Rate Rule Detectives

Find the constant rate and write a proportional equation.

NY-7.RP.2 · Recognize and represent proportional relationships between quantities.

Name _____ Date _____

Spot the Constant Rate

A relationship is proportional when the output divided by the input stays the same for every pair with a nonzero input. This constant rate is called k, and you can write the relationship as output = kx, where x is the input.

Worked example

At a music shop, 8 albums cost $56. Let x be the number of albums. Write an equation for the cost.

1. Find the cost for 1 album: 56/8 = 7.
2. The constant rate is $7 per album.
3. Multiply the number of albums by 7.

cost = 7x

1. Practice

Five art brushes use 15 mL of paint, and 9 art brushes use 27 mL of paint. Is the paint amount proportional to the number of brushes? Explain by comparing unit rates.

2. Practice

Six game tokens cost $18. At the same price per token, 11 tokens cost x dollars. Find x.

3. Practice

A bike travels 42 miles in 3 hours at a constant speed. Let x be the number of hours. Write an equation for the distance traveled.

4. Practice

A proportional relationship includes the points (2, 10), (4, 20), and (6, 30). Let x be the first coordinate. Write an equation for the second coordinate.

5. Practice

A club orders T-shirts. Two shirts cost $24, 5 shirts cost $60, and 10 shirts cost $125. Is the cost proportional to the number of shirts? Explain.

6. Practice

A phone case printer charges $13 for 2 cases at a constant price per case. Let x be the number of cases. Write an equation for the cost.

7. Apply

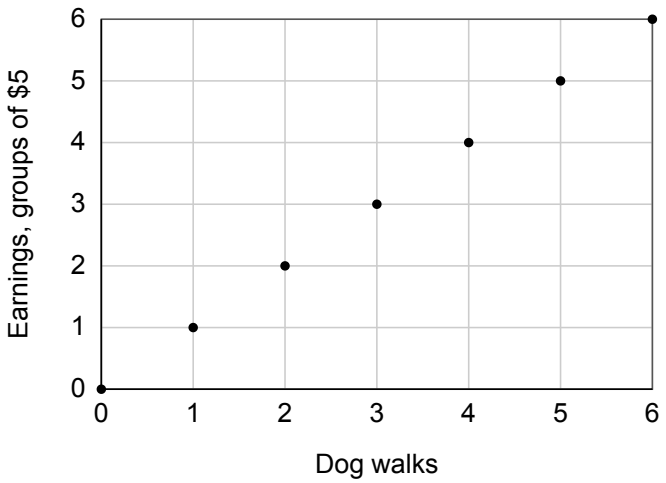
A student edits short video clips at a steady rate. Let x be the number of minutes. Use the table to write an equation for the number of clips, then find how many clips the student can edit in 13 minutes.

Video Clips Edited

Minutes	Clips
2	6
5	15
10	30

8. Apply

The graph shows earnings from dog walking. The vertical axis counts groups of $5. Is the relationship proportional? State the dollar rate, write an equation for earnings, and find the earnings for 9 walks. Only whole walks are possible; each plotted point represents a completed walk.



9. Challenge

At a school market, 3 keychains cost $18 and 5 keychains cost $30. Let x be the number of keychains. Write an equation for the cost, find x when the cost is $54, and decide whether the statement "$66 buys 10 keychains" is compatible with the relationship. Explain.

What to accept

Accept equivalent equations that clearly show the same constant rate, such as 14x for distance. For explanations, accept any correct comparison of unit rates or proof that the relationship does or does not have one constant rate.

1. Practice

Yes; 15/5 = 3 mL per brush and 27/9 = 3 mL per brush.

2. Practice

x = 33

3. Practice

distance = 14x

4. Practice

second coordinate = 5x

5. Practice

No; 24/2 = 12 and 60/5 = 12, but 125/10 = 12.5.

6. Practice

cost = 13/2x

7. Apply

number of clips = 3x; 39 clips

Divide clips by minutes to find the constant rate: 6/2 = 3 clips per minute. Use 3(13) to find 39 clips.

8. Apply

Yes; $5 per walk; earnings = 5x; $45

The plotted points have earnings of $5 times the walk count, including (0,0). Nine walks earn 9 × $5 = $45.

9. Challenge

cost = 6x; x = 9; No, because 10 keychains should cost $60, not $66.