

Equation Detectives

Find the rule behind each linear pattern.

GRADE 8 • 8.PFA.3.e

8.PFA.3.e "Write an equation of a linear function in the form $y = mx + b$, given a graph, table, or a situation in context."

NAME _____

DATE _____

BUILD THE EQUATION

Find the slope m by dividing the change in y by the change in x . Then use a point on the line to find b , the y -intercept, and write the rule as $y = mx + b$.

WORKED EXAMPLE

A line passes through (11, 8) and (17, 14). Write its equation.

1. Find the slope: $m = (14 - 8)/(17 - 11) = 6/6 = 1$.

2. Use (11, 8): $8 = 1(11) + b$.

3. Solve for b : $b = -3$.

Answer: $y = x - 3$

PRACTICE 6 problems

1 A graph shows a line passing through (2, 7) and (5, 13). Write the equation of the line.

ANSWER _____

2 Write an equation for the table. x : -2, 0, 2 y : 10, 6, 2

ANSWER _____

3 Write an equation for the table. x : 0, 4, 8 y : 2, 5, 8

ANSWER _____

4 A graph has a y -intercept of -4 and passes through (6, 5). Write the equation of the line.

ANSWER _____

5 A line passes through (-3, 8) and (1, 0). Write the equation of the line.

ANSWER _____

6 Write an equation for the table. x : -4, -2, 0, 2 y : -9, -5, -1, 3

ANSWER _____

APPLY IT Show your work

- 1** A custom keychain shop charges a \$4 design fee plus \$7 for each keychain. Let x be the number of keychains and y be the total cost in dollars. Write an equation for the total cost.

WORK SPACE

ANSWER _____

- 2** A student earns \$18 from a sponsor and then earns \$3 for each video they edit. Let x be the number of videos and y be the total earnings in dollars. Write an equation for the total earnings.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A line passes through $(2, -5)$ and $(8, 4)$. Write the equation of the line in $y = mx + b$ form. Explain how you found both m and b .

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A graph shows a line passing through (2, 7) and (5, 13). Write the equation of the line.	$y = 2x + 3$
2	Write an equation for the table. x: -2, 0, 2 y: 10, 6, 2	$y = -2x + 6$
3	Write an equation for the table. x: 0, 4, 8 y: 2, 5, 8	$y = 3/4x + 2$
4	A graph has a y-intercept of -4 and passes through (6, 5). Write the equation of the line.	$y = 3/2x - 4$
5	A line passes through (-3, 8) and (1, 0). Write the equation of the line.	$y = -2x + 2$
6	Write an equation for the table. x: -4, -2, 0, 2 y: -9, -5, -1, 3	$y = 2x - 1$

PART 2 • APPLY IT

1. $y = 7x + 4$ The cost increases by \$7 for each keychain, so $m = 7$. The \$4 design fee is the starting cost, so $b = 4$.
2. $y = 3x + 18$ Earnings increase by \$3 per video, so $m = 3$. The sponsor payment is the starting amount, so $b = 18$.

CHALLENGE

$m = (4 - (-5))/(8 - 2) = 9/6 = 3/2$. Using (2, -5), $-5 = 3/2(2) + b$, so $b = -8$. Therefore, $y = 3/2x - 8$.

Accept equivalent slope forms, such as $y = 1x - 3$ for the worked example. Students may use either given point to find b , as long as the final equation is equivalent.