

Rate Connection Lab

Link tables, equations, and graphs for proportional relationships.

GRADE 7 • 7.PFA.1.e

7.PFA.1.e "Make connections between and among representations of a proportional relationship between two quantities using problems in context, tables, equations, and graphs..."

NAME _____

DATE _____

ONE RATE, MANY FORMS

In a proportional relationship, the graph is a line through (0,0), and the equation has the form $y=kx$. The constant k is the unit rate and the slope, so divide y by x for a point with x not equal to 0. Use k to connect a table, equation, or graph.

WORKED EXAMPLE

A line goes through (0,0) and (5,20). Write an equation for the line. Then find y when $x=8$.

1. Find k : $20/5=4$.
2. Write the equation: $y=4x$.
3. Substitute $x=8$: $y=4(8)=32$.

Answer: $y=4x$; $y=32$ when $x=8$.

PRACTICE 6 problems

- 1** The table shows a proportional relationship.
x: 1, 2, 6 y: 3, 6, 18 Write an equation. Then find y when $x=10$.

ANSWER _____

- 2** The equation $y=-2x$ represents a proportional relationship. What is the slope? Find y when $x=-7$.

ANSWER _____

- 3** A graph is a line through (0,0) and (9,18). What is the unit rate? Write an equation for the line.

ANSWER _____

- 4** Complete the proportional table and write its equation. x: 0, 10, 16 y: 0, 15, ____

ANSWER _____

- 5** Which ordered pair lies on the graph of $y=3/7x$? A. (14,6) B. (14,7) C. (21,6)

ANSWER _____

- 6** A line through (0,0) also passes through (-2,14). Write an equation for the line and name its slope.

ANSWER _____

APPLY IT Show your work

- 1** At an online game tournament, you earn 6 tickets for each match you complete. You start with 0 tickets. Write an equation for tickets y after x matches. Then list the ticket totals for $x=0$, $x=3$, and $x=11$ as ordered pairs that could be plotted.

WORK SPACE

ANSWER _____

- 2** A student saves \$9 per week for headphones and starts with \$0. A graph includes the point (12,108). Does this point fit the relationship? Write an equation and give another point on the graph when $x=13$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A line passes through (0,0) and (12,-18). A table for the same relationship includes $x=2$ and $y=-3$. Another representation is $y=-3/2x$. Are all three representations of the same proportional relationship? Explain your reasoning.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The table shows a proportional relationship. x: 1, 2, 6 y: 3, 6, 18 Write an equation. Then find y when x=10.	$y=3x$; $y=30$ when $x=10$.
2	The equation $y=-2x$ represents a proportional relationship. What is the slope? Find y when $x=-7$.	Slope: -2; $y=14$.
3	A graph is a line through (0,0) and (9,18). What is the unit rate? Write an equation for the line.	Unit rate: 2; $y=2x$.
4	Complete the proportional table and write its equation. x: 0, 10, 16 y: 0, 15, ____	24; $y=3/2x$.
5	Which ordered pair lies on the graph of $y=3/7x$? A. (14,6) B. (14,7) C. (21,6)	A. (14,6)
6	A line through (0,0) also passes through (-2,14). Write an equation for the line and name its slope.	$y=-7x$; slope: -7.

PART 2 • APPLY IT

- $y=6x$; (0,0), (3,18), (11,66).** The unit rate is 6 tickets per match, so multiply each x-value by 6. The ordered pairs can be plotted on a graph of $y=6x$.
- Yes; $y=9x$; (13,117).** After 12 weeks, 12 times 9 equals 108, so the point fits. Use $y=9x$ to find that 13 weeks gives \$117.

CHALLENGE

Yes. The slope from the graph is $-18/12=-3/2$, the equation has slope $-3/2$, and when $x=2$, $y=(-3/2)(2)=-3$.

Accept equivalent equation forms, such as $y=(3/2)x$ for $y=3/2x$. For ordered pairs, require the x-value first and accept correct reasoning that compares unit rates or slopes.