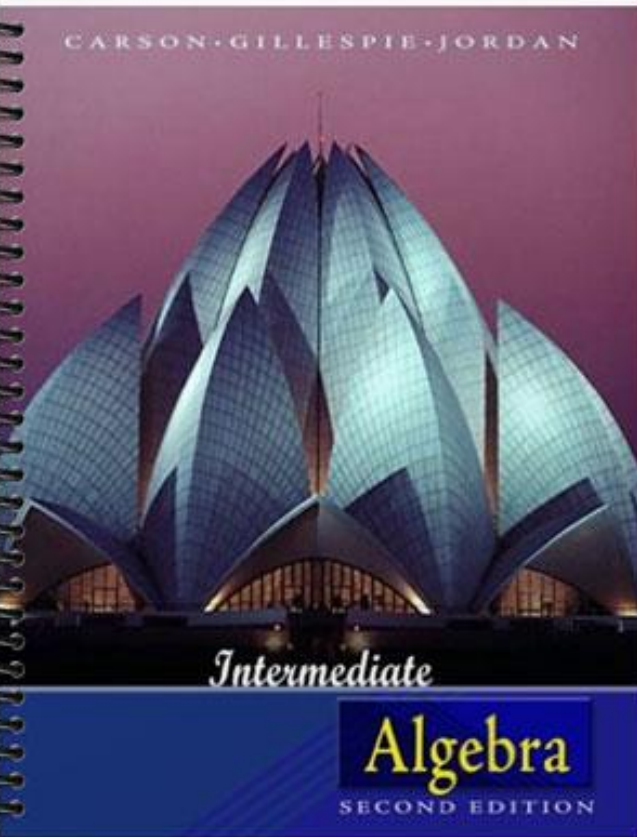


SOLUTIONS MANUAL

CARSON • GILLESPIE • JORDAN



Intermediate

Algebra

SECOND EDITION

Chapter 2

Linear Equations and Inequalities in One Variable

Exercise Set 2.1

2. A set containing all the solutions for a given equation.

4. $\{ \}$ or

6. Subtract b from both sides.

8. $3x + 3 = 15$ 10. $7 - 5u = 13$

$$3x = 12$$

$$5u = 6$$

$$x = 4$$

$$u = \frac{6}{5}$$

12. $3p + 4 = 4p - 4$ 14. $6q - 5 = 3q + 4$

$$4 = p - 4$$

$$3q - 5 = 4$$

$$8 = p$$

$$3q = 9$$

$$q = 3$$

16. $3(h + 2) = 12$ 18. $2b + 3(b - 2) = 4$

$$3h + 6 = 12$$

$$2b + 3b - 6 = 4$$

$$3h = 6$$

$$5b - 6 = 4$$

$$h = 2$$

$$5b = 10$$

$$b = 2$$

20. $2(l + 5) - 2 = 2 + 2(l + 4)$

$$2l + 10 - 2 = 2 + 2l + 8$$

$$2l + 8 = 2l + 10$$

$$8 = 10$$

No solution

22. $3\left(\frac{1}{3}y - 5\right) = 3(7y + 4 - 5y)$

$$y - 15 = 21y + 12 - 15y$$

$$y - 15 = 6y + 12$$

$$15 = 5y + 12$$

$$27y = 5y$$

$$\frac{27}{5} = y$$

24. $10(0.2p - 0.7) = 10(0.7p - 3.6)$

$$2p - 7 = 7p - 36$$

$$5p = 29$$

$$p = 5.8$$

26. $7d - 42 = 27d = 64 - 9d$

$$20d - 42 = 64 - 9d$$

$$11d - 42 = 64$$

$$11d = 106$$

$$d = 9.64$$

28. $12c + 2(c - 3) = 7 + 5(2c - 1)$

$$12c + 2c - 6 = 7 + 10c - 5$$

$$14c - 6 = 2 + 10c$$

$$4c - 6 = 2$$

$$4c = 8$$

$$c = 2$$

30. $18 - 8(3 - s) = 5(s + 4) + 27$

$$18 - 24 + 8s = 5s + 20 + 27$$

$$6 + 8s = 5s + 27$$

$$13s - 6 = 27$$

$$13s = 33$$

$$s = 2.54$$

32. $5m + 3 + 3(4m - 5) = 5(m + 5) - 5$

$$5m + 3 + 12m - 15 = 5m + 25 - 5$$

$$17m - 12 = 5m + 20$$

$$12m = 32$$

$$m = \frac{32}{12} = \frac{8}{3}$$

34. $10\left(\frac{4}{5}k - 6\right) = 10\left(7 - \frac{1}{2}k\right)$

$$8k - 60 = 70 - 5k$$

$$13k = 130$$

$$k = 10$$

36. $12\left(\frac{2}{3}(d - 6)\right) = 12\left(3 + \frac{3}{4}d\right)$

$$8(d - 6) = 36 + 9d$$

$$8d - 48 = 36 + 9d$$

$$48 = 36 + d$$

$$84 = d$$

$$\begin{aligned}
 38. \quad & 3.3 \quad 0.6a = 1.1(4 - a) - 2 \\
 & 10(3.3 - 0.6a) = 10(4.4 - 1.1a - 2) \\
 & 33 - 6a = 44 - 11a - 20 \\
 & 33 - 6a = 24 - 11a \\
 & 5a = 9 \\
 & a = 1.8
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & x \quad 2.28 + 1.6x = 4.6 + 0.05x - 0.25 \\
 & 2.6x - 2.28 = 0.05x + 4.35 \\
 & 2.55x = 6.63 \\
 & x = 2.6
 \end{aligned}$$

$$\begin{aligned}
 42. \quad & 16(q - 3) + 2q - 1 = 5(q + 1) + 13q + 2 \\
 & 16q - 48 + 2q - 1 = 5q + 5 + 13q + 2 \\
 & 18q - 49 = 18q + 7 \\
 & -49 = 7
 \end{aligned}$$

No solution

$$\begin{aligned}
 44. \quad & 5(p + 2) - 3p + 5 = 5 - 8p \\
 & 5p + 10 - 3p + 5 = 5 - 8p \\
 & 2p + 15 = 5 - 8p \\
 & 10p = -10 \\
 & p = -1
 \end{aligned}$$

All real numbers

$$\begin{aligned}
 46. \quad & \text{Mistake: The distributive property was not used.} \\
 & \text{Correct: } 4 + 3(p - 1) = 14 \\
 & 4 + 3p - 3 = 14 \\
 & 1 + 3p = 14 \\
 & 3p = 13 \\
 & p = \frac{13}{3}
 \end{aligned}$$

$$\begin{aligned}
 48. \quad & \text{Mistake: Subtracted before distributing into the} \\
 & \text{parentheses. Correct: } 7 - 2(d + 2) - 3 = 5 \\
 & 7 - 2d - 4 - 3 = 5 \\
 & -2d - 0 = 5 \\
 & -2d = 5 \\
 & d = -\frac{5}{2}
 \end{aligned}$$

$$50. \quad b^2 = c^2 - a^2 \qquad 52. \quad t = \frac{I}{Pr}$$

$$\begin{aligned}
 54. \quad & A = 2 - rh \\
 & \frac{A}{2 - h} = r \\
 56. \quad & V = \frac{1}{3} r^2 h \\
 & 3V = r^2 h \\
 & \frac{3V}{r^2} = h
 \end{aligned}$$

$$\begin{aligned}
 58. \quad & t = \frac{2}{\quad} \\
 & t = 2 \\
 & \frac{t}{2} = \quad \\
 60. \quad & B = P(1 + rt) \\
 & \frac{B}{1 + rt} = P
 \end{aligned}$$

$$\begin{aligned}
 62. \quad & P = 2r + 2d \\
 & P - 2r = 2d \\
 & \frac{P - 2r}{2} = d
 \end{aligned}$$

$$\begin{aligned}
 64. \quad & h = 16t^2 + h_0 \\
 & h - h_0 = 16t^2 \\
 & \frac{h - h_0}{16} = t^2
 \end{aligned}$$

$$\begin{aligned}
 66. \quad & E = \frac{1}{2}mv^2 + mgy \\
 & E - mgy = \frac{1}{2}mv^2 \\
 & 2(E - mgy) = mv^2 \\
 & \frac{2(E - mgy)}{m} = v^2
 \end{aligned}$$

68. Mistake: Subtracted b instead of dividing by b .
Correct: $h = \frac{A}{b}$

70. Mistake: Did not multiply both sides of the equation by 2. Correct: $A = \frac{1}{2}bh$

$$2A = bh$$

$$\frac{2A}{h} = b$$

Exercise Set 2.2

2. Answers will vary. Some possible answers: Draw a picture. Make a table. Underline key words. Search for a related example.
4. $n + 2, n + 4$
6. Concentration refers to the portion of a solution that is pure solute.

$$\begin{aligned}
 8. \quad & 89 = \frac{5}{9}(F - 32) \\
 & \frac{9}{5}(89) = \frac{9}{5} \cdot \frac{5}{9}(F - 32) \\
 & 160.2 = F - 32 \\
 & 128.2 = F
 \end{aligned}$$

10. Find the area of the house: $A = 35 \cdot 40$
 $A = 1400$

$$\begin{aligned}
 \text{Find the area of the lot: } & A = \frac{1}{2}(85 + 65)110 \\
 & A = 0.5(150)110 \\
 & A = 8250
 \end{aligned}$$

Subtract the area of the house from the area of the lot to find the area to be landscaped.

$$8250 - 1400 = 6850 \text{ sq. ft.}$$

8 Chapter 2 Linear Equations and Inequalities in One Variable

$$12. \quad 1725 = P + P(0.03)(5)$$

$$1725 = P + 0.15P$$

$$1725 = 1.15P$$

$$\$1500 = P$$

$$x + (x+1) + (x+2) + (x+3) = 34$$

$$4x + 6 = 34$$

$$4x = 28$$

$$x = 7$$

$$14. \quad 15 = 7w - 6 \qquad 16. \quad 2(n - 3) = 5$$

$$21 = 7w \qquad 2n - 6 = 5$$

$$3 = w \qquad 2n = 11$$

$$n = \frac{11}{2}$$

The integers are 7, 8, 9, and 10.

30. If two angles are complementary their sum is 90 degrees. Let one of the angles be x and the other be $2x + 15$.

$$x + (2x + 15) = 90$$

$$3x + 15 = 90$$

$$3x = 75$$

$$x = 25$$

The angles are 25° and $2(25) + 15 = 65^\circ$.

$$18. \quad 6 - 3(a - 5) = 4a$$

$$6 - 3a + 15 = 4a$$

$$21 - 3a = 4a$$

$$21 = 7a$$

$$3 = a$$

32. If two angles are supplementary their sum is 180 degrees. Let one of the angles be x and the other angle be $2x - 15$.

$$x + (2x - 15) = 180$$

$$3x - 15 = 180$$

$$3x = 195$$

$$x = 65$$

The angles are 65° and $2(65) - 15 = 115^\circ$.

20. Translate 115% of what is 22,678?

$$\frac{115}{100} = \frac{22,678}{x}$$

$$115x = 100 \cdot 22,678$$

$$115x = 2,267,800$$

$$x = 19720$$

The wholesale price is \$19,720.

22. Translate 60% of what is 24.50?

$$\frac{60}{100} = \frac{24.50}{x}$$

$$60x = 100 \cdot 24.50$$

$$60x = 2450$$

$$x = 40.83$$

The original price was \$40.83.

24. Translate 87.5% of what is 24,360?

$$\frac{87.5}{100} = \frac{24,360}{x}$$

$$87.5x = 100 \cdot 24,360$$

$$87.5x = 2,436,000$$

$$x = 27,840$$

The previous month's revenue was \$27,840.

26. The consecutive integers are x and $x + 1$.

$$x + (x+1) = 191$$

$$2x + 1 = 191$$

$$2x = 190$$

$$x = 95$$

The integers are 95 and $95 + 1 = 96$.

28. The consecutive integers are x , $x + 1$, $x + 2$ and $x + 3$.

$$34. \quad 13x; 7(14.50 - x) \qquad 36. \quad \frac{d}{45}; \frac{d+10}{50}$$

$$38. \quad 80 - x; 0.40(80)$$

$$40. \quad 13x + 7(14.50 - x) = 155.50$$

$$13x + 101.5 - 7x = 155.50$$

$$6x = 54$$

$$x = 9$$

\$9 for the 1 gal. and \$5.50 for the $\frac{1}{2}$ gal.

$$42. \quad \frac{d}{45} = \frac{d+10}{50}$$

$$50d = 45(d+10)$$

$$50d = 45d + 450$$

$$5d = 450$$

$$d = 90$$

Paul has traveled 90 miles. That has taken him

$$\frac{90}{45} = 2 \text{ hr. So, it is } 6:00 + 2 \text{ hr} = 8:00 \text{ PM}$$

$$44. \quad 0.45x + 0.35(80 - x) = 0.40(80)$$

$$0.45x + 28 - 0.35x = 32$$

$$0.1x + 28 = 32$$

$$0.1x = 4$$

$$x = 40$$

	how many	value	total amount
46. desktop	10	x	$10x$
laptop	4	$x + 260$	$4(x + 260)$

$$10x + 4(x + 260) = 20,080$$

$$10x + 4x + 1040 = 20,080$$

$$14x + 1040 = 20,080$$

$$14x = 19,040$$

$$x = 1360$$

Desktops are \$1360 and laptops are \$1620.

	how many	value	total amount
48. Monopoly	$2x$	8.95	$8.95(2x)$
Trivial Pursuit	x	15.95	$15.95x$

$$8.95(2x) + 15.95x = 575.45$$

$$17.9x + 15.95x = 575.45$$

$$33.85x = 575.45$$

$$x = 17$$

17 Trivial Pursuit games and 34 Monopoly games

	rate	time	distance
50. east	60	x	$60x$
west	48	x	$48x$

$$60x + 48x = 270$$

$$108x = 270$$

$$x = 2.5$$

The cars will be 270 miles apart in 2.5 hours.

	rate	time	distance
52. Bonnie	65	$x + 0.25$	$65(x + 0.25)$
Bob	70	x	$70x$

$$65(x + 0.25) = 70x$$

$$65x + 16.25 = 70x$$

$$16.25 = 5x$$

$$3.25 = x$$

Bob will catch up in 3.25 hours at 5:00 PM.

	concentrate	vol. of solution	vol. of fertilizer
54. 50%	0.50	15	$0.50(15)$
40%	0.40	x	$0.40x$
46%	0.46	$x + 15$	$0.46(x + 15)$

$$0.50(15) + 0.40x = 0.46(x + 15)$$

$$7.5 + 0.4x = 0.46x + 6.9$$

$$0.6 + 0.4x = 0.46x$$

$$0.6 = 0.06x$$

$$10 = x$$

10-oz. of 40%

	concentrate	vol. of solution	vol. of HCl
56. 10%	0.10	50	$0.10(50)$
25%	0.25	x	$0.25x$
20%	0.20	$x + 50$	$0.20(x + 50)$

$$0.10(50) + 0.25x = 0.20(x + 50)$$

$$5 + 0.25x = 0.20x + 10$$

$$0.05x + 5 = 10$$

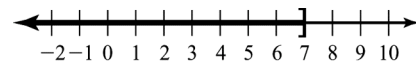
$$0.05x = 5$$

$$100 = x$$

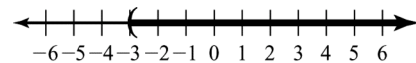
100 ml. of 10%

Exercise Set 2.3

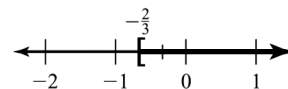
- For $x < a$, the value of a is not included in the solution. For $x \geq a$, the value of a is included in the solution.
- All real numbers less than or equal to 4 are part of the solution set.
- Multiplying or dividing both sides of the inequality by a negative number.
- $\{n | n \geq 7\}$ $(7, \infty)$



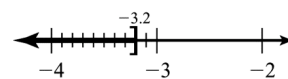
- $\{x | x > 3\}$ $(3, \infty)$



- $a | a \geq \frac{2}{3}$ $(\frac{2}{3}, \infty)$



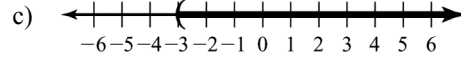
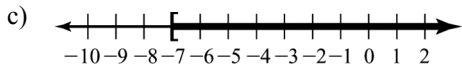
- $\{s | s \geq 3.2\}$ $(3.2, \infty)$



- $x + 6 \leq 1$
 $x \leq 7$

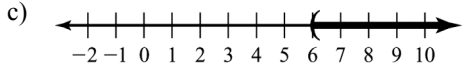
- $\{x | x \leq 7\}$ b) $(7, \infty)$

10 Chapter 2 Linear Equations and Inequalities in One Variable



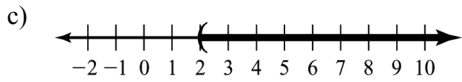
18. $3x < 18$
 $x > 6$

a) $\{x > 6\}$ b) $(6, \infty)$



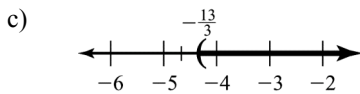
20. $9y - 7 > 11$
 $9y > 18$
 $y > 2$

a) $\{y | y > 2\}$ b) $(2, \infty)$



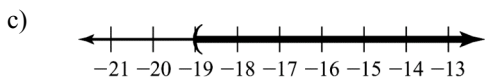
22. $3c + 4 < 17$
 $3c < 13$
 $c > \frac{13}{3}$

a) $\{c | c > \frac{13}{3}\}$ b) $(\frac{13}{3}, \infty)$



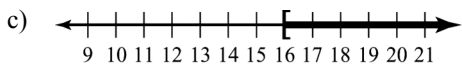
24. $4 > \frac{1}{5} \frac{q}{5}$
 $20 > \frac{1}{5} q$
 $19 > q$
 $19 < q$

a) $\{q | q > 19\}$ b) $(19, \infty)$



26. $5b - 3 = 13 + 4b$
 $b - 3 = 13$
 $b = 16$

a) $\{b | b = 16\}$ b) $\{16\}$

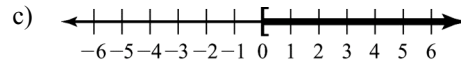


28. $4 - 9k < 4k + 19$
 $4 - 5k < 19$
 $5k < 15$
 $k > 3$

a) $\{k | k > 3\}$ b) $(3, \infty)$

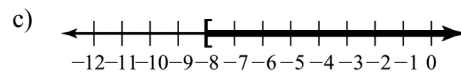
30. $6(3a + 2) - 10 = 2$
 $18a + 12 - 10 = 2$
 $18a + 2 = 2$
 $18a = 0$
 $a = 0$

a) $\{a | a = 0\}$ b) $\{0\}$



32. $4(v - 10) = 17(v + 3) + 13$
 $4v - 40 = 17v + 51 + 13$
 $4v - 40 = 17v + 64$
 $13v = 104$
 $v = 8$

a) $\{v | v = 8\}$ b) $\{8\}$



34. $\frac{1}{7}(3x - 28) > \frac{4}{7}x + \frac{1}{4}$
 $\frac{3}{7}x - 4 > \frac{4}{7}x + \frac{1}{4}$
 $x - 4 > \frac{1}{4}$
 $x > \frac{17}{4}$

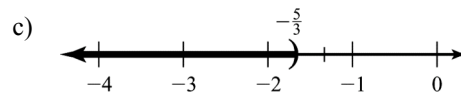
a) $\{x | x > \frac{17}{4}\}$ b) $(\frac{17}{4}, \infty)$



36. $\frac{1}{5}(p + 10) - \frac{1}{2}(p + 5) > 0$
 $2(p + 10) - 5(p + 5) > 0$
 $2p + 20 - 5p - 25 > 0$
 $3p - 5 > 0$
 $3p > 5$

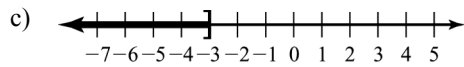
$p < \frac{5}{3}$

a) $\{p | p < \frac{5}{3}\}$ b) $(-\infty, \frac{5}{3})$



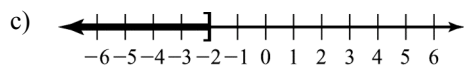
$$38. \begin{array}{r} 1.2b \ 1.4 \ 1.5b \ 0.5 \\ 0.3b \ 1.4 \ 0.5 \\ 0.3b \ 0.9 \\ b \ 3 \end{array}$$

a) $\{b|b \geq 3\}$ b) $(3, \infty)$



$$40. \begin{array}{r} 3.2f + 3.6 \ 1.8f \ 0.3(f + 6) \ 0.4 \\ 3.2f + 3.6 \ 1.8f \ 0.3f + 1.8 \ 0.4 \\ 1.4f + 3.6 \ 0.3f + 1.4 \\ 1.1f + 3.6 \ 1.4 \\ 1.1f \ 2.2 \\ f \ 2 \end{array}$$

a) $\{f|f \geq 2\}$ b) $(2, \infty)$



$$42. \begin{array}{r} \frac{2}{3}x > 8 \\ x > 12 \end{array} \qquad 44. \begin{array}{r} 3x - 2 < 10 \\ 3x < 12 \\ x < 4 \end{array}$$

$$46. \begin{array}{r} 3 - 2x \leq 17 \\ 2x \leq 14 \\ x \leq 7 \end{array} \qquad 48. \begin{array}{r} 3(x - 4) + 8 \leq 16 \\ 3x - 12 + 8 \leq 16 \\ 3x - 4 \leq 16 \\ 3x \leq 20 \\ x \leq \frac{20}{3} \end{array}$$

$$50. \begin{array}{r} \frac{70 + 62 + 75 + x}{4} \leq 70 \\ \frac{207 + x}{4} \leq 70 \\ 207 + x \leq 280 \\ x \leq 73 \end{array}$$

Eric must score lower than 73.

$$52. \begin{array}{r} \frac{186 + 178 + x}{3} \geq 180 \\ \frac{364 + x}{3} \geq 180 \\ 364 + x \geq 540 \\ x \geq 176 \end{array}$$

Paulette must bowl 176 or higher.

$$54. \begin{array}{r} 4w \leq 14 \\ w \leq 3.5 \end{array}$$

The width must be 3.5 ft. or more.

$$56. \begin{array}{r} C \leq 12 \\ d \leq 12 \\ d \leq \frac{12}{3} \\ d \leq 3.8 \text{ cm} \end{array}$$

$$58. \begin{array}{r} 338 \leq 65t \\ 5.2 \leq t \end{array}$$

She will complete her trip in 5.2 hours or more.

$$60. \begin{array}{r} (65n + 10,000) \leq (25n + 15,000) \leq 0 \\ 65n + 10,000 \leq 25n + 15,000 \leq 0 \\ 40n \leq 5000 \leq 0 \\ 40n \leq 5000 \\ n \leq 125 \end{array}$$

125 or more homes must be cleaned to break even or make a profit.

$$62. \begin{array}{r} a) t < \frac{5}{9}(2795 - 32) \\ t < \frac{5}{9}(2763) \\ t < 1535 \end{array} \qquad b) t \geq 1535$$

$$64. \begin{array}{r} 24,500 \leq 9.8m \\ 2500 \text{ kg} \leq m \end{array}$$

about 2500 kg or less

Puzzle Problem

There is no conflict in what they said, so since "at least" one lied, they both must have lied. Therefore, the brother is older.

Collaborative Exercises

- $F + L$
- Yes, because 40% off the price of lenses means we pay 60% of the regular price, which would be $0.6L$.
- 40% of \$90 = 36 or without discount: $120 + 90 = \$210$; with: $120 + 0.6(90) = \$174$; Anna saves $210 - 174 = \$36$
- $F + 0.6(90) \leq 125$; $F \leq \$71$
- Senior discount: $0.75(140 + 260) = \$300$; 40% off lenses sale: $140 + 0.6(260) = \$296$; the 40% is slightly better.
- $60 + 0.60L < 0.75(60 + L)$
 $60 + 0.60L < 45 + 0.75L$
 $0.15L < 15$
 $L < \$100$
- $0.85(F + L)$

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8. $80 + 0.60L < 0.85(80 + L)$
 $80 + 0.60L < 68 + 0.85L$
 $80 - 0.25L < 68$
 $0.25L < 12$
 $L > 48$

Exercise Set 2.4

2. Two inequalities joined by either “and” or “or.”

4. For two sets A and B , the union of A and B , symbolized by $A \cup B$, is a set containing each element in either A or B .

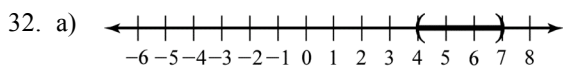
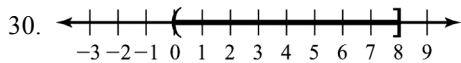
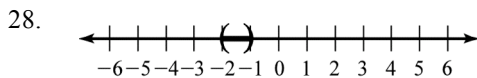
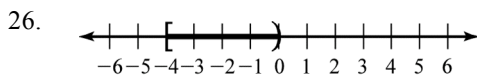
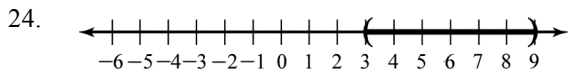
6. We graph the region included in either of the two inequalities.

8. a. $\{2, 4, 6\}$ 10. a. $\{14\}$
 b. $\{2, 4, 6, 8, 10\}$ b. $\{8, 10, 12, 14, 16, 18\}$

12. a. 14. a. $\{m, n, o, p, q\}$
 b. $\{a, e, h, l, m, o, t, v\}$ b. $\{a, b, c, \dots, x, y, z\}$

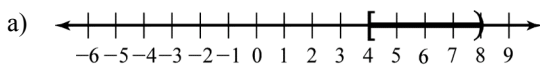
16. $3 < n < 7$ 18. $0 < m < 3$

20. $1 < r < 1$ 22. $7 < t < 15$



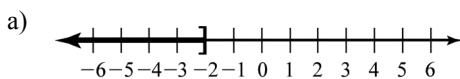
b) $\{x | 4 < x < 7\}$ c) $(4, 7)$

34. $x \geq 4$ and $x < 8$



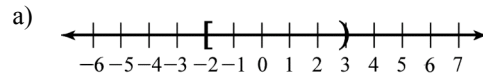
b) $\{x | 4 \leq x < 8\}$ c) $[4, 8)$

36. $x \leq 2$ and $x \geq 5$



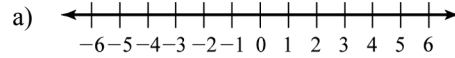
b) $\{x | x \leq 2\}$ c) $(-\infty, 2]$

38. $3x \geq 6$ and $5x < 15$
 $x \geq 2$ $x < 3$



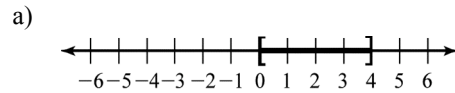
b) $\{x | x \geq 2 \text{ and } x < 3\}$ c) $[2, 3)$

40. $6x < 18$ and $x \geq 1$
 $x > 3$ $x \geq 1$



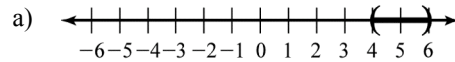
b) $\{x | x > 3 \text{ and } x \geq 1\}$ c) no interval notation

42. $0 \leq x \leq 4$



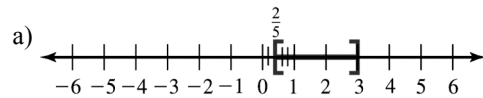
b) $\{x | 0 \leq x \leq 4\}$ c) $[0, 4]$

44. $8 < 2x < 12$
 $4 < x < 6$



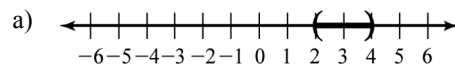
b) $\{x | 4 < x < 6\}$ c) $(4, 6)$

46. $0 \leq 2 + 5x \leq 13$
 $2 \leq 5x \leq 15$
 $\frac{2}{5} \leq x \leq 3$



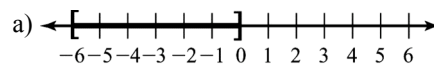
b) $\{x | \frac{2}{5} \leq x \leq 3\}$ c) $[\frac{2}{5}, 3]$

48. $8 < 2x < 4$
 $4 > x > 2$

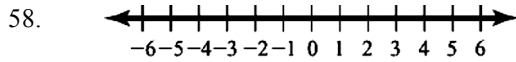
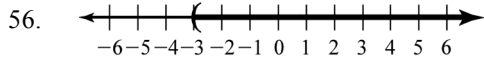
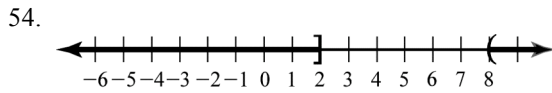
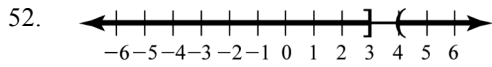


b) $\{x | 2 < x < 4\}$ c) $(2, 4)$

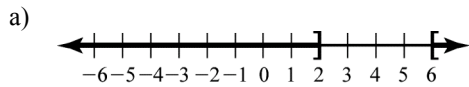
50. $4 \leq 4 - x \leq 2$
 $0 \leq x \leq 6$
 $0 \leq x \leq 6$
 $6 \leq x \leq 0$



b) $\{x | 6 \leq x \leq 0\}$ c) $[6, 0]$



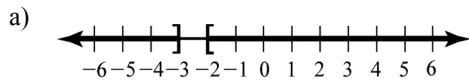
60. $a > 2$ or $a < 6$



b) $\{a \mid a > 2 \text{ or } a < 6\}$

c) $(-\infty, 2) \cup (6, \infty)$

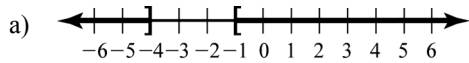
62. $4t > 12$ or $4t < 8$
 $t > 3$ or $t < 2$



b) $\{t \mid t > 3 \text{ or } t < 2\}$

c) $(-\infty, 2) \cup (3, \infty)$

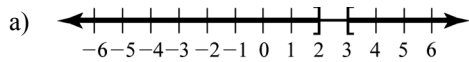
64. $2x > 2$ or $2x < 8$
 $x > 1$ or $x < 4$



b) $\{x \mid x > 1 \text{ or } x < 4\}$

c) $(-\infty, 1) \cup (4, \infty)$

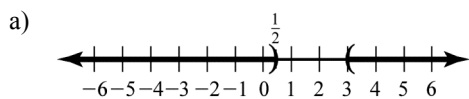
66. $2q > 6$ or $2q < 4$
 $q > 3$ or $q < 2$



b) $\{q \mid q > 3 \text{ or } q < 2\}$

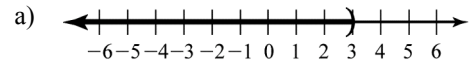
c) $(-\infty, 2) \cup (3, \infty)$

68. $2m < 1$ or $2m > 6$
 $m < \frac{1}{2}$ or $m > 3$



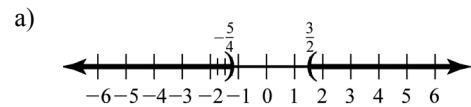
b) $m \mid m < \frac{1}{2} \text{ or } m > 3$ c) $(-\infty, \frac{1}{2}) \cup (3, \infty)$

70. $5d < 5$ or $5d < 15$
 $d < 1$ or $d < 3$



b) $\{d \mid d < 3\}$ c) $(-\infty, 3)$

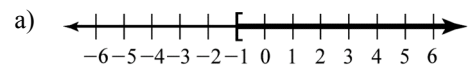
72. $4n > 5$ or $4n < 6$
 $n > \frac{5}{4}$ or $n < \frac{3}{2}$



b) $n \mid n > \frac{5}{4} \text{ or } n < \frac{3}{2}$

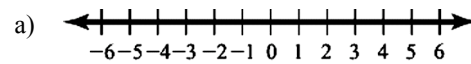
c) $(-\infty, \frac{5}{4}) \cup (\frac{3}{2}, \infty)$

74. $y > 1$ or $y < 1$



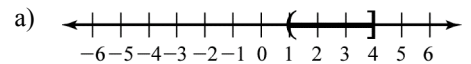
b) $\{y \mid y > 1\}$ c) $(1, \infty)$

76. $4k > 8$ or $4k < 2$
 $k > 2$ or $k < \frac{1}{2}$



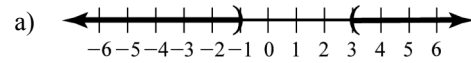
b) $\{x \mid x \text{ is a real number}\}$ c) $(-\infty, \infty)$

78. $1 < x$ and $x < 4$



b) $\{x \mid 1 < x < 4\}$ c) $(1, 4)$

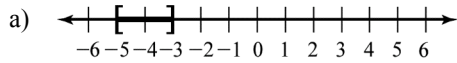
80. $3x < 3$ or $3x > 9$
 $x < 1$ or $x > 3$



b) $\{x \mid x < 1 \text{ or } x > 3\}$

c) $(-\infty, 1) \cup (3, \infty)$

82. $3 < x < 5$

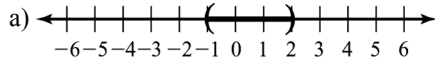


b) $\{x | 3 < x < 5\}$ c) $(3, 5)$

84. $7 < 3x < 4 < 2$

$3 < 3x < 6$

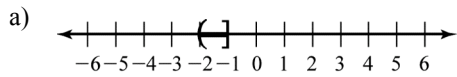
$1 < x < 2$



b) $\{x | 1 < x < 2\}$ c) $(1, 2)$

86. $3 < 3x < 6$

$1 < x < 2$

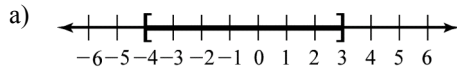


b) $\{x | 1 < x < 2\}$ c) $(1, 2)$

88. $2 < x+1 < 5$

$3 < x < 4$

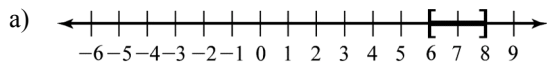
$3 < x < 4$



b) $\{x | 3 < x < 4\}$ c) $(3, 4)$

90. $75 < 12.5x < 100$

$6 < x < 8$



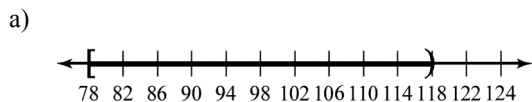
b) $\{x | 6 < x < 8\}$

c) $(6, 8)$

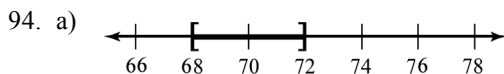
92. $70 < \frac{60 + 72 + 70 + x}{4} < 80$

$280 < 202 + x < 320$

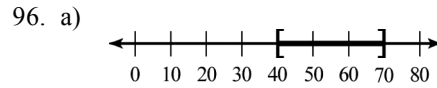
$78 < x < 118$



b) $\{x | 78 < x < 118\}$ c) $(78, 118)$



b) $\{x | 68 < x < 72\}$ c) $(68, 72)$



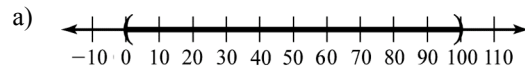
b) $\{x | 40 \text{ mph} < x < 70 \text{ mph}\}$

c) $(40, 70)$

98. $32 < \frac{9}{5}C + 32 < 212$

$0 < \frac{9}{5}C < 180$

$0 < C < 100$



b) $\{x | 0 < C < 100 & C\}$ c) $(0, 100)$

100. $\{x | 1980 < x < 1983\}$; 1980, 1983

102. $\{x | 1980 < x < 1989\}$; [1980, 1989)

104. $\{x | 1980 < x < 1983 \text{ or } 1988 < x < 2002\}$;
 $1980, 1983 \cup 1988, 2002$

Puzzle Problem

Since $d = rt$, then $r = \frac{d}{t}$.

$\frac{40}{2} = r = \frac{40}{1.75}$

20 km/hr. $r = 22.9$ km/hr.

Exercise Set 2.5

2. We are to find numbers that are 5 units from 0.

4. There is no solution.

6. After separating the absolute value equation into two equations, one with the two expressions equal and the other with the two expressions opposites, one of the equations leads to a false conclusion.

8. $y = 5$ or $y = 5$ 10. no solution

12. $w - 1 = 4$ or $w - 1 = 4$
 $w = 5$ $w = 3$

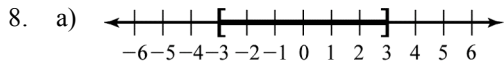
14. $3s + 7 = 10$ or $3s + 7 = 10$

$s = \frac{17}{3}$ $s = 1$

16. $3x - 2 = 5$ or $3x - 2 = 5$
 $3x = 7$ $3x = 3$
 $x = \frac{7}{3}$ $x = 1$
18. $2x - 1 = 2$ or $2x - 1 = 2$
 $x = \frac{1}{2}$ $x = \frac{3}{2}$
20. no solution 22. $6 - 3m = 0$
 $m = 2$
24. $|3r| = 3$
 $3r = 3$ or $3r = 3$
 $r = 1$ $r = 1$
26. $|x+3| = 6$
 $x+3 = 6$ or $x+3 = 6$
 $x = 9$ $x = 3$
28. $|v - 2| = 2$
 $v - 2 = 2$ or $v - 2 = 2$
 $v = 0$ $v = 4$
30. $|3t - 2| = 3$
 $3t - 2 = 3$ or $3t - 2 = 3$
 $t = \frac{1}{3}$ $t = \frac{5}{3}$
32. $|4u - 2| = 4$
 $4u - 2 = 4$ or $4u - 2 = 4$
 $u = \frac{1}{2}$ $u = \frac{3}{2}$
34. $|x - 5| = 5$
 $x - 5 = 5$ or $x - 5 = 5$
 $x = 0$ $x = 10$
36. $|5 - 2x| = 10$
 $5 - 2x = 10$ or $5 - 2x = 10$
 $x = \frac{15}{2}$ $x = \frac{5}{2}$
38. $|2y+14| = 5$
 $2y+14 = 5$ or $2y+14 = 5$
 $y = \frac{19}{2}$ $y = \frac{9}{2}$
40. $2p+5 = 3p+10$ or $2p+5 = (3p+10)$
 $5 = p$ $2p+5 = 3p - 10$
 $5p = 15$
 $p = 3$
42. $p - 1 = 2p+8$ or $p - 1 = (2p+8)$
 $9 = p$ $p - 1 = 2p - 8$
 $p = \frac{7}{3}$
44. $3 - 6c = 2c - 3$ or $3 - 6c = (2c - 3)$
 $6 = 8c$ $3 - 6c = 2c + 3$
 $\frac{3}{4} = c$ $0 = 4c$
 $0 = c$
46. $2r - 1 = 1 - 2r$ or $2r - 1 = (1 - 2r)$
 $r = \frac{1}{2}$ $2r - 1 = 1 + 2r$
 $0 = 0$
 all real numbers
48. $4 + 2q = 2q + 8$ or $4 + 2q = (2q + 8)$
 $4 - 8$ $4 + 2q = 2q - 8$
 $4q = 12$
 $q = 3$
50. $|5+n| = 17$
 $5+n = 17$ or $5+n = 17$
 $n = 22$ $n = 12$
52. $\frac{u}{3} + 2 = 3$ or $\frac{u}{3} + 2 = 3$
 $u = 15$ $u = 3$
54. $\frac{6 - 5w}{6} = \frac{2}{3}$ or $\frac{6 - 5w}{6} = \frac{2}{3}$
 $18 - 15w = 12$ $18 - 15w = 12$
 $w = \frac{2}{5}$ $w = 2$
56. $\left|p + \frac{2}{3}\right| = 8$
 $p + \frac{2}{3} = 8$ or $p + \frac{2}{3} = 8$
 $p = \frac{26}{3}$ $p = \frac{22}{3}$

Exercise Set 2.6

2. $x < a$ and $x > a$
4. Shade to the left of $-a$ and to the right of a .
6. when $a < 0$



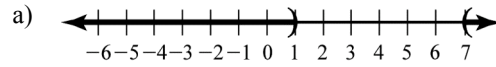
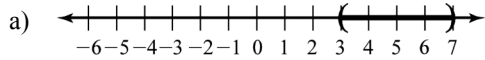
b) $\{h \mid h \leq -6 \text{ or } h \geq 6\}$

b) $\{y \mid y \geq 3\}$ c) $[3, 3]$

c) $(-\infty, 6] \cup [6, \infty)$

10. $2 < m \leq 5 < 2$
 $3 < m < 7$

24. $a \leq 4 < 3$ or $a \geq 4 > 3$
 $a < 1$ $a > 7$



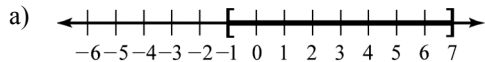
b) $\{m \mid 3 < m < 7\}$ c) $(3, 7)$

b) $\{a \mid a < 1 \text{ or } a > 7\}$

c) $(-\infty, 1) \cup (7, \infty)$

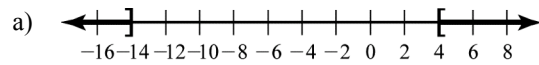
12. $4 \leq p \leq 3$
 $1 \leq p \leq 7$

26. $|x+5| \leq 9$



$x+5 \leq 9$ or $x+5 \geq 9$
 $x \leq 4$ $x \geq 14$

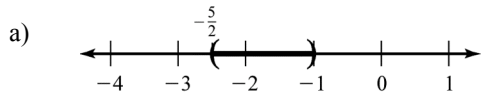
b) $\{p \mid 1 \leq p \leq 7\}$ c) $[1, 7]$



14. $3 < 4x+7 < 3$
 $\frac{5}{2} < x < 1$

b) $\{x \mid x \leq -14 \text{ or } x \geq 4\}$

c) $(-\infty, -14] \cup [4, \infty)$

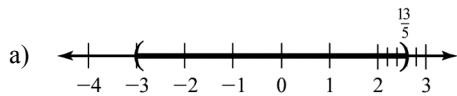
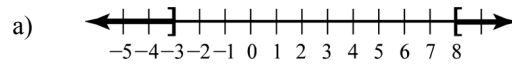


28. $|2x-5| \leq 11$

$2x-5 \leq 11$ or $2x-5 \geq 11$
 $x \leq 8$ $x \geq 3$

b) $x \mid \frac{5}{2} < x < 1$ c) $\frac{5}{2}, 1$

16. $14 < 5h \leq 1 < 14$
 $\frac{13}{5} > h > 3$



b) $\{x \mid x \leq -3 \text{ or } x \geq 8\}$

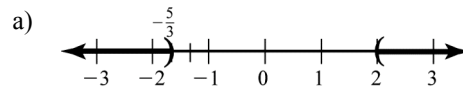
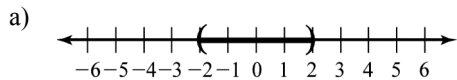
c) $(-\infty, -3] \cup [8, \infty)$

b) $h \mid 3 < h < \frac{13}{5}$ c) $3, \frac{13}{5}$

30. $|6h+1| > 11$

$6h+1 < -11$ or $6h+1 > 11$
 $h < -2$ $h < \frac{5}{3}$

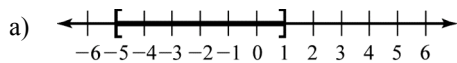
18. $2 < u < 2$



b) $\{u \mid 2 < u < 2\}$ c) $(2, 2)$

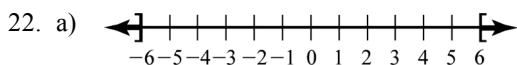
20. $3 \leq n+2 \leq 3$

b) $h \mid h < \frac{5}{3}$ or $h > 2$



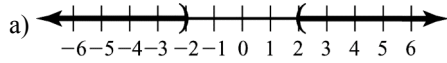
c) $(-\infty, \frac{5}{3}) \cup (2, \infty)$

b) $\{n \mid 5 \leq n \leq 1\}$ c) $[5, 1]$



32. $|m| > 2$

$m < -2$ or $m > 2$

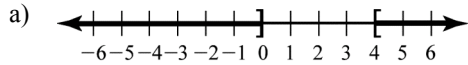


b) $\{m | m < 2 \text{ or } m > 2\}$

c) $(-\infty, 2) \cup (2, \infty)$

34. $|x - 2| \geq 2$

$x - 2 \geq 2$ or $x - 2 \leq -2$
 $x \geq 4$ or $x \leq 0$

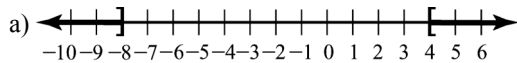


b) $\{x | x \leq 0 \text{ or } x \geq 4\}$

c) $(-\infty, 0] \cup [4, \infty)$

36. $|2x + 4| \leq 12$

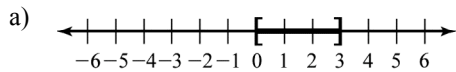
$2x + 4 \leq 12$ or $2x + 4 \geq -12$
 $2x \leq 8$ or $2x \geq -16$
 $x \leq 4$ or $x \geq -8$



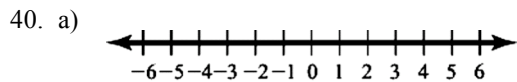
b) $\{x | x \geq -8 \text{ or } x \leq 4\}$

c) $(-\infty, -8] \cup [4, \infty)$

38. $3 \leq 2y + 3 \leq 3$
 $3 \leq y \leq 0$

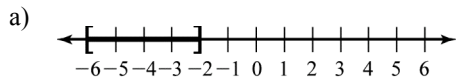


b) $\{y | 0 \leq y \leq 3\}$ c) $[0, 3]$



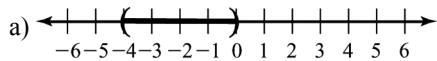
b) $\{b | b \text{ is a real number}\}$ c) $(-\infty, \infty)$

42. $2 \leq u + 4 \leq 2$
 $6 \leq u \leq 2$



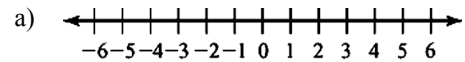
b) $\{u | 6 \leq u \leq 2\}$ c) $[6, 2]$

44. $6 < 3p + 6 < 6$
 $12 < 3p < 0$
 $4 < p < 0$



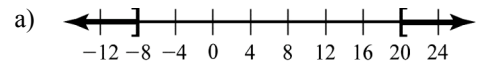
b) $\{p | 4 < p < 0\}$ c) $(-\infty, 4) \cup (0, \infty)$

46. $|5 + k| < 3$



b) $(-\infty, \infty)$ c) no interval notation

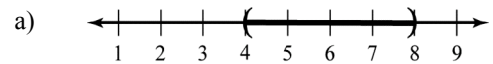
48. $3 \leq \frac{1}{2}x - 7$ or $3 \leq \frac{1}{2}x - 7$
 $\frac{1}{2}x - 7 \geq 3$ or $\frac{1}{2}x - 7 \geq 3$
 $\frac{1}{2}x \geq 10$ or $\frac{1}{2}x \geq 10$
 $x \geq 20$ or $x \geq 20$



b) $\{x | x \geq 20 \text{ or } x \geq 20\}$

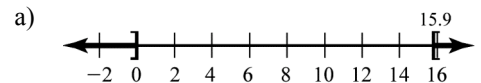
c) $(-\infty, 20] \cup [20, \infty)$

50. $1 < 0.5y - 3 < 1$
 $2 < 0.5y < 4$
 $4 < y < 8$



b) $\{y | 4 < y < 8\}$ c) $(4, 8)$

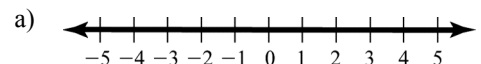
52. $5.3 \leq \frac{2}{3}w - 5.3$ or $5.3 \leq \frac{2}{3}w - 5.3$
 $\frac{2}{3}w - 5.3 \geq 5.3$ or $\frac{2}{3}w - 5.3 \geq 5.3$
 $\frac{2}{3}w \geq 10.6$ or $\frac{2}{3}w \geq 10.6$
 $w \geq 15.9$ or $w \geq 15.9$



b) $\{w | w \geq 15.9 \text{ or } w \geq 15.9\}$

c) $(-\infty, 15.9] \cup [15.9, \infty)$

54. $|8p + 7| > 1$



b) $\{p | p \text{ is a real number}\}$ c) $(-\infty, \infty)$

56. $|x - 3| > 2$ 58. $|x + 1| \leq 4$

60. $|x| \geq 2$

62. $|x| < \text{any negative number}$