

1. Suppose that $f(x)$ is linear and that $f(4) = 1$ and $f(0) = -7$. If $f(x) = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.

Part A: $b = -7$

Part B: $m = 2$

Learning Objective: Find a formula for a linear function from a table.

difficulty: medium

2. Suppose that $f(x)$ is linear with slope -2 and passing through the point $(5, -16)$. If $f(x) = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.

Part A: $b = -6$

Part B: $m = -2$

Learning Objective: Find a formula for a linear function from a graph.; Find a formula for a linear function from a verbal description. difficulty: medium

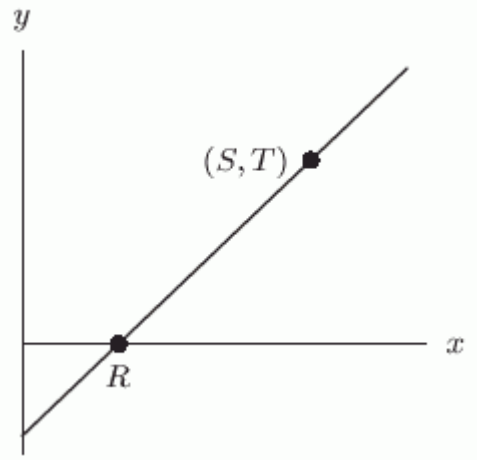
3. Suppose that $f(x)$ is linear with an x -intercept of -1 and a y -intercept of 5 . If $f(x) = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.

Part A: $b = 5$

Part B: $m = 5$

Learning Objective: Find a formula for a linear function from a graph.; Find a formula for a linear function from a verbal description. difficulty: medium

4. Choose the formula that represents the linear function graphed in the following figure?



- A) $y = \frac{RT + T x}{R - S}$
 B) $y = \frac{RT - T x}{R - S}$
 C) $y = \frac{R - T x}{R - S}$
 D) $y = \frac{T - RT x}{R - S}$

Ans: B Learning Objective: Find a formula for a linear function from a graph.
 difficulty: hard

5. If the linear equation $-3x + 4y + 1 = 3x$ is written in the form $y = b + mx$, then $b =$ _____ and $m =$ _____.

Part A: -0.25

Part B: 1.5

Learning Objective: Find a formula for a linear function from a verbal description.
 difficulty: medium

6. Let $y = b + mx$ define a linear function with slope $1/4$ that passes through the point $(-1, 3)$. Then $b =$ _____ and $m =$ _____.

Part A: $b = 13/4$ or $3\frac{1}{4}$

Part B: $m = 1/4$

Learning Objective: Find a formula for a linear function from a graph.
 difficulty: medium

7. Let $y = b + mx$ define a linear function with y-intercept -3 that passes through the point $(-5, 7)$. Then $b = \underline{\hspace{2cm}}$ and $m = \underline{\hspace{2cm}}$.

Part A: $b = -3$

Part B: $m = -2$

Learning Objective: Find a formula for a linear function from a graph.; Find a formula for a linear function from a verbal description. difficulty: medium

8. Let $y = b + mx$ be the formula for the linear function defined in the following table. Then $b = \underline{\hspace{2cm}}$ and $m = \underline{\hspace{2cm}}$.

Time, t	0	1	2
Population, $P = f(t)$	50,000	52,000	54,000

Part A: $b = 50,000$

Part B: $m = 2,000$

Learning Objective: Find a formula for a linear function from a table. difficulty: medium

9. A car company has found that there is a linear relationship between the amount of money it spends on advertising and the number of cars it sells. When it spent 50,000 dollars on advertising, it sold 425 cars. Moreover, for each additional 10 thousand dollars spent, they sell 15 more cars. Let $y = b + mx$ be the formula for the number of cars sold as a function of x , the amount of money spent on advertising. Then $b = \underline{\hspace{2cm}}$ and $m = \underline{\hspace{2cm}}$.

Part A: $b = 350$

Part B: $m = 0.0015$

Learning Objective: Find a formula for a linear function from a verbal description. difficulty: medium

10. A car company has found that there is a linear relationship between the amount of money it spends on advertising and the number of cars it sells. When it spent 60,000 dollars on advertising, it sold 680 cars. Moreover, for each additional 5 thousand dollars spent, they sell 40 more cars. Let $y = b + mx$ be the formula for the number of cars sold as a function of x , the amount of money spent on advertising. What is the practical interpretation of the vertical intercept of the equation?

A) The dollars spent on advertising per car sold.

B) The number of cars sold with no money spent on advertising.

C) The amount of advertising spent before any cars are sold.

D) The number of cars sold per dollar spent on advertising.

Ans: B Learning Objective: Find a formula for a linear function from a verbal description. difficulty: medium

11. ComElectric, the Cambridge power company, charges its customers \$9.00 a month and \$0.0675 per kwh, plus a \$0.0315 per kwh surcharge. (A kwh, or kilowatt-hour, is a unit of electricity supplied). The formula for the monthly cost for x kwh of electricity is $C = b + mx$ dollars, where $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.
Part A: $b = 9.00$
Part B: $m = 0.099$
Learning Objective: Find a formula for a linear function from a verbal description.
difficulty: medium
12. If a linear population function is 50,000 in year $t = 0$ and grows by 1,250 people per year, then $P(t) = b + mt$, where $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.
Part A: $b = 50,000$
Part B: $m = 1,250$
Learning Objective: Find a formula for a linear function from a verbal description.
difficulty: easy
13. At a price of \$2.80 per gallon, the average weekly demand by consumers for gasoline is 43 gallons. If the price rises to \$2.85, the weekly demand drops to 39 gallons. Assuming demand is linear, let $Q = b + mp$, where Q is the weekly quantity of gasoline demanded and p is the price per gallon. Then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.
Part A: $b = 267$
Part B: $m = -80$
Learning Objective: Find a formula for a linear function from a verbal description.
difficulty: medium
14. An airplane has room for 390 coach-fare seats. It can replace any 3 coach-fare seats with 2 first-class seats. Suppose the airplane is configured with x coach-fare seats and y first-class seats, with no space wasted. If $x = 0$, what is the value of y ?
Ans: 260
Learning Objective: Find a formula for a linear function from a verbal description.
difficulty: medium
15. An airplane has room for 300 coach-fare seats. It can replace any 3 coach-fare seats with 2 first-class seats. Suppose the airplane is configured with x coach-fare seats and y first-class seats, with no space wasted. If $y = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.
Part A: $b = 200$
Part B: $m = -2/3$
Learning Objective: Find a formula for a linear function from a verbal description.
difficulty: medium

16. If a linear population function is 80,000 in year $t = 0$ and 87,500 by year $t = 10$, then $P(t) = b + mt$, where $b = \underline{\hspace{2cm}}$ and $m = \underline{\hspace{2cm}}$.

Part A: $b = 80,000$

Part B: $m = 750$

Learning Objective: Find a formula for a linear function from a graph.; Find a formula for a linear function from a verbal description. difficulty: medium

17. An athlete wanting to strengthen his cardiovascular system will bench-press a weight, w , as many times, N , as possible. The following table shows the relationship between N and w .

Weight, w (in pounds)	150	160	170	180
Max # of bench-presses, N	28	25	22	19

Assuming this is a linear relationship, let $N = b + mw$. Then $b = \underline{\hspace{2cm}}$ and $m = \underline{\hspace{2cm}}$.

Part A: $b = 73$

Part B: $m = -0.3$

Learning Objective: Find a formula for a linear function from a table. difficulty: medium

18. An athlete wanting to strengthen his cardiovascular system will bench-press a weight, w , as many times, N , as possible. The following table shows the relationship between N and w .

Weight, w (in pounds)	140	150	160	170
Max # of bench-presses, N	28	24	20	16

Assuming this is a linear relationship, what is the maximum weight this athlete will be able bench-press 5 times? Round to the nearest whole number.

Ans: 198 pounds

Learning Objective: Find a formula for a linear function from a table. difficulty: hard

19. Find a formula for the linear function that passes through the points (3,3) and (-2,18).

Express your answer in $y = mx + b$ form.

Ans: $y = -3x + 12$

Learning Objective: Find a formula for a linear function from a graph.; Find a formula for a linear function from a table. difficulty: medium

20. Find a formula for the linear function that passes through the point (3,14) with slope 5.

Express your answer in $y = mx + b$ form.

Ans: $y = 5x + -1$

Learning Objective: Find a formula for a linear function from a graph. difficulty: medium

21. Find a formula for the linear function that has x-intercept -3 and y-intercept 9 . Express your answer in $y = mx + b$ form.

Ans: $y = 3x + 9$

Learning Objective: Find a formula for a linear function from a graph.

difficulty: medium

22. Mark all of the following functions that are neither increasing nor decreasing.

A) $\frac{1}{2}f(x) - 1 = -x$

B) $-\frac{1}{2}g(x) = -x + 1$

C) $4h(x) + x = 2$

D) $j(x) = -2x$

E) $k(x) = 2$

F) $4p(x) + x = 6$

Ans: E Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

23. Are the lines $y = -0.5x + 4$ and $y = -0.5x - 1$ parallel, perpendicular, or neither?

Ans: parallel

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: medium

24. Rewrite the equation in slope-intercept form.

$$\frac{8x + y}{3} = 6$$

Ans: $y = -8x + 18$

Learning Objective: Find equations for linear functions and vertical lines and recognize when two lines are parallel or perpendicular. difficulty: easy

25. Rewrite the equation in slope-intercept form.

$$4(x + y) - 4 = 20x + 12$$

Ans: $y = 4x + 4$

Learning Objective: Find equations for linear functions and vertical lines and recognize when two lines are parallel or perpendicular. difficulty: medium

26. $y = 7 + 7x$

A) Horizontal

B) Vertical

C) Neither

Ans: C Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: easy

27. Are the lines represented by these equations parallel? Perpendicular? Or neither?

$$y = \frac{3}{7}x + 8$$

$$y = \frac{3}{7}x - 3$$

- A) Neither
- B) Parallel
- C) Perpendicular

Ans: B Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: easy

28. Are the lines represented by these equations parallel? Perpendicular? Or neither?

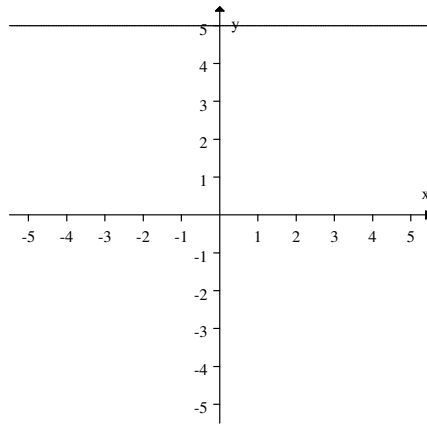
$$9x + 8y = 2$$

$$8x + 9y = 4$$

- A) Perpendicular
- B) Parallel
- C) Neither

Ans: C Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: medium

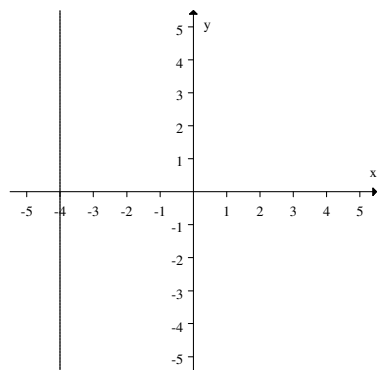
29. Find the equation of the line shown.



Ans: $y = 5$

Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: easy

30. Find the equation of the line shown.



Ans: $x = -4$

Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: easy

31. Determine the slope of a line parallel to

$$y = \frac{8}{5}x - 8$$

Ans: $\frac{8}{5}$

Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: easy

32. Determine the slope of a line perpendicular to

$$y = \frac{7}{5}x - 7$$

Ans: $-\frac{5}{7}$

Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: easy

33. Find the formula for a linear function such that $f(18) = -4$ and $f(36) = -2$.

Ans: $y = \frac{1}{9}x - 6$

Learning Objective: Find a formula for a linear function from a table. difficulty: medium

34. Find the equation of a line parallel to $y = \frac{1}{2}x - 6$ and through the point $(6, -7)$

Ans: $y = \frac{1}{2}x - 10$

Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: medium

35. Find the equation of a line parallel to $y = \frac{3}{4}x - 2$ and through the point $(3, 0)$

Ans: $y = -\frac{4}{3}x + 4$

Learning Objective: Identify and produce equations of horizontal, vertical, parallel, and perpendicular lines. difficulty: medium