

Chapter 6

Exercise Set 6.1

Solve the equation for x .

1. $3x - 5 = 13$

2. $6 - 2x = -8$

3. $5 = 3x - 9$

4. $-2 = 4 - x$

5. $3x + 7 = 5x - 11$

6. $9x + 4 = -4x - 7$

7. $2(3x - 7) = 8x + 10$

8. $4(x - 1) = 6(3 - 2x)$

9. $5 = 3 - (4 - 2x)$

10. $7x - (1 - 4x) = 12$

11. $5(2 - x) - 4(1 - 3x) = 6$

12. $5 - 2(3x - 8) = 3 - x$

13. $\frac{x}{5} = \frac{2}{7}$

14. $\frac{3}{4}x = 8$

15. $0.05x = 3$

16. $\frac{4x}{0.01} = \frac{200}{3}$

17. $\frac{2x}{7} = \frac{10}{3}$

18. $6\pi x = 27$

19. $4x - 3\pi = 7x + 6\pi$

20. $\frac{2x - 3}{5} = \frac{x + 1}{6}$

21. $\frac{3x - 5}{4} = x + \frac{1}{2}$

22. $\frac{5x - 1}{3} = 2x - 3$

23. $\frac{x + 1}{3} = \frac{7x + 2}{4}$

24. $4.35x + 32 = 5.75x - 17$

25. $0.05x = x - 190$

26. $0.07x + 0.05(1000 - x) = 65$

27. $25 = \frac{5}{3}(x - 12)$

28. $16 = \frac{4}{7}x - 8$

29. $\frac{1}{4}x - \frac{2}{3} = 1$

30. $\frac{7}{5}x - 7 = 2.8$

31. $\frac{2}{5}(x+3) = x-1$

32. $18\pi + 6\pi x = 420$

33. $x + \frac{1}{2}x = 5 - \frac{1}{3}x$

34. $\frac{2x}{3} + \frac{3x}{4} = 1$

35. The perimeter P of a rectangle of length l and width w is $P = 2l + 2w$. If the perimeter of a rectangle is 116 inches and its length is 31 inches, what is its width in inches?

36. The area A of a triangle of base b and height h is $A = \frac{1}{2}bh$. If the base of a triangle is 15 centimeters and its area is 165 square centimeters, what is its height in centimeters?

37. The volume V of a cone of base radius r and height h is $V = \frac{1}{3}\pi r^2 h$. If the base radius is 5 inches and the volume is 700 cubic inches, what is the height in inches?

38. The formula for calculating a z -score for a sample score of x is $z = \frac{x - \bar{x}}{s}$ where \bar{x} is the mean of the sample and s is the standard deviation. Find the sample score x if $\bar{x} = 70$, $s = 10$ and $z = -2.4$.

39. The formula $C = \frac{5}{9}(F - 32)$ expresses a temperature in degrees Fahrenheit as a temperature in degrees Celsius. Find the temperature in degrees Fahrenheit if the temperature in degrees Celsius is a) 15 b) -10.

40. The surface area S of a cylinder is $S = 2\pi r^2 + 2\pi r h$ where r is the base radius and h is the height. If the base radius is 5 inches and the surface area is 250 square inches, what is the height in inches?

Exercise Set 6.2

Solve the equation for the indicated variable.

1. $2x+3y=6$; for y

2. $5x=8x-7z$; for x

3. $ax+by=c$; for y

4. $V=\frac{4}{5}xyz$; for z

5. $\frac{3}{2}ab=9$; for a

6. $PV=nRT$; for R

7. $L=\frac{3}{5}F+9$

8. $s=\frac{a-rz}{1-r}$; for z

9. $a^2x=bx+c$; for x

10. $bx-(c-x)=a+d$; for x

11. $a-(3b-cy)=dy$; for y

12. $\frac{3a}{c}=\frac{a-1}{d}$; for a

13. $\frac{x-a}{5}=\frac{y-b}{3}$; for x

14. $\frac{2x-3}{c}=\frac{x+1}{d}$; for x

15. $R=\frac{4}{9}(T-12)$; for T

16. $3x=2y(1-x)$; for x

17. $\frac{3}{4}x+\frac{2}{3}y=5$; for x

18. $a[b-(1-3cx)]=dx$; for x

19. $\frac{x+3}{a}+\frac{y+1}{b}=1$; for x

20. $z=\frac{ax-b}{c}$; for x

21. The perimeter P of a rectangle of length l and width w is $P=2l+2w$. Solve this equation for w .

22. The area A of a triangle of base b and height h is $A=\frac{1}{2}bh$. Solve this equation for b .

23. The circumference C of a circle of radius r is $C=2\pi r$. Solve this equation for r .

24. The volume V of a cone of base radius r and height h is $V = \frac{1}{3}\pi r^2 h$. Solve this equation for h .
25. The formula $F = \frac{9}{5}C + 32$ expresses a temperature in degrees Celsius C as a temperature in degrees Fahrenheit F . Solve this equation for C .
26. The formula for calculating a z -score for a sample score of x is $z = \frac{x - \bar{x}}{s}$ where \bar{x} is the mean of the sample and s is the standard deviation. Solve this equation for x .
27. The length L of a spring with natural length L_0 and with a weight of W pounds hanging from it is $L = \frac{4}{7}W + L_0$. Solve this equation for W .
28. The formula $F = \frac{GmM}{r^2}$ is Newton's Law of Gravitation, where F is the force of attraction between two bodies, one of mass m and the other of mass M , a distance r apart and where G is the gravitational constant. Solve this equation for m .
29. The volume V of a pyramid with square base of side length L and height h is $V = \frac{L^2 h}{3}$. Solve this equation for h .
30. The surface area S of a cylinder is $S = 2\pi r^2 + 2\pi r h$ where r is the base radius and h is the height. Solve this equation for h .

Exercise Set 6.3

1. The length of a rectangle is 2 feet longer than its width. If its width is x feet, find its area and its perimeter in terms of x .
2. The width of a rectangle is half its length. If its length is x feet, find its area and its perimeter in terms of x .
3. The length of a rectangle is 3 feet longer than twice its width. If its width is x feet, find its area and its perimeter in terms of x .
4. If the length of a rectangle is l meters and its area is A square meters, find its width in terms of l and A .
5. If the length of a rectangle is l meters and its perimeter is P meters, find its width in terms of l and P .
6. The height of a triangle is 3 times longer than its base. If its base is b inches, find its area in terms of b .
7. If the height of a triangle is h centimeters and its area is A square centimeters, find its base b in terms of h and A .
8. The average of three numbers x , y and z is A . Find z in terms of A , x and y .
9. (a) If x is the smallest of three consecutive odd integers, what is the sum S of these three integers in terms of x ? (b) If x is between the smallest and largest of three consecutive odd integers, what is the sum S of these three integers in terms of x ?
10. A Corvette going east at x miles per hour and a Mustang going west at 5 miles per hour faster than the Corvette pass each other on a long straight highway. How many miles apart are the two cars 10 minutes after passing each other, in terms of x ?
11. Chuck goes on a trip in his Prius hybrid. He goes x miles and averages 50 miles per gallon of gas. If gas costs \$3.50 per gallon, how much did he pay for gas on this trip in terms of x ?
12. Hannah earns \$12 per hour at her job, but earns one and a half times that rate for overtime hours in excess of 35 hours per week. How much does she earn one week if works x overtime hours, in terms of x ?
13. A master carpenter makes twice as much per hour as his assistant. On one job, the assistant work 5 hours more than the carpenter. If the assistant makes x dollars per hour and works h hours on this job, how much altogether are they paid for the job, in terms of x and h ?

14. Beth works out by running x miles from her house each day at the rate of 8 miles per hour and walking back home at the rate of 3 miles per hour. How many hours does it take her to complete this workout in terms of x ?

15. A woman earning a salary of x dollars per year gets a $3\frac{1}{2}\%$ raise. **(a)** What is her raise in terms of x ? **(b)** What is her new annual salary in terms of x ?

16. A shirt selling for x dollars is marked down 15%. What is the new price of the shirt in terms of x ?

17. A man invests x dollars in an account paying 4% annual interest and twice as much in an account earning 6% interest. **(a)** How much does the man invest in these two accounts altogether in terms of x ? **(b)** How much annual interest does the man earn from these accounts in terms of x ?

18. Janis invests \$4,000 dollars, part in a savings account earning 2.5% annual interest and the rest in a certificate of deposit earning 4.5% annual interest. If she invested x dollars in the savings account, how much interest did she earn on her investment in terms of x ?

19. A coin purse contains nickels, dimes and quarters. It contains x quarters, twice as many dimes as quarters, and 3 more nickels than quarters. **(a)** How many coins does the purse contain in terms of x ? **(b)** How much money, in cents, does the purse contain in terms of x ?

20. Chris has only \$5, \$10, and \$20 bills in his wallet. It contains x \$10 bills, 4 more than twice as many \$20 bills as \$10 bills and 7 more \$5 bills as \$10 bills. **(a)** How many bills does are in his wallet in terms of x ? **(b)** How much money, in dollars, is in the wallet in terms of x ?

21. Select Blend coffee contains 35% Columbian coffee and Premium Blend coffee contains 75% Columbian coffee. If x pounds of Brand A coffee is blended with y pounds of Brand B coffee, how many pounds of Columbian coffee is in this mixture, in terms of x and y ?

22. The sum of four consecutive even integers is 140. What are the four integers?

23. A company president makes 80% more than her vice president. Their combined annual salary is \$630,000. What is the annual salary of these two executives?

24. A car dealer reduces the price of a Ford Focus by 20%. What was the price of the car before this reduction if the current price is \$14,560?

- 25.** In 2011, Jay Bruce of the Cincinnati Reds hit 3 more home runs than his teammate Joey Votto. Together they hit 61 home runs. How many home runs did each player hit?
- 26.** In the 2011-2012 University of Kentucky national championship season, freshman stars Anthony Davis, Michael Kidd-Gilchrist and Terrence Jones combined to score 1,512 points. If Kidd-Gilchrist scored 7 more points than Jones and Davis scored 91 more points than Kidd-Gilchrist, how many points did each player score?
- 27.** A student has scores of 84 and 92 on the first two tests in her Algebra II class. What score does she need to get on the third test to make the average on the three tests 90 so that she can get an A in the course?
- 28.** The grade in a geometry class consists of 100 points for homework, 100 points each for two exams and 200 points for the final exam. Students who earn 90% or more of the total points possible earn an A. Gail has 95 points on homework, 82 points on the first exam and 88 points on the second exam. What is the minimum score on the final exam that she needs to earn an A?
- 29.** A rectangular garden has length 35 feet and surrounded by 88 feet of fencing. What is the area of the garden?
- 30.** A rectangle is 4 inches longer than it is wide and has a perimeter of 160 inches. What are the length and width of the rectangle?
- 31.** A rectangle is twice as long as it is wide and has a perimeter of 300 feet. What is the area of the rectangle?
- 32.** A rectangular field with length 28 feet and area 672 square feet is to be enclosed by a fence. How much will it cost to purchase the fence if it sells for \$3.50 per linear foot?
- 33.** A man is four times older than his daughter. The sum of their ages is 45. How old is his daughter?
- 34.** A woman is twice as old as her son and 12 years ago, she was three times older than her son. How old is her son?
- 35.** Joanne invests a total of \$7,000 in two accounts, the first paying a simple annual interest rate of 4% and the second a simple annual interest rate of 6%. After one year the total interest earned on this investment is \$375. How much did she invest in each account?
- 36.** A coin purse contains nickels, dimes and quarters worth \$4.35. There are twice as many nickels as dimes and 3 more quarters than dimes. How many coins of each type are in the purse?

- 37.** An envelope contains \$1, \$5, \$10 and \$20 bills worth \$210. There are 12 more \$1 bills as \$5 bills, twice as many \$10 bills as \$5 bills, and an equal number of \$10 and \$20 bills. How many bills of each type are in the envelope?
- 38.** Financial consultant E. Z. Money has a client who has invested \$40,000 in an account yielding 4% annual interest. She wants her client to invest in another account yielding 7% annual interest to ensure that the annual interest earned from the two accounts combined is 5%. How much should be invested in the account yielding 7% annual interest?
- 39.** Romeo and Juliet have a lover's quarrel. They stomp off in opposite directions with Juliet walking 2 feet per second faster than Romeo. At what rate, in feet per second, is each of them walking if they are 480 feet apart after one minute?
- 40.** Sleazy, the little-known eighth dwarf in the classic Snow White story, is appropriately named. When Snow White walked into the woods one day at 4 feet per second, Sleazy followed her half a minute later walking briskly at 6 feet per second. How long will it take for Sleazy to catch up with Snow White?
- 41.** Speedy is another dwarf who hangs out with Sleazy. He stays fast by running at 7 miles per hour from his tiny cottage and then walking back along the same path at 3 miles per hour. How many miles does he travel if this workout takes 1 hour to complete?
- 42.** Two cars are 30 miles apart and moving towards each other on the same highway. One car is going 10 miles per hour faster than the other. How fast is each of the cars going if they pass each other 15 minutes later?
- 43.** Curly, Larry and Moe all work for the same company and they compare their annual salaries. Curly makes 20% more than Moe and Larry makes 30% more than Moe. Altogether they make \$183,750 per year. How much per year does each man make?
- 44.** Chemistry professor M. T. Beaker wants to mix a solution containing 60% acid with a solution containing 30% acid to produce a 300-milliliter mixture containing 50% acid. How many milliliters of each solution should he use?
- 45.** Professor Beaker has a 50-milliliter solution containing 60% acid. How many milliliters of pure water should he add to this solution to produce a solution containing 40% acid?
- 46.** Select Blend coffee contains 35% Columbian coffee and Premium Blend coffee contains 75% Columbian coffee. A store manager wants to mix these two brands of coffee to obtain a 30-pound mixture containing 50% Columbian coffee. How many pounds of each brand should he use?
- 47.** Thrifty Blend coffee does not contain any Columbian coffee and Premium Blend coffee contains 75% Columbian coffee. A store manager wants to mix 20 pounds of

Premium coffee with some Thrifty Blend coffee to obtain mixture containing 50% Columbian coffee. How many pounds of Thrifty Blend should he use?

48. Thrifty Blend coffee sells for \$2.00 a pound and Premium Blend coffee sells for 3.50 a pound. A store manager wants to mix these two blends to produce a 30-pound mixture that sells for \$2.50 a pound. How many pounds of each blend should she mix?

49. A master carpenter makes \$55 an hour and his assistant makes \$30 an hour. On one job, the assistant works 5 hours longer than the carpenter and together they earn \$2,020 in wages. How many hours did each man work?

50. A married couple takes their three children to a ball game. A ticket for a child costs 40% less than a than a ticket for an adult. If the cost of admission for the family is \$133, what is the cost of a ticket for an adult?

Exercise Set 6.4

Solve the linear inequality. Graph its solution set and express it in interval notation.

1. $3x - 7 \geq 11$

2. $1 - 2x < 5$

3. $19 - 4x < 0$

4. $5x - 1 \leq 2x - 7$

5. $4x + 12 \geq 9x + 8$

6. $-(2x - 3) \leq 0$

7. $-3x \geq -7$

8. $3x + 11 \leq 6x + 8$

9. $-7x - 3x + 23 > 3$

10. $\frac{3}{4}x \geq 1$

11. $\frac{x}{7} - 5 < 2$

12. $0.2(x - 3) < 4$

13. $\frac{2x}{3} < 3.8$

14. $2 - (1 - 3x) \geq 5 - 2(3 - x)$

15. $\frac{1}{2}\left(x - \frac{1}{3}\right) > 2$

16. $7x + 1 \leq 3 - (2x - 4)$

17. $\frac{3}{4}x - \frac{2}{5}x > 1$

18. $2(1 - 3x) \leq 3(2 + x)$

19. $0.01x + 2.6 \geq 1.3$

20. $-\frac{5}{3}x - 18 > x + \frac{1}{3}x$

21. $\frac{1}{3}x - \frac{1}{4}x \leq 5 - x$

22. $\frac{5x}{12} \geq \frac{7x}{18} + \frac{1}{6}$