LESSON MAKER PRO

# Lines Tell Stories

*Find the rate, find the start, build the model.*

**GRADE 8 · 8.F.4**

**8.F.4** "Apply the concepts of linear functions to real-world and mathematical situations. Understand that the slope is the constant rate of change and the y-intercept is the point where x = 0..."

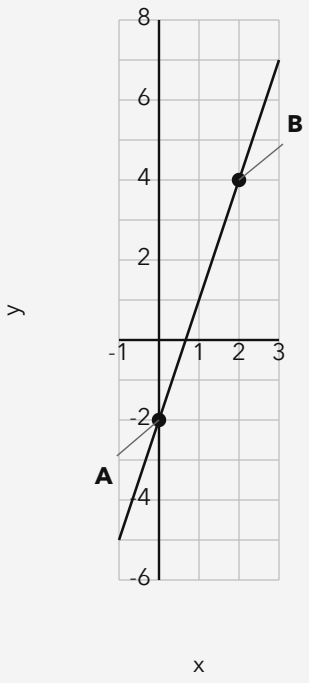
NAME _____ DATE _____

## RATE AND STARTING VALUE

For a linear relationship, slope is the change in y divided by the change in x. In y = mx + b, m is the slope and b is the y-value when x = 0. In a real situation, the slope tells how much the amount changes each time x increases by 1.

## WORKED EXAMPLE

Use the graph to find the slope and y-intercept. Then write the equation of the line.

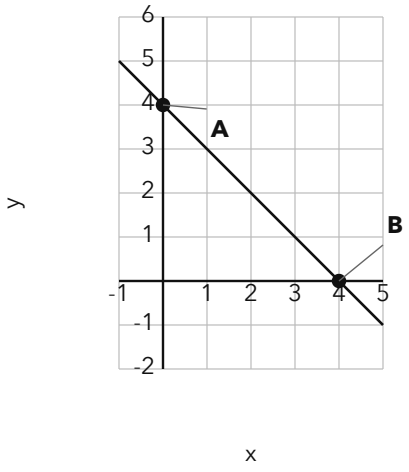



1. Read two points on the line: (0, -2) and (2, 4).
2. Find the slope: (4 - (-2)) / (2 - 0) = 6/2 = 3.
3. The line crosses the y-axis at (0, -2), so b = -2.
4. Put m and b into y = mx + b: y = 3x - 2.

**Answer: Slope: 3; y-intercept: (0, -2); equation: y = 3x - 2.**

## PRACTICE 6 problems

**1** Use the graph to find the slope and y-intercept. Write the equation of the line.




**ANSWER** _____

**2** Use the table to find the slope and y-intercept.

| x | y |
|---|---|
| 0 | 5 |
| 2 | 9 |
| 4 | 13 |

**ANSWER** _____

**3** A line passes through (2, 11) and (6, 19). Find its slope and write its equation.

**ANSWER** _____

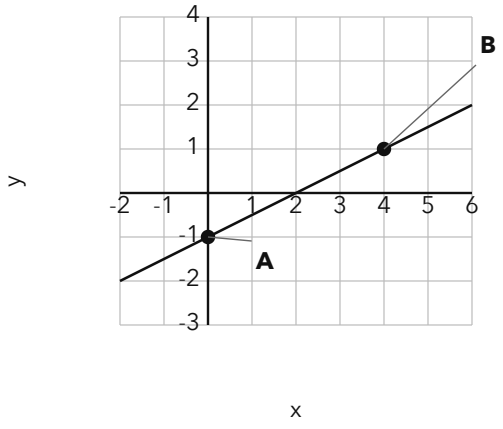
**4** For y = -4x + 6, find the slope and y-intercept.

**ANSWER** _____

**5** A sticker collection starts with 8 stickers and grows by 5 stickers each day. Let x be the number of days and y be the total stickers. Write an equation. What do its slope and y-intercept mean?

**ANSWER** _____

**6** Use the graph to find the slope and y-intercept. Write the equation of the line.




**ANSWER** _____

## APPLY IT Show your work

**1** You have $12 in an online game wallet and add $4 each week. Let x be the number of weeks and y be the balance in dollars. Write an equation, explain what its slope and y-intercept mean, and find the balance after 6 weeks.

WORK SPACE

**ANSWER** _____

**2** A video has 150 views 2 hours after upload and 330 views 5 hours after upload. Assume views grow at a constant rate. Let x be hours after upload and y be views. Write an equation, explain the slope and y-intercept, and predict the views after 7 hours.

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

A bike rental costs $17 for 2 hours and $32 for 5 hours. Another rental charges $11 to start plus $4 per hour. Let x be hours and y be cost in dollars. Write an equation for each rental. At how many hours will they cost the same, and what will that cost be? Explain how you found it.

WORK SPACE AND ANSWER

**ANSWER KEY**

# Lines Tell Stories

**GRADE 8 · 8.F.4**

## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Use the graph to find the slope and y-intercept. Write the equation of the line. | **Slope: -1; y-intercept: (0, 4); y = -x + 4.** |
| 2 | Use the table to find the slope and y-intercept. | **Slope: 2; y-intercept: (0, 5).** |
| 3 | A line passes through (2, 11) and (6, 19). Find its slope and write its equation. | **Slope: 2; y = 2x + 7.** |
| 4 | For y = -4x + 6, find the slope and y-intercept. | **Slope: -4; y-intercept: (0, 6).** |
| 5 | A sticker collection starts with 8 stickers and grows by 5 stickers each day. Let x be the number of days and y be the total stickers. Write an equation. What do its slope and y-intercept mean? | **y = 5x + 8. The slope means 5 stickers are added each day; the y-intercept means the collection started with 8 stickers.** |
| 6 | Use the graph to find the slope and y-intercept. Write the equation of the line. | **Slope: 1/2; y-intercept: (0, -1); y = (1/2)x - 1.** |

## PART 2 · APPLY IT

1. **y = 4x + 12. The slope means the balance grows by $4 per week, and the y-intercept means it started at $12. After 6 weeks, the balance is $36.** Use the weekly increase as the slope and the starting balance as the y-intercept. Substitute x = 6 to get y = 4(6) + 12 = 36.
2. **y = 60x + 30. The slope means 60 more views per hour, and the y-intercept means the model predicts 30 views at upload. After 7 hours, the model predicts 450 views.** The slope is (330 - 150) / (5 - 2) = 60 views per hour. Use 150 = 60(2) + b to find b = 30, then evaluate 60(7) + 30 = 450.

## CHALLENGE

**The first rental is y = 5x + 7, and the second is y = 4x + 11. The first rate is (32 - 17) / (5 - 2) = 5, so its starting fee is 17 - 5(2) = 7. Set 5x + 7 = 4x + 11 to get x = 4. Both rentals cost $27 for 4 hours.**

Accept the y-intercept as either b or the point (0, b). Accept equivalent equations, such as y = x/2 - 1 for problem 6.