

Concept and Vocabulary:

1. The point-slope form of the equation of a nonvertical line with slope m that passes through the point (x_1, y_1) is _____.
2. The equation $5x + 3y = 10$ is written in _____ form.
3. The equation $y = 3x + 7$ is written in _____ form.
4. The equation $y - 6 = 4(x + 1)$ is written in _____ form.
5. The graph of $y = 3$ is a/an _____ line.
6. The graph of $x = -1$ is a/an _____ line.

Practice Exercises:

Write the point-slope form of the equation of the line satisfying each of the conditions in exercises 1 - 27. Then use the point-slope form of the equation to write the slope-intercept form of the equation.

1. Slope = 3, passing through (2,5)
3. Slope = 5, passing through (-2,6)

5. Slope = -8, passing through (-3,-2)

13. Slope = $-\frac{2}{3}$, passing through (6, -2)

7. Slope = -12, passing through (-8,0)

15. Passing through (1,2) and (5,10)

9. Slope = -1, passing through $(-\frac{1}{2}, -2)$

17. Passing through (-3,0) and (0,3)

11. Slope = $\frac{1}{2}$, passing through the origin

19. Passing through (-3,-1) and (2,4)

21. Passing through $(-4,-1)$ and $(3,4)$

25. Passing through $(2,4)$ with x -intercept $(-2,0)$

23. Passing through $(-3,-1)$ and $(4,-1)$

27. x -intercept $(-\frac{1}{2}, 0)$ and y -intercept $(0,4)$

In exercises 29 - 37 odd, write an equation in slope-intercept form of the line satisfying the given conditions.

29. The line passing through $(-3,2)$ and parallel to the line whose equation is $y = 4x + 1$.

31. The line passing through $(-1,-5)$ and parallel to the line whose equation is $3x + y = 6$.

33. The line passing through $(4,-7)$ and perpendicular to the line whose equation is $x - 2y = 3$.
35. The line passing through $(2,4)$ and with the same y -intercept as the line whose equation is $x - 4y = 8$.
37. The line with an x -intercept at $(-4,0)$ and is parallel to the line containing $(3,1)$ and $(2,6)$.

Applications:

39. Studies show that texting while driving is as risky as driving with a 0.08 blood alcohol level, the standard for drunk driving. The bar graph in the text shows the number of fatalities in the United States involving distracted driving from 2004 through 2008. Although the distracted category involves such activities as talking on cellphones, conversing with passengers, and eating, experts at the National Highway Traffic Safety Administration claim that texting while driving is the clearest menace because it requires looking away from the road.
- a. Shown to the right of the bar graph in the text is a scatter plot with a line passing through two of the data points. Use the two points whose coordinates are shown by the voice balloons to write the slope-intercept form of an equation that models the number of highway fatalities involving distracted driving, y , in the United States x years after 2004.
- b. In 2010, surveys showed overwhelming public support to ban texting while driving, although at that time only 19 states and Washington, D.C., outlawed the practice. Without additional laws that penalize texting drivers, use the model from part (a) to project the number of fatalities in the United States in 2014 involving distracted driving.

SUPPLEMENT TO §3.5

1. Determine the equations for the lines graphed in the following figures.

a.

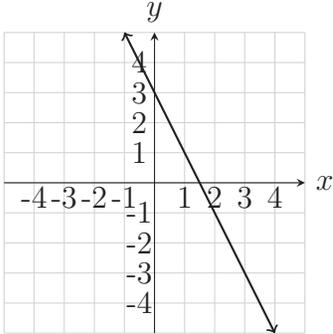


Figure 1

d.

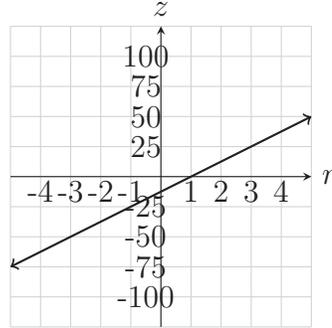


Figure 4

b.

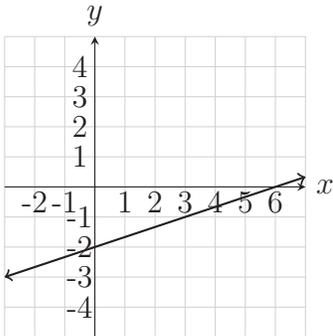


Figure 2

e.

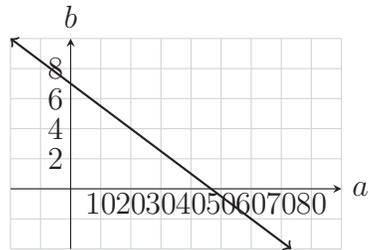


Figure 5

c.

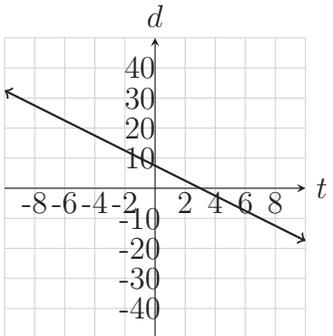


Figure 3

f.

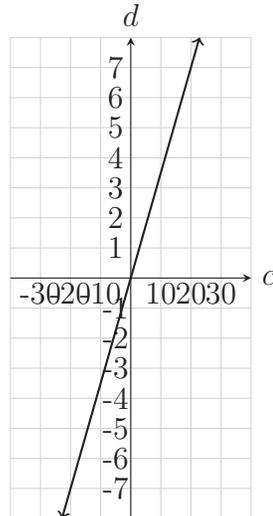


Figure 6

2. The population of a suburb of Portland was 12,500 in 1990. The population of the suburb has been increasing at an average rate of 750 people per year.
- Write a linear equation that gives the town population in terms of the year using P to represent the population of the Portland suburb t years since 1990.
 - Use the linear equation found in part (a) to predict the suburb's population in 2005. Show all of your work and then state a conclusion using a complete sentence.
3. A storage tank at a production factory holds 250 gallons of a liquid chemical at the beginning of a day. Over the course of the day the chemical is used for production purposes at a constant rate. Two hours after the production begins there are 210 gallons remaining.
- Determine the linear equation which models the amount of chemical remaining in the tank in terms of the number of hours of production time during this day. Be sure to define any variable you use.
 - Use the linear equation you found in part (a) to determine the number of hours of production which will result in the tank being half full.

4. The life span of an insect can be modified by the temperature of the environment. Assume that the relationship between temperature of the environment, in degrees Celsius, and life span of the fruit fly, in days, is linear. Suppose a population of fruit flies has a life span of 80 days at a temperature of 10 degrees and a life span of 50 days at a temperature of 20 degrees.
- Write a linear relationship between the temperature and the life span.
 - What is the life span at a temperature of 25 degrees?
 - At what temperature is the life span 92 days?
5. Savannah worked 12 hours one week and earned \$137.40. The next week she worked 17 hours and earned \$194.65.
- Write a linear equation that gives Savannah's weekly wages based on the number of hours she worked that week.
 - If Savannah works 15 hours in a week, how much does she make?
 - If Savannah earns \$240.45 in a week, how many hours does she work?

ANSWERS TO SUPPLEMENT §3.5:

1. a. $y = -2x + 3$

c. $d = -\frac{5}{2}t + \frac{15}{2}$

e. $b = -\frac{3}{20}a + 7$

b. $y = \frac{1}{3}x - 2$

d. $z = \frac{25}{2}r - \frac{25}{2}$

f. $d = \frac{7}{20}c$

2. a. $P = 750t + 12,500$

b. According to the model, the population of the suburb will be 23,750 in 2005.

3. a. Let t represent the number of hours of production and let A represent the amount of chemical (in gallons) remaining in the tank.

b. The tank will be half empty after 6 hours and 15 minutes of production.

$$A = -20t + 250$$

4. a. Let L represent the life span of the fruit fly (in days) at a temperature of T in degrees Celsius. Then the linear model which describes the fruit fly's lifespan in terms of the environment's temperature in degrees Celsius is given by

b. The life span is 35 days when the temperature is 25 degrees Celsius.

c. The temperature is 6 degrees Celsius when the life span is 92 days.

$$L = -3T + 110.$$

5. a. Let W represent Savannah's weekly pay, in dollars, when she works h hours. Then the linear model of Savannah's wages in terms of hours is given by

b. Savannah earns \$171.75 if she works 15 hours in a week.

c. Savannah worked 21 hours if she earned \$240.45 for the week.

$$W = 11.45h.$$