

A Practice by Example

Examples 1, 2
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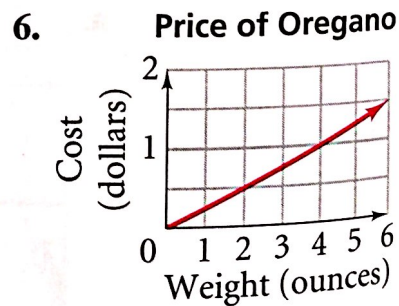
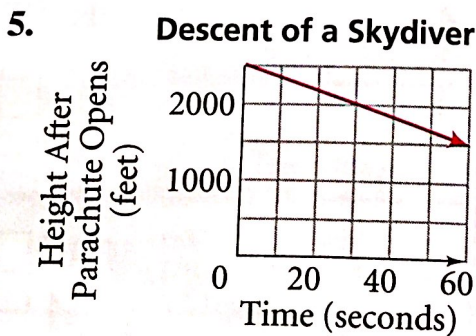
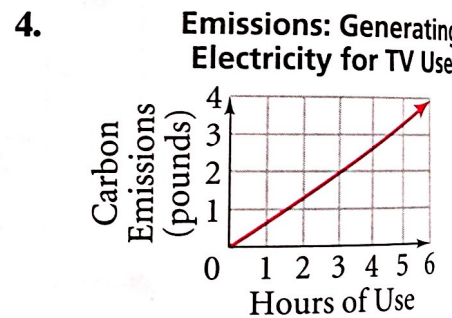
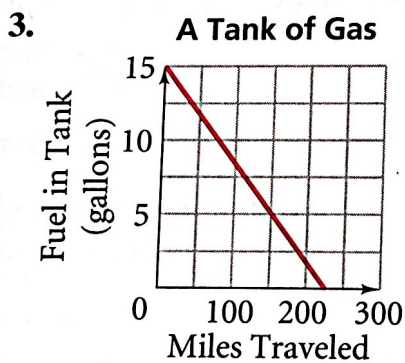
The rate of change is constant in each table and graph. Find the rate of change. Explain what the rate of change means for each situation.

1.

Time (hours)	Temperature (°F)
1	-2
4	7
7	16
10	25
13	34

2.

People	Cost (dollars)
2	7.90
3	11.85
4	15.80
5	19.75
6	23.70

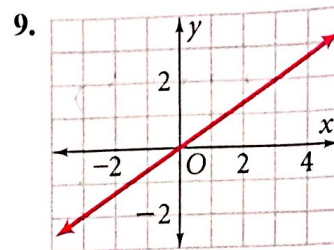
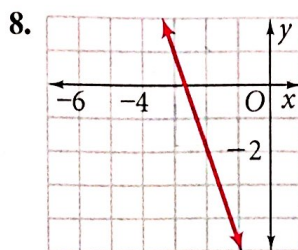
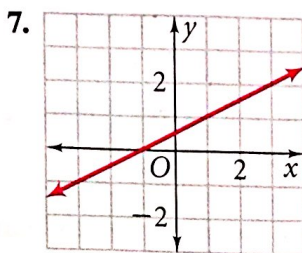


-World Connection

Jump from 11,000 feet gives skydiver about 60 seconds to fall at more than 100 mi/h.

Example 3
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Find the slope of each line.



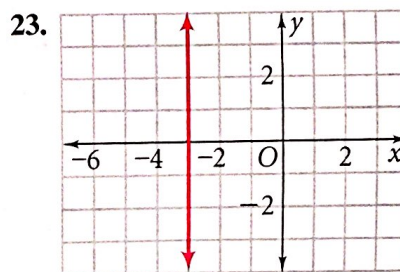
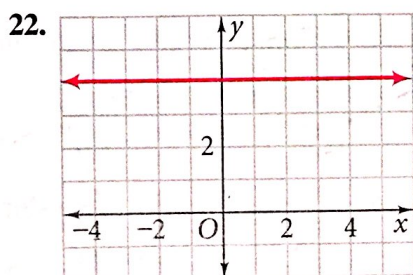
Example 4
(page 285)

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

- | | | |
|----------------------|----------------------|-----------------------|
| 10. (3, 2), (5, 6) | 11. (5, 6), (3, 2) | 12. (4, 8), (8, 11) |
| 13. (-4, 4), (2, -5) | 14. (-2, 1), (1, -2) | 15. (-3, 1), (3, -5) |
| 16. (-8, 0), (1, 5) | 17. (0, 0), (3, 5) | 18. (-4, -5), (-9, 1) |
| 19. (5, 0), (0, 2) | 20. (-7, 1), (7, 8) | 21. (0, -1), (1, -6) |

Example 5
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State whether the slope is zero or undefined.



- | | | |
|---------------------|---------------------|-------------------------------------|
| 24. (3, 4), (-3, 4) | 25. (4, 3), (4, -3) | 26. $(-5, \frac{1}{2})$, $(-5, 3)$ |
|---------------------|---------------------|-------------------------------------|

B Apply Your Skills

Find the rate of change for each situation.

27. A baby is 18 in. long at birth and 27 in. long at ten months.
 28. The cost of group museum tickets is \$48 for four people and \$78 for ten people.
 29. You drive 30 mi in one hour and 120 mi in four hours.

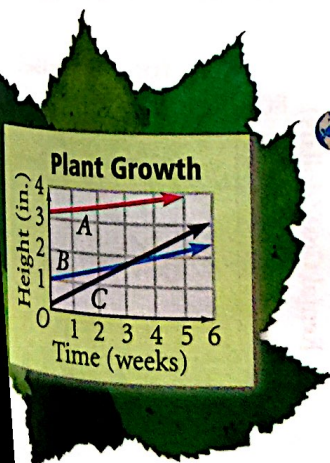
Find the slope of the line passing through each pair of points.

- | | | |
|----------------------------------|---|-----------------------------|
| 30. (-7, 1), (7, 8) | 31. $(4, 1\frac{2}{3})$, $(-2, \frac{2}{3})$ | 32. (0, 3.5), (-4, 2.5) |
| 33. $(\frac{1}{2}, 8)$, (1, -2) | 34. $(-5, \frac{1}{2})$, (-5, 3) | 35. (0.5, 6.25), (3, -1.25) |

Through the given point, draw the line with the given slope.

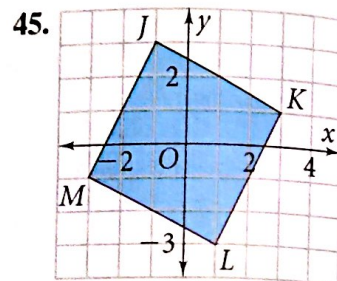
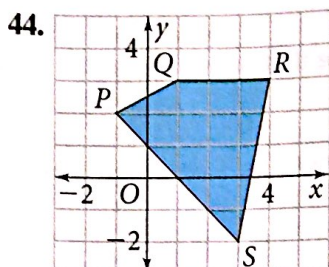
- | | | | |
|-------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 36. K(3, 5)
slope -2 | 37. M(5, 2)
slope $-\frac{1}{2}$ | 38. Q(-2, 3)
slope $\frac{3}{5}$ | 39. R(2, -3)
slope $-\frac{4}{3}$ |
|-------------------------|-------------------------------------|-------------------------------------|--------------------------------------|

40. a. **Biology** Which line in the graph at the left is the steepest?
 b. During the 6-week period, which plant had the greatest rate of change? The least rate of change? How do you know?
41. a. Find the slope of the line through A(4, -3) and B(1, -5) using A for (x_2, y_2) and B for (x_1, y_1) .
 b. Find the slope of the line in part (a) using B for (x_2, y_2) and A for (x_1, y_1) .
 c. **Critical Thinking** Explain why it does not matter which point you use for (x_2, y_2) and which point you use for (x_1, y_1) when you calculate a slope.



42. **Construction** An extension ladder has a label that says, "Do not place base of ladder less than 5 ft from the vertical surface." What is the greatest slope possible if the ladder can safely extend to reach a height of 12 ft? Of 18 ft?
43. **Writing** If two points on a line have positive coordinates, is the slope necessarily positive? Explain.

Geometry Find the slope of the sides of each figure.



46. a. Graph the direct variation $y = -\frac{2}{3}x$.
 b. What is the constant of variation?
 c. What is the slope?
 d. What is the relationship between the constant of variation and the slope?
47. a. **Open-Ended** Name two points on a line with a slope of $\frac{3}{4}$.
 b. Name two points on a line with a slope of $-\frac{1}{2}$.

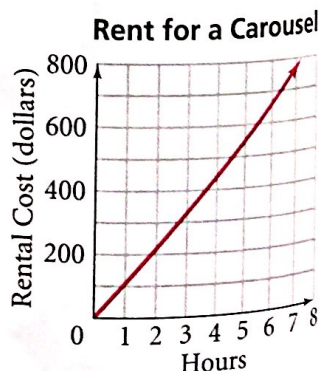
Each pair of points lies on a line with the given slope. Find x or y .

48. $(2, 4), (x, 8)$; slope = -2 49. $(2, 4), (x, 8)$; slope = $-\frac{1}{2}$
 50. $(4, 3), (x, 7)$; slope = 2 51. $(x, 3), (2, 8)$; slope = $-\frac{5}{2}$
 52. $(-4, y), (2, 4y)$; slope = 6 53. $(3, 5), (x, 2)$; undefined slope

Reasoning In Exercises 54–60, tell whether each statement is *true* or *false*. If false, give a counterexample.

54. A rate of change must be either positive or zero.
 55. All horizontal lines have the same slope.
 56. A line with slope 1 always passes through the origin.
 57. Two lines may have the same slope.
 58. The slope of a line that passes through Quadrant III must be negative.
 59. A line with slope 0 never passes through point $(0, 0)$.
 60. Two points with the same x -coordinate are always on the same vertical line.

61. **Business** The graph shows how much it costs to rent carousel equipment.
 a. Estimate the slope of the line. What does that number mean?
 b. Customers pay \$2 for a ride. What is the average number of customers needed to cover the rental costs?

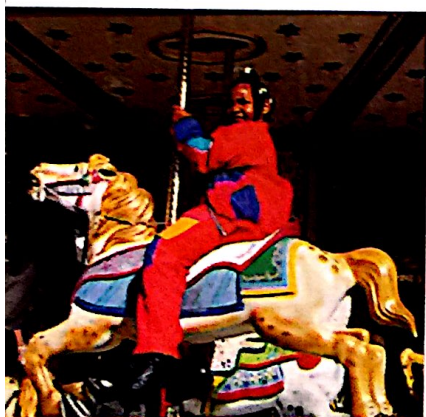


62. **Error Analysis** A friend says the slope of a line passing through $(1, 7)$ and $(3, 9)$ is equal to the ratio $\frac{1-3}{7-9}$. What is your friend's error?



Need Help?

For help with direct variation and the constant of variation see p. 262.



Real-World Connection

On a carousel, the outer horses cover more distance than the inner horses, giving them a faster speed.