Represent Proportional Relationships

Name: _____

Prerequisite: Identify Proportional Relationships

Study the example showing how to tell whether a relationship is proportional. Then solve problems 1–7.

Example

Suppose you are buying grapes at a farmers' market. The cost of the grapes you buy depends on how many pounds you get. Two different stalls sell grapes at the market. Find the ratio of the cost to weight for each pair of values in both tables.

Stall A				
Weight, in Pounds	2	4	6	8
Total Cost ($)	4	8	12	16

Stall B				
Weight, in Pounds	2	4	6	8
Total Cost ($)	8	10	12	14

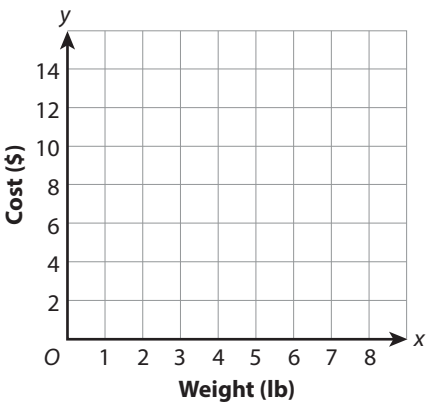
$\frac{4}{2} = 2 \quad \frac{8}{4} = 2 \quad \frac{12}{6} = 2 \quad \frac{16}{8} = 2$

$\frac{8}{2} = 4 \quad \frac{10}{4} = 2.5 \quad \frac{12}{6} = 2 \quad \frac{14}{8} = 1.75$

If a group of ratios are equivalent, they are part of a proportional relationship.

The relationship of total cost to weight in Stall A is proportional.

The relationship of total cost to weight in Stall B is not proportional.



1 Plot a point for each of the first three ordered pairs in each table. Connect the points for each relationship by drawing a line through the points to the *y*-axis.

2 Look at your graph in problem 1. Does the line for either the proportional relationship or the relationship that is not proportional go through the origin? If so, which relationship?

_____

_____

3 Suppose the cost of 10 pounds of grapes at Stall A is $15. Would the relationship still be proportional? Explain.

_____

_____

Vocabulary

proportional relationship a numerical relationship that can be represented by equivalent ratios.

Solve.

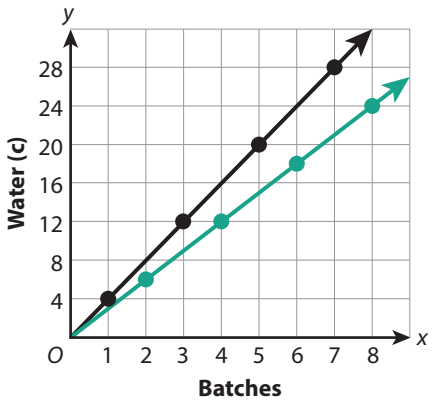
4 The number of cups of water used in two different soup recipes depends on the number of batches of the recipe you make. The tables show the number of cups of water used in the two soup recipes.

Recipe A				
Batches	2	4	6	8
Water (c)	6	12	18	24

Recipe B				
Batches	1	3	5	7
Water (c)	4	12	20	28

Do the ratios of cups of water to batches of soup in each table represent a proportional relationship? Explain.

5 The graph shows the data from the tables in problem 4. Which line represents Recipe B? Explain how you know.



6 Use the graph that you identified in problem 5 for Recipe B to find how much water is needed for 4 batches of soup. Is the ratio of water to batches equivalent to the ratios you found for Recipe B in problem 4?

7 Tomás collects sports cards. The number of baseball cards he buys each week is proportional to the number of football cards he buys.

a. Fill in the missing numbers in the table.

Week	1	2	3	4
Number of Baseball Cards	9	15		6
Number of Football Cards	6		8	

b. Suppose Tomás buys a total of 30 baseball and football cards in Week 5. How many of each would he have to buy to keep the same proportional relationship?

Name: _____

Use Tables, Graphs, and Equations

Study the example problem showing how to use a table and a graph to find a unit cost. Then solve problems 1–6.

Example

The table shows the costs for different numbers of tickets for the band concert. Find the unit cost.

Band Concert Tickets

Number of Tickets	2	4	6	8
Cost ($)	12	24	36	48

Use a Table

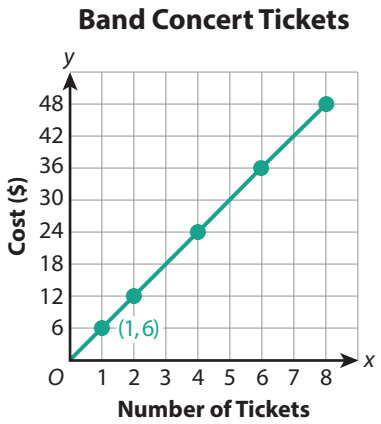
The ratios in the table are all equivalent, so you can divide the cost by the number of tickets in any of the ratios to find the unit cost.

$\frac{\$24}{4 \text{ tickets}} = \frac{\$6}{1 \text{ ticket}}$, or \$6 for 1 ticket

The unit cost is 6.

Use a Graph

The graph of the data shows that the cost of one ticket, is \$6, so the unit cost is 6.



1 Explain what the unit cost means in the context of the example problem.

_____

2 Use two points on the graph to find the slope. How does the slope relate to the unit cost?

_____

_____

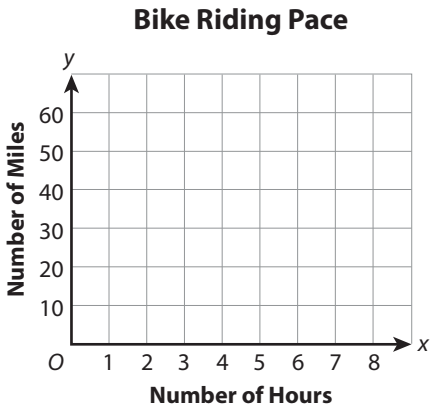
3 Use the slope you found in problem 2 to write an equation for finding the cost y of x tickets.

_____

Solve.

4 The table shows the distance Nikki travels on her bike as a function of how many hours she rides at a constant rate. Use the information in the table to make a graph, using the coordinate plane to the right. Find the slope of the graph and explain what it means in this situation.

Number of Hours	2	4	6	8
Number of Miles	16.5	33	49.5	66



5 The table below shows the cost c for different numbers of binders b. Is the relationship proportional? If so, represent it with an equation. If not, explain why not.

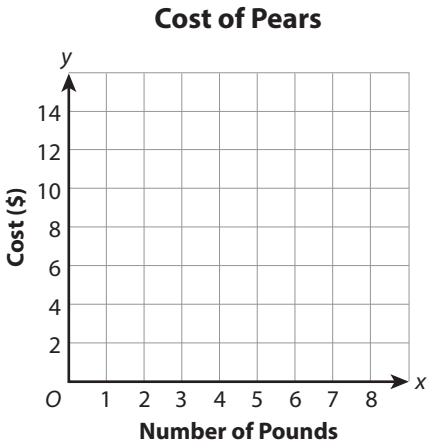
Number of Binders (b)	4	8	12	16
Cost (c)	$5.40	$10.80	$16.20	$21.60

6 Sean wrote the equation $9.25 = 5m$, where m is the cost per pound, to show the relationship between the total cost, $9.25, and the number of pounds of pears, 5, he bought at Quick Mart. Find the unit cost of the pears, write an equation to show the cost y of x pounds of pears, and use the equation to complete the table. Then use the information in your table to make a graph.

Unit cost: _____

Equation: _____

Number of Pounds		5		
Cost ($)		9.25		



Name: _____

Compare Proportional Relationships

Study the example problem showing how to compare proportional relationships. Then solve problems 1–6.

Example

The table and the equation show the rates at which two different students read in words per minute. Which student reads faster?

Student A

Number of Minutes	1	2	3	4
Number of Words Read	150	300	450	600

Student B

$y = 158x$, where x is the number of minutes and y is the number of words read.

For Student A use the table to find the number of words read in 1 minute, and for Student B use the slope in the equation.

Student A: 150 words per minute
Student B: 158 words per minute

Compare the rates: $158 > 150$.
Student B reads faster.

1 How much faster does Student B read than Student A?

_____

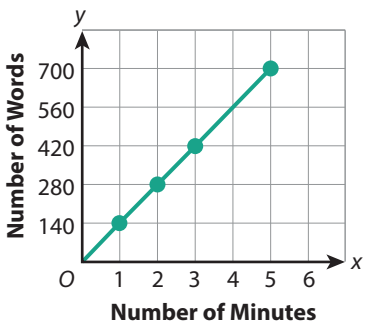
2 The graph shows the rate at which Student C reads. Explain how to find the reading rate for Student C from the graph.

_____

_____

_____

Student C Reading Rate



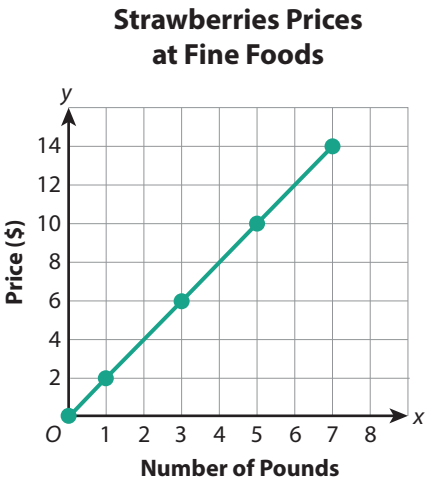
3 List the three students and their reading rates in order from fastest reader to slowest reader.

_____

_____

Solve.

4 The price of strawberries at Fine Foods is shown in the graph. At Best Market, the price y for x pounds of strawberries is given by $y = 2.9x$. Which store sells strawberries at a higher unit price? How much more will you pay for 6 pounds of strawberries at that store than the other store?



5 The price y for x pounds of nails at U-Fix-It is represented by $y = 4.4x$. The unit price for the same type of nails at Just Hardware is \$0.30 per pound greater than the unit price at U-Fix-It. Complete the table to show the costs for 1, 2, 3, and 4 of pounds of nails at Just Hardware.

Number of Pounds	1	2	3	4
Price ($)				

6 The table and the equation show the approximate speeds for a roadrunner and a coyote running at top speed. Which animal runs faster? How much faster per minute? (1 mile = 5,280 feet, 1 minute = 60 seconds)

Roadrunner

Number of Seconds	1	2	3	4
Number of Feet	29	58	87	116

Coyote

$y = 0.7x$, where x is the number of minutes and y is the number miles.

Show your work.

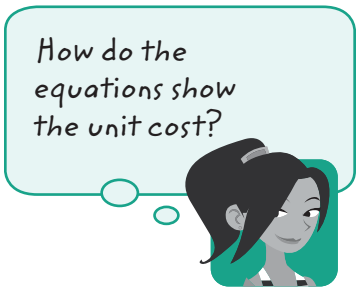
Solution: _____

Name: _____

Represent Proportional Relationships

Solve the problems.

1 The cost y (in dollars) for x ounces of peanuts is represented by the equation $y = 0.23x$. The cost y (in dollars) for x ounces of pecans is represented by the equation $y = 0.45x$. Which statement is true? Select all that apply.



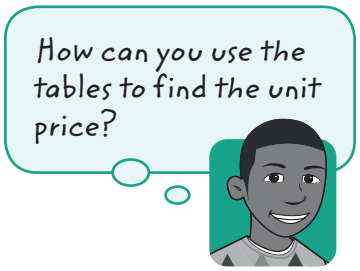
A The cost for peanuts is $0.22 per ounce less than the cost for pecans.

B The cost for peanuts is greater than the cost for pecans.

C The cost for 8 ounces of peanuts is $3.60.

D The cost for 8 ounces of pecans is $3.60.

2 For each table, write in the equation that represents the price per ticket.



Tickets, x	2	5	6	8
Price ($), y	15	37.50	45	60

Tickets, x	3	4	5	6
Price ($), y	27.75	37	46.25	55.50

Tickets, x	2	3	4	5
Price ($), y	12	18	24	30

Solve.

3 Which equation can be used to represent the distance d for the times t given in the table?

Time, t (sec)	4	6	8	10
Distance, d (ft)	234	351	468	585

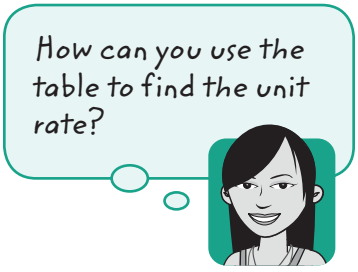
A $d = 234t$

B $d = 58.5t$

C $d = 4t$

D $d = \frac{1}{58.5}t$

Rebekah chose **A** as the correct answer. How did she get that answer?



4 A grocery store sells Health-Wise orange juice in a quart bottle for $2.24. The store also sells a 59-ounce bottle of Health-Wise orange juice for $3.54.

Part A

Identify the unit cost for each bottle of orange juice. (1 quart = 32 ounces).

Show your work.

Solution: _____

Part B

Which bottle of orange juice is the better buy?

Solution: _____