

Rate Rule Detectives

Find the constant of proportionality and represent each relationship.

GRADE 7 • MA.7.AR.4

MA.7.AR.4 "Analyze and represent two-variable proportional relationships."

NAME _____

DATE _____

ONE CONSTANT RATE

A relationship is proportional when y/x stays the same for every pair with x not equal to zero. That constant rate is k , and you can represent the relationship with $y = kx$.

WORKED EXAMPLE

A recipe uses 8 cups of water for 2 batches. Write an equation relating cups of water y to batches x , then find y for 5 batches.

1. Find the unit rate: $8 / 2 = 4$ cups per batch.
2. Use the rate as k : $y = 4x$.
3. Substitute $x = 5$: $y = 4(5) = 20$.

Answer: $y = 4x$; 20 cups of water

PRACTICE 6 problems

- 1** The table shows x : 3, 6, 9 and y : 18, 36, 54. Is the relationship proportional? Write its equation.

ANSWER _____

- 2** Are the pairs (3, 21), (6, 42), and (9, 65) proportional? Explain using ratios.

ANSWER _____

- 3** For the proportional relationship $y = 11x$, find y when $x = 7$.

ANSWER _____

- 4** The table shows x : 3, 6, 12 and y : 21, 42, 84. Write an equation for the relationship.

ANSWER _____

- 5** Which ordered pair lies on $y = 9x$? A. (6, 54)
B. (9, 72) C. (12, 96)

ANSWER _____

- 6** A proportional relationship has $k = 7/3$. Find y when $x = 18$.

ANSWER _____

APPLY IT Show your work

- 1** At an arcade, 6 game tokens cost \$18. The cost c is proportional to the number of tokens t . Write an equation for the cost, then find the cost of 11 tokens.

WORK SPACE

ANSWER _____

- 2** A student club sells 9 poster prints for \$27 at a constant price per print. How much will 14 prints cost? Write an equation using c for cost and p for prints.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A music club awards points proportionally to songs played. The table shows 3 songs for 18 points, 9 songs for 54 points, and 15 songs for 90 points. Jordan says that 21 songs earn 120 points. Is Jordan correct? Explain and give the correct number of points.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The table shows x: 3, 6, 9 and y: 18, 36, 54. Is the relationship proportional? Write its equation.	Yes; $k = 6$, so $y = 6x$.
2	Are the pairs (3, 21), (6, 42), and (9, 65) proportional? Explain using ratios.	No. $21/3 = 42/6 = 7$, but $65/9$ is not 7.
3	For the proportional relationship $y = 11x$, find y when $x = 7$.	77
4	The table shows x: 3, 6, 12 and y: 21, 42, 84. Write an equation for the relationship.	$y = 7x$
5	Which ordered pair lies on $y = 9x$? A. (6, 54) B. (9, 72) C. (12, 96)	A. (6, 54)
6	A proportional relationship has $k = 7/3$. Find y when $x = 18$.	42

PART 2 • APPLY IT

- $c = 3t$; \$33** Divide \$18 by 6 to find a unit price of \$3 per token. Multiply 11 by \$3.
- $c = 3p$; \$42** The unit price is $\$27 / 9 = \3 per print. Use $c = 3p$ and substitute $p = 14$.

CHALLENGE

No. The rate is 6 points per song, so 21 songs earn 126 points.

Accept equivalent equations with the variables reversed appropriately, such as $c = 3t$ or $3t = c$. For proportionality explanations, students should show that the ratios are constant or identify the constant rate.