

Equation Detectives

Turn rates and starting values into equations.

HIGH SCHOOL • MA.912.AR.2.2

MA.912.AR.2.2 "Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context."

NAME _____

DATE _____

BUILD THE RULE

A linear relationship can be written $y=mx+b$. Find m by dividing the change in y by the change in x , then use a point to find b . In a written situation, b is the starting amount and m is the amount that changes for each 1 unit of x .

WORKED EXAMPLE

The table shows a linear relationship. Write the equation. x : 2, 4, 6 y : 11, 17, 23

1. Find the slope: $(17-11)/(4-2)=6/2=3$.
2. Use point (2,11): $11=3(2)+b$.
3. Solve for the intercept: $b=5$.
4. Write the equation: $y=3x+5$.

Answer: $y=3x+5$

PRACTICE 6 problems

- 1** The table shows a linear relationship. Write y in terms of x . x : 1, 8, 9 y : 15, 64, 71

ANSWER _____

- 2** A gaming channel starts with 30 followers and gains 9 followers each day. Let x be the number of days and y be the number of followers. Write an equation.

ANSWER _____

- 3** A graph shows a line through (0,-7) and (8,1). Write the equation of the line.

ANSWER _____

- 4** The table shows a linear relationship. Write y in terms of x . x : 0, 9, 18 y : -8, 1, 10

ANSWER _____

- 5** A digital wallet has \$50. You spend \$7 each week. Let x be the number of weeks and y be the balance in dollars. Write an equation.

ANSWER _____

- 6** A graph shows a line through (7,0) and (14,56). Write the equation of the line.

ANSWER _____

APPLY IT Show your work

- 1** A sneaker-resale app charges a seller a \$16 account fee plus \$9 for each pair of sneakers authenticated. Let x be the number of pairs and y be the total cost in dollars. Write an equation.

WORK SPACE

ANSWER _____

- 2** Your phone has 72 GB of available data. You use 8 GB each day. Let x be the number of days and y be the available data in GB. Write an equation.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A line passes through (8,18) and (16,27). Write its equation in $y=mx+b$ form. Explain how you found b .

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The table shows a linear relationship. Write y in terms of x . x : 1, 8, 9 y : 15, 64, 71	$y=7x+8$
2	A gaming channel starts with 30 followers and gains 9 followers each day. Let x be the number of days and y be the number of followers. Write an equation.	$y=9x+30$
3	A graph shows a line through (0,-7) and (8,1). Write the equation of the line.	$y=x-7$
4	The table shows a linear relationship. Write y in terms of x . x : 0, 9, 18 y : -8, 1, 10	$y=x-8$
5	A digital wallet has \$50. You spend \$7 each week. Let x be the number of weeks and y be the balance in dollars. Write an equation.	$y=-7x+50$
6	A graph shows a line through (7,0) and (14,56). Write the equation of the line.	$y=8x-56$

PART 2 · APPLY IT

1. $y=9x+16$ The account fee is the starting value, so $b=16$. The cost rises by \$9 per pair, so $m=9$.
2. $y=-8x+72$ The available data starts at 72 GB. It decreases by 8 GB each day, so the slope is -8.

CHALLENGE

$y=(9/8)x+9$. The slope is $(27-18)/(16-8)=9/8$. Using (8,18), $18=(9/8)(8)+b$, so $b=9$.

Accept equivalent equations, including forms with terms in a different order. For the challenge, accept a correct slope calculation and substitution that lead to $b=9$.