LESSON MAKER PRO

Lines Tell Stories

Connect rates and starting values to linear equations.

GRADE 8 · MA.8.AR.3

MA.8.AR.3 "Extend understanding of proportional relationships to two-variable linear equations."

NAME _____ DATE _____

RATE AND START

A two-variable linear equation can be written as y = mx + b. The number m tells how much y changes when x increases by 1, and b is the value of y when x is 0. A proportional relationship has b = 0, so its equation is y = mx.

WORKED EXAMPLE

Find y when y = 17x + 19 and x = 13.

1. Substitute 13 for x: y = 17(13) + 19.
2. Multiply: y = 221 + 19.
3. Add: y = 240.

Answer: y = 240

PRACTICE 6 problems

1 In y = 8x + 1, identify the slope and the y-intercept.

ANSWER _____

2 Use the table to write an equation in the form y = mx + b.

INPUT AND OUTPUT

x	y
0	2
1	8
2	14
3	20

ANSWER _____

3 For y = 9x - 6, find y when x = 4.

ANSWER _____

4 A line has a y-intercept of -2. Its y-value increases by 4 each time x increases by 1. Write its equation.

ANSWER _____

5 Which equation represents a proportional relationship? Write the letter and a reason. A. y = 12x + 1 B. y = x + 12 C. y = 12x

ANSWER _____

6 For y = 3x + 9, find x when y = 27.

ANSWER _____

APPLY IT Show your work

1 A music app charges a $6 monthly fee plus $2 for each premium song download. Let x be the number of downloads and y be the total cost. Write an equation for y. Then find the total cost for 9 downloads.

WORK SPACE

ANSWER _____

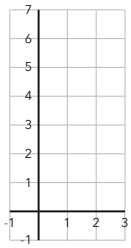
2 An arcade card costs $8, and each game costs $4. You have $32. Let x be the number of games and y be the total cost. Write an equation for y. Then determine how many games you can play.

WORK SPACE

ANSWER _____

CHALLENGE One step up

On the grid, graph y = 2x + 1. Then explain in one sentence whether the relationship is proportional.



WORK SPACE AND ANSWER

ANSWER KEY

Lines Tell Stories

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In y = 8x + 1, identify the slope and the y-intercept.	**Slope: 8; y-intercept: 1**
2	Use the table to write an equation in the form y = mx + b.	**y = 6x + 2**
3	For y = 9x - 6, find y when x = 4.	**30**
4	A line has a y-intercept of -2. Its y-value increases by 4 each time x increases by 1. Write its equation.	**y = 4x - 2**
5	Which equation represents a proportional relationship? Write the letter and a reason. A. y = 12x + 1 B. y = x + 12 C. y = 12x	**C; y = 12x has a y-intercept of 0.**
6	For y = 3x + 9, find x when y = 27.	**6**

PART 2 · APPLY IT

1. **y = 2x + 6; y = 24 when x = 9.** The monthly fee is the starting value, 6, and each download adds 2. Substitute 9 for x: y = 2(9) + 6 = 24.
2. **y = 4x + 8; x = 6 games.** The card is the starting cost, 8, and each game adds 4. Set 32 = 4x + 8, then subtract 8 and divide by 4.

CHALLENGE

Plot (-1,-1), (0,1), (1,3), (2,5), and (3,7), then draw a line. It is not proportional because its y-intercept is 1, so it does not pass through (0,0).

Accept equivalent equation forms, such as y = 6 + 2x. For the challenge, accept any correctly drawn line through the listed points and a statement that identifies the nonzero y-intercept or failure to pass through the origin.