

Chapter 5 Exercises

1. Evaluate the function $f(x) = x^2 + 2x - 3$ for the given values.

x	$f(x) = x^2 + 2x - 3$
-3	
-2	
0	
1	
2	
3	

Determine the dependent and independent variables. Then write a function to represent each situation and answer each question.

- A car purchased in 2010 had an initial value of \$19,500. If the car depreciates at \$1200 per year, write an equation that represents the depreciation. What is the value of the car after 5 years?
- The cost to rent a car for a day is an initial cost of \$35 and \$0.25 per mile driven. Write an equation that represents to the cost of the car rental. What is the total cost if you drove 250 miles?
- Jeff delivers pizza for Papa Jim's Pizza. Papa Jim's pays Jeff an hourly wage of \$6.25. In addition to his hourly wage, Jeff earns \$0.25 for every pizza he delivers. Write an equation that represents the wages earned by Jeff, where x represents the number of pizzas delivered when Jeff works a five-hour shift. If Jeff delivers 21 pizzas during his shift, how much money will he earn?

Graph each equation.

5. $y = -2x$

6. $y = 3x + 1$

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

Find the slope and y -intercept of each linear equation.

8. $y = -3x + 4$

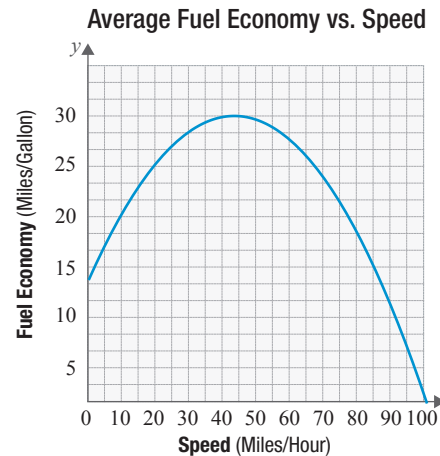
9. $y = \frac{3}{4}x - 3$

10. A medical conference has two phases. The first phase consists of a general opening speech lasting 40 minutes and several presentations for 50 minutes each. The second phase consists of the participants' reports, each lasting 55 minutes, and a fifteen-minute conclusion. The conference organizer wants to know how many speakers should participate in the conference in order for the duration of the two phases to be the same.

Write two linear functions, one for the duration of the first phase, $C(x)$, and one for the duration of the second phase, $R(x)$. Use the functions to find out how many people need to participate in the conference in order for both stages to have the same duration.

11. Mark is a beginner illusionist. To start performing, he needs to invest \$5400 on props. Also, renting a room for each performance will cost him \$1400. He plans to sell tickets for \$20, and the capacity of the room is 150 people. Suppose that, on average, the hall will be two-thirds full at each performance. Let x be the number of performances.
- Write the cost function for holding performances.
 - Write the revenue function.
 - Write the profit function for Mark.
 - Determine the x -value of the break-even point for his business.
 - If Mark holds 20 performances, what profit can he expect to make?
12. Graph the linear inequality $3x - 5y > 22$.
13. Graph the system of linear inequalities:
$$\begin{cases} 3x - 4y > 0 \\ y \geq 2x - 5 \end{cases}$$
14. A cereal manufacturer is creating a new cereal that is a mix of two previously established cereals: cinnamon squares and chocolate puffs. Cinnamon squares cost \$0.15 per ounce to make and chocolate puffs cost \$0.19 per ounce to make. Standard packaging costs \$0.45 per box. The company wants to minimize the cost of creating this cereal. Let x represent the number of ounces of cinnamon squares and let y represent the number of ounces of chocolate puffs that are added to each box of cereal. Write the objective function that describes the cost to create each box of cereal.
15. The objective function $z = 2x + 5y$ is subject to the following constraints.
- $$x + 2y \leq 40$$
- $$y \leq 15$$
- $$x \geq 0$$
- $$y \geq 0$$
- Find the maximum value of z .
16. A basketball's height (in feet) is a function of time in flight (in seconds), modeled by an equation such as $h(t) = -16t^2 + 40t + 6$.
- Describe the graph of the function in terms of time in flight and height.
 - Describe how you could use the given function relating time in flight to height to find when the shot will reach the height of the basket (10 feet)?
 - Describe how you could find the time when the ball would hit the floor if it missed the basket entirely?

17. The figure contains the graph of a function, $f(x) = -0.00875x^2 + 0.775x + 13$, that measures the average fuel economy for a certain model of car based on the speed x of the car (in miles per hour).



- a. What is the miles per gallon average if the vehicle is traveling 80 miles per hour?
 - b. What is the miles per gallon average if the vehicle is traveling 40 miles per hour?
 - c. At approximately what speed will the car have the greatest fuel economy? Round your answer to the nearest whole mile per gallon.
18. The function $C(x) = 0.0086x^2 + 1.11x - 1.37$ represents the stopping distance in feet while talking on a cell phone and driving at a speed of x mph. What distance will it take you to stop while talking on a cell phone if you are driving 50 mph? 80 mph?
19. Whispertown has a population growth model of $P(t) = at^2 + bt + P_0$ where P_0 is the initial population. Suppose that the projected future population of Whispertown t years after January 1, 2012, is described by the quadratic model $P(t) = 0.8t^2 + 6t + 24,000$.
- a. What is the projected population of Whispertown on January 1, 2030?
 - b. In what month and year will the population reach 60,000?
20. A rifle fires a projectile vertically upward from a height of 150 feet above the ground, with an initial velocity of 1250 ft/sec. Recall that projectiles are modeled by the function $h(t) = -16t^2 + v_0t + y_0$.
- a. Write a quadratic equation to model the height in feet above the ground after t seconds.
 - b. During what time interval will the projectile be more than 10,000 feet above the ground?
 - c. After how many seconds will the projectile hit the ground?
21. A ball is dropped from the top of a 750-foot tall building. How long does it take the ball to hit the ground? Recall that projectiles are modeled by the function $h(t) = -16t^2 + v_0t + y_0$. (Note that $v_0 = 0$.)