Got It? **4.** What is the slope of the line through the given points?

a. $(4, -3), (4, 2)$ b. $(-1, -3), (5, -3)$
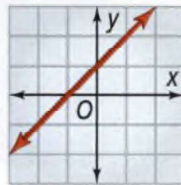
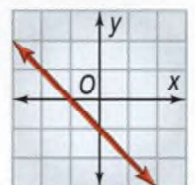The following summarizes what you have learned about slope.

take note

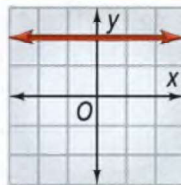## Concept Summary   Slopes of Lines

A line with positive slope slants upward from left to right.
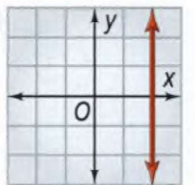
A line with negative slope slants downward from left to right.

A line with a slope of 0 is horizontal.
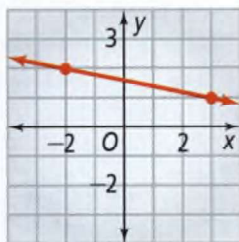
A line with an undefined slope is vertical.

Lesson Check

Do you know HOW?

1. Is the rate of change in cost constant with respect to the number of pencils bought? Explain.

Cost of Pencils				
Number of Pencils	1	4	7	12
Cost ($)	0.25	1	1.75	3

2. What is the slope of the line?

3. What is the slope of the line through $(-1, 2)$ and $(2, -3)$?

Do you UNDERSTAND?   MATHEMATICAL PRACTICES

4. Vocabulary What characteristic of a graph represents the rate of change? Explain.

5. Open-Ended Give an example of a real-world situation that you can model with a horizontal line. What is the rate of change for the situation? Explain.

6. Compare and Contrast How does finding a line's slope by counting units of vertical and horizontal change on a graph compare with finding it using the slope formula?

7. Error Analysis A student calculated the slope of the line at the right to be 2. Explain the mistake. What is the correct slope?

up 1 unit

right 2 units
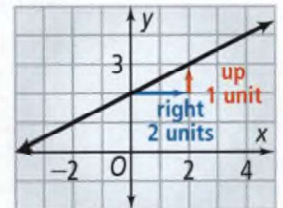
Practice and Problem-Solving Exercises ● MATHEMATICAL PRACTICES

A Practice

Determine whether each rate of change is constant. If it is, find the rate of change and explain what it represents.

◀ See Problem 1.

8. **Turtle Walking**

Time (min)	Distance (m)
1	6
2	12
3	15
4	21

9. **Hot Dogs and Buns**

Hot Dogs	Buns
1	1
2	2
3	3
4	4

10. **Airplane Descent**

Time (min)	Elevation (ft)
0	30,000
2	29,000
5	27,500
12	24,000

Find the slope of each line.

◀ See Problem 2.

11.

12.

13.

14.

15.

16.
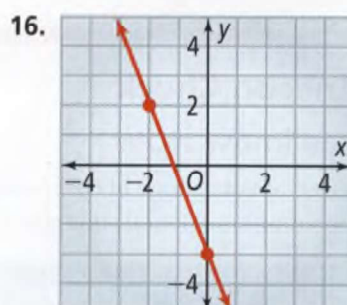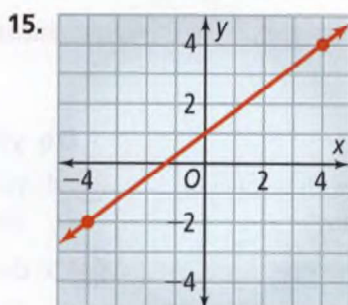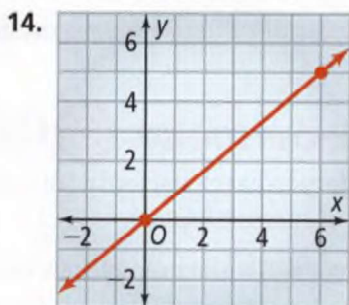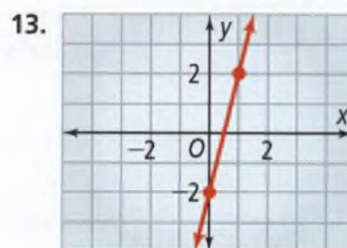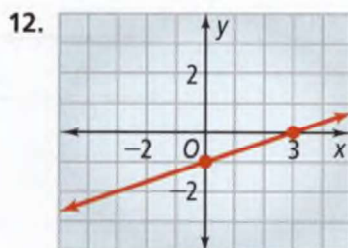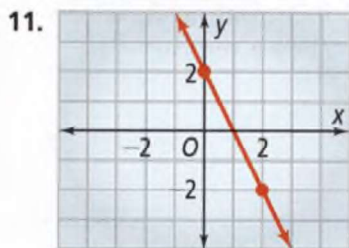
Find the slope of the line that passes through each pair of points.

◀ See Problem 3.

17. $(0, 0), (3, 3)$

18. $(1, 3), (5, 5)$

19. $(4, 4), (5, 3)$

20. $(0, -1), (2, 3)$

21. $(-6, 1), (4, 8)$

22. $(2, -3), (5, -4)$

Find the slope of each line.

◀ See Problem 4.

23.

24.

25.

Without graphing, tell whether the slope of a line that models each linear relationship is *positive*, *negative*, *zero*, or *undefined*. Then find the slope.

26. The length of a bus route is 4 mi long on the sixth day and 4 mi long on the seventeenth day.

27. A babysitter earns $9 for 1 h and $36 for 4 h.

28. A student earns a 98 on a test for answering one question incorrectly and earns a 90 for answering five questions incorrectly.

29. The total cost, including shipping, for ordering five uniforms is $66. The total cost, including shipping, for ordering nine uniforms is $114.

State the independent variable and the dependent variable in each linear relationship. Then find the rate of change for each situation.

30. Snow is 0.02 m deep after 1 h and 0.06 m deep after 3 h.

31. The cost of tickets is $36 for three people and $84 for seven people.

32. A car is 200 km from its destination after 1 h and 80 km from its destination after 3 h.

Use the slope formula to find the slope of the line that passes through each pair of points. Then plot the points and sketch the line that passes through them. Does the slope you found using the formula match the direction of the line you sketched?

33. $(-2, 1), (7, 1)$ **34.** $(4.25, 0), (3.5, 3)$

35. $\left(-\frac{1}{2}, \frac{4}{7}\right), \left(8, \frac{4}{7}\right)$ **36.** $(-5, 0.124), (-5, -0.584)$

37. $(-42.25, 5.2), (3.25, 3)$ **38.** $\left(-2, \frac{2}{11}\right), \left(-2, \frac{7}{13}\right)$

39. Think About a Plan The graph shows the average growth rates for three different animals. Which animal's growth shows the fastest rate of change? The slowest rate of change?
- How can you use the graph to find the rates of change?
- Are your answers reasonable?

Rate of Growth

40. Open-Ended Find two points that lie on a line with slope -9.

41. Profit John's business made $4500 in January and $8600 in March. What is the rate of change in his profit for this time period?

Each pair of points lies on a line with the given slope. Find x or y.

42. $(2, 4), (x, 8)$; slope $= -2$ **43.** $(4, 3), (5, y)$; slope $= 3$

44. $(2, 4), (x, 8)$; slope $= -\frac{1}{2}$ **45.** $(3, y), (1, 9)$; slope $= -\frac{5}{2}$

46. $(-4, y), (2, 4y)$; slope $= 6$ **47.** $(3, 5), (x, 2)$; undefined slope

48. Reasoning Is it true that a line with slope 1 always passes through the origin? Explain your reasoning.