

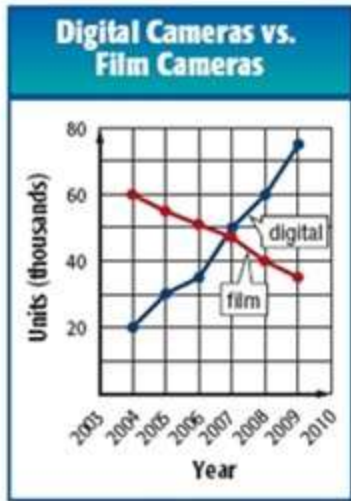
2-3 Rate of Change and Slope

CCSS REGULARITY Find the rate of change for each set of data.

1.

Time (min)	2	4	6	8	10
Distance (ft)	12	24	36	48	60

ANSWER:
6 feet/min



CAMERAS The graph shows the number of digital still cameras and film cameras sold by Yellow Camera Stores in recent years.

a. Find the average rate of change of the number of digital cameras sold from 2004 to 2009.

b. Find the average rate of change of the number of film cameras sold from 2004 to 2009.

c. What do the signs of each rate of change represent?

ANSWER:

a. about 11,000 per year

b. about -5000 per year

c. The positive rate in part a represents an increase in sales of digital cameras. The negative rate in part b represents a decrease in sales of film cameras.

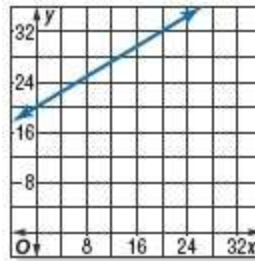
Find the slope of the line that passes through each pair of points.

5. $(-1, 4), (3, -8)$

ANSWER:

-3

Determine the rate of change of each graph.



7.

ANSWER:

$\frac{3}{5}$

Find the rate of change for each set of data.

9.

Time (day)	3	6	9	12	15
Height (mm)	20	40	60	80	100

ANSWER:

$\frac{20}{3}$ mm/day

2-3 Rate of Change and Slope

11. **HEALTH** The table below shows Lisa's temperature during an illness over a 3-day period.

Day	Monday		Tuesday		Wednesday	
	8:00 A.M.	8:00 P.M.	8:00 A.M.	8:00 P.M.	8:00 A.M.	8:00 P.M.
Temp (°F)	100.5	102.3	103.1	100.7	99.9	98.6

- a. What was the average rate of change in Lisa's temperature from 8:00 A.M. on Monday to 8:00 P.M. on Monday?
- b. What was the average rate of change in Lisa's temperature from 8:00 A.M. on Tuesday to 8:00 P.M. on Wednesday? Is your answer reasonable? What does the sign of the rate mean?
- c. During which 12-hour period was the average rate of change in Lisa's temperature the greatest?

ANSWER:

- a. $0.15^\circ/\text{h}$
 b. $-0.125^\circ/\text{h}$; Yes; the number should be negative because her temperature is dropping.
 c. Monday 8:00 A.M.-Monday 8:00 P.M.

Find the slope of the line that passes through each pair of points. Express as a fraction in simplest form.

13. $(-9, -11), (6, 3)$

ANSWER:

$$\frac{14}{15}$$

15. $(-4.5, 9.5), (-1, 2.5)$

ANSWER:

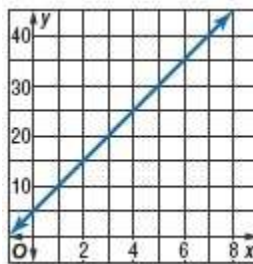
$$-2$$

17. $(-6, -2), (-1.5, 5.5)$

ANSWER:

$$\frac{5}{3}$$

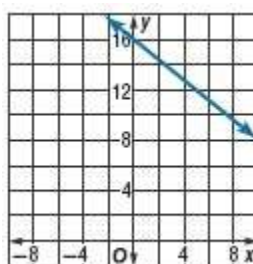
Determine the rate of change of each graph.



19.

ANSWER:

$$5$$



21.

ANSWER:

$$-0.8$$

Determine the rate of change for each equation.

23. $6y = 8x - 40$

ANSWER:

$$\frac{4}{3}$$

25. $12x - 4y + 5 = 18$

ANSWER:

$$3$$

27. $\frac{3}{2}x - \frac{5}{4}y = 15$

ANSWER:

$$\frac{6}{5}$$

2-3 Rate of Change and Slope

29. **WASHINGTON MONUMENT** The Washington Monument is 555 feet $5\frac{1}{8}$ inches tall and weighs 90,854 tons. The monument is topped by an aluminum square pyramid. The sides of the pyramid's base measure 5.6 inches, and the pyramid is 8.9 inches tall. Estimate the slope that a face of the pyramid makes with its base.

ANSWER:
about 3.2

Find the value of r so that the line that passes through each pair of points has the given slope.

31. $(6, r), (3, 3), m = 2$

ANSWER:
9

33. $(10, r), (4, -3), m = \frac{4}{3}$

ANSWER:
5

35. **MULTIPLE REPRESENTATIONS** In this problem, you will explore the rate of change for the function $f(x) = x^2$.

a. **GRAPHICAL** Graph $f(x) = x^2$.

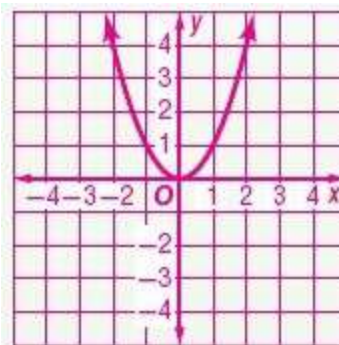
b. **TABULAR** Complete the table.

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	16	9							
slope		-7							

c. **VERBAL** Describe what happens to the rate of change for $f(x) = x^2$ as x increases.

ANSWER:

a.



b.

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	16	9	4	1	0	1	4	9	16
slope		-7	-5	-3	-1	1	3	5	7

c. Sample answer: The rate of change is not constant. The rate of change increases as x approaches infinity.

2-3 Rate of Change and Slope

37. **CHALLENGE** The graph of a line passes through the points (2, 3) and (5, 8). Explain how you would find the y-coordinate of the point (11, y) on the same line. Then find y.

ANSWER:

Sample answer: Because the slope from (2, 3) to (5, 8) is the same as the slope from (5, 8) to (11, y), find the slope between each pair of points and set them equal to each other. Then solve for y.

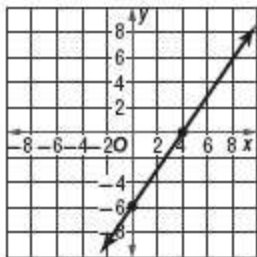
$$\begin{aligned}\frac{8-3}{5-2} &= \frac{y-8}{11-5} \\ \frac{5}{3} &= \frac{y-8}{6} \\ 30 &= 3(y-8) \\ 10 &= y-8 \\ 18 &= y\end{aligned}$$

39. **REASONING** Determine whether the statement *A line has a slope that is a real number is sometimes, always, or never true.* Explain your reasoning.

ANSWER:

Sometimes; the slope of a vertical line is undefined.

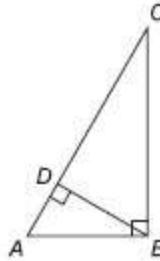
41. **GRIDDED RESPONSE** What is the slope of the line shown in the graph?



ANSWER:

3/2 or 1.5

43. **GEOMETRY** In $\triangle ABC$ shown, $AC = 16$ and $m\angle DAB = 60$. What is the measure of \overline{BD} ?



F $9\sqrt{2}$

G 9

H $4\sqrt{3}$

J 4

ANSWER:

H

State whether each equation or function is a linear function. Write yes or no. Explain.

45. $6y - 8x = 19$

ANSWER:

Yes; it can be written in $f(x) = mx + b$ form.

47. $18 = 2xy + 6$

ANSWER:

No; it cannot be written in $f(x) = mx + b$ form.

Evaluate each function.

49. $g(-4)$ if $g(x) = -3x^2 + 2$

ANSWER:

-46

2-3 Rate of Change and Slope

51. **RACING** There are 8 contestants in a 400-meter race. In how many different ways can the top three runners finish?

ANSWER:

336

Determine the quadrant of the coordinate plane where each point is located.

53. $(-2, 6)$

ANSWER:

II

Solve each equation.

55. $8 = 4m - 6$

ANSWER:

3.5

57. $-2 = -3x + 5$

ANSWER:

$\frac{7}{3}$