting.
- Explain that the unit rate describes the price per hour of pet-sitting.
- Ask: *What is the price (y) of 2 hours (x) of pet-sitting?* ($24) *What is the price (y) of 3 hours (x) of pet-sitting?* ($36)
- Ask: *How much does the total price go up every time you add 1 hour of pet-sitting? What is the unit rate in price per hour for pet-sitting?* ($12/hour)

3 Compare the slope and the unit rate.

- Have the student describe slope in his own words. Be sure the student understands that slope is the change in *y* for each increase of 1 unit of *x*.

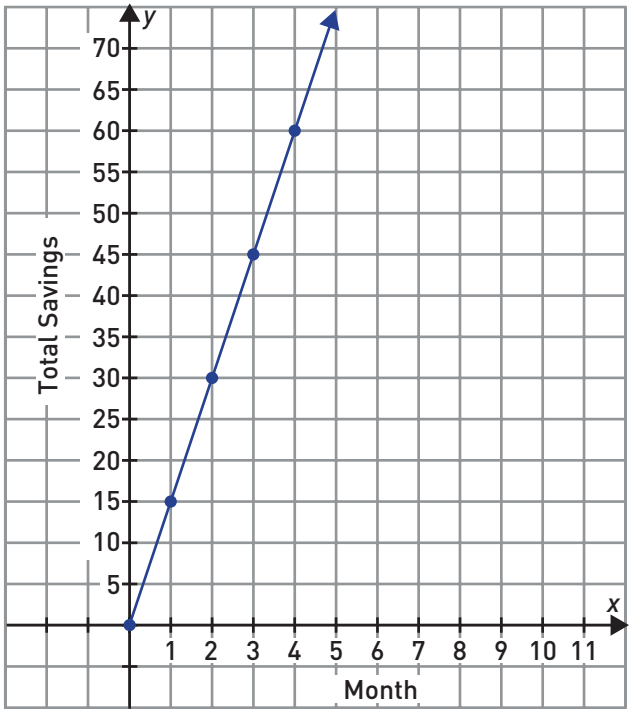
- Have the student describe unit rate in his own words. Be sure the student understands that unit rate is the change in price for each increase of 1 hour.
- Ask: *What can you conclude about slope and unit rate?* (The slope of the graph represents the unit rate.)

4 Practice.

- Give the student a second graph and have him identify the slope and unit rate.

Check for Understanding

Present the student with the following problem: The graph shows that Maya saves the same amount of money each month. What is the slope of the graph? (15) What is Maya's unit rate of savings? ($15 per month)



For the student who struggles, use the chart below to help pinpoint where extra help may be needed.

If you observe…	the student may…	Then try…
the student says that the slope is 1 and savings is $1 per month	be looking only at rate of change in *x*.	make a table of values from ordered pairs and looking for the rate of change.
the student says that the slope is 5 and savings is $5 per month	be looking at the scale of the *y*-axis.	having the student interpret the graph. Reinforce the importance of looking at both axes: (1, 15) is $15 in week 1, (2, 30) is $30 in week 2, and so on.
the student says that the slope is $\frac{1}{15}$ and savings is $0.07 per month	be calculating slope as the change in *x* for each increase of 1 unit of *y*.	having the student place a finger on each *x*-value and trace upward to see the corresponding *y*-value. Then review the meaning of slope.