

Answer Key

Section 2-1

1. 107 2. 13.5 3. 12 4. 7 5. 77
6. A 7. A 8. C

Section 2-2

1. 29 2. 27 3. $\frac{5}{2}$ 4. 4 5. 136
6. B 7. C 8. C

Section 2-3

1. 6 2. 2 3. 3 4. 3 5. 52
6. 5 7. 48 8. 19

Section 2-4

1. D 2. D 3. A 4. C 5. $\frac{1}{2}$
6. $\frac{3}{4}$ 7. 2 8. 0.8

Section 2-5

1. B 2. C 3. A 4. A 5. D
6. D

Chapter 2 Practice Test

1. C 2. B 3. C 4. D 5. C
6. A 7. B 8. D 9. 0 10. 1.43
11. 3

Answers and Explanations

Section 2-1

1. 107

$$\underbrace{n+18}_{18 \text{ more than } n} = 125$$

$$n = 125 - 18 = 107$$

2. 13.5

$$20 = \underbrace{2w-7}_{7 \text{ less than twice } w}$$

$$20 + 7 = 2w - 7 + 7 \quad \text{Add 7 to each side.}$$

$$27 = 2w \quad \text{Simplify.}$$

$$\frac{27}{2} = \frac{2w}{2} \quad \text{Divide each side by 2.}$$

$$13.5 = w \quad \text{Simplify.}$$

3. 12

$$\underbrace{2x-9}_{9 \text{ less than twice } x} = \underbrace{x+3}_{3 \text{ more than } x}$$

$$2x - 9 - x = x + 3 - x \quad \text{Subtract } x \text{ from each side.}$$

$$x - 9 = 3 \quad \text{Simplify.}$$

$$x = 12$$

4. 7

$$\underbrace{4c-8}_{8 \text{ less than 4 times } c} = 20$$

$$4c - 8 + 8 = 20 + 8 \quad \text{Add 8 to each side.}$$

$$4c = 28 \quad \text{Simplify.}$$

$$c = 7$$

5. 77

Let n = the smallest of four consecutive odd integers. Then,

$$n + (n + 2) + (n + 4) + (n + 6) = 296 .$$

$$4n + 12 = 296$$

$$4n = 284$$

$$n = 71$$

The greatest of the four consecutive odd integers is $n + 6$. Therefore,

$$n + 6 = 71 + 6 = 77$$

6. A

$$\underbrace{\frac{3}{4}a + 24}_{\text{the sum of three fourths of } a \text{ and } 24} = -9$$

$$\frac{3}{4}a + 24 - 24 = -9 - 24 \quad \text{Subtract 24 from each side.}$$

$$\frac{3}{4}a = -33 \quad \text{Simplify.}$$

$$\frac{4}{3} \cdot \frac{3}{4}a = \frac{4}{3}(-33) \quad \text{Multiply each side by } \frac{4}{3}.$$

$$a = -44$$

7. A

$$\underbrace{(g-23)\frac{1}{2}}_{g \text{ is decrease by } 23 \text{ and then multiplied by } \frac{1}{2}} = \underbrace{2g+8}_{8 \text{ more than twice } g}$$

$$(g-23)\frac{1}{2} \cdot 2 = (2g+8)2 \quad \text{Multiply each side by 2.}$$

$$g - 23 = 4g + 16 \quad \text{Simplify.}$$

$$g - 23 + 23 = 4g + 16 + 23 \quad \text{Add 23 to each side.}$$

$$g = 4g + 39 \quad \text{Simplify.}$$

$$g - 4g = 4g + 39 - 4g \quad \text{Subtract } 4g .$$

$$-3g = 39 \quad \text{Simplify.}$$

$$g = -13$$

8. C

$$\frac{\frac{p}{q}}{\frac{q}{p}} = \frac{3(p+q)}{\frac{-12}{\text{twelve less than three times the sum of } p \text{ and } q}}$$

Section 2-2

1. 29

$$\begin{aligned} \text{Given } -11 + x &= 9. \\ 20 - (11 - x) &= 20 - 11 + x = 20 + (-11 + x) \\ &= 20 + 9 = 29 \end{aligned}$$

2. 27

$$\begin{aligned} 33 - a &= a + 27 - 5a \\ 33 - a &= 27 - 4a && \text{Simplify.} \\ 33 - a + 4a &= 27 - 4a + 4a && \text{Add } 4a \text{ to each side.} \\ 33 + 3a &= 27 && \text{Simplify.} \end{aligned}$$

3. $\frac{5}{2}$

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

Multiply by 4 on both sides of the equation to simplify the given equation.

$$\begin{aligned} 4\left(\frac{1}{2}x - 3\right) &= 4\left(\frac{3}{4} - x\right) \\ 2x - 12 &= 3 - 4x && \text{Distributive Property} \\ 2x - 12 + 4x &= 3 - 4x + 4x && \text{Add } 4x \text{ to each side.} \\ 6x - 12 &= 3 && \text{Simplify.} \\ 6x - 12 + 12 &= 3 + 12 && \text{Add } 12 \text{ to each side.} \\ 6x &= 15 && \text{Simplify.} \\ x &= \frac{15}{6} = \frac{5}{2} \end{aligned}$$

4. 4

$$\begin{aligned} x - (3 - 2x) + (4 - 5x) &= -7 \\ x - 3 + 2x + 4 - 5x &= -7 && \text{Simplify.} \\ -2x + 1 &= -7 && \text{Simplify.} \\ -2x + 1 - 1 &= -7 - 1 && \text{Subtract } 1. \\ -2x &= -8 && \text{Simplify.} \\ x &= \frac{-8}{-2} = 4 \end{aligned}$$

5. 136

$$\frac{\frac{3}{4}x}{\frac{4}{3}} = \frac{20}{\text{decreased by twenty}} = \frac{82}{\text{equals eighty two}}$$

$$\frac{3}{4}x - 20 + 20 = 82 + 20 \quad \text{Add } 20 \text{ to each side.}$$

$$\frac{3}{4}x = 102 \quad \text{Simplify.}$$

$$x = \frac{4}{3} \cdot 102 = 136$$

6. B

$$\frac{2\frac{3}{5}x}{\frac{5}{2}} = \frac{-26}{\text{negative twenty six}}$$

$$\frac{13}{5}x = -26 \quad \frac{2\frac{3}{5}}{5} = \frac{13}{5}$$

$$\frac{5}{13} \cdot \frac{13}{5}x = \frac{5}{13} \cdot -26 \quad \text{Multiply each side by } \frac{5}{13}.$$

$$x = -10$$

7. C

Let x = the total students in the high school.

$$\text{Then } \frac{2}{9}x = 142.$$

$$x = \frac{9}{2} \cdot 142 = 639$$

8. C

$$820c + 380r = 4,360$$

Substitute 3 for c in the equation above since c represents the number of cups of cashews.

$$820(3) + 380r = 4,360$$

$$2,460 + 380r = 4,360 \Rightarrow 380r = 1,900$$

$$\Rightarrow r = 5$$

Section 2-3

1. 6

$$7n + 3 = 2n - 12 \Rightarrow 5n = -15 \Rightarrow n = -3$$

$$\text{Therefore, } -n + 3 = -(-3) + 3 = 3 + 3 = 6.$$

2. 2

$$7(h - 5) - 3h = \frac{3}{2}h \Rightarrow 7h - 35 - 3h = \frac{3}{2}h$$

$$\Rightarrow 4h - 35 = \frac{3}{2}h \Rightarrow 4h - \frac{3}{2}h = 35$$

$$\Rightarrow \frac{5}{2}h = 35 \Rightarrow h = 35 \cdot \frac{2}{5} = 14$$

$$\text{Therefore, } \frac{1}{7}h = \frac{1}{7}(14) = 2.$$

3. 3

$$\frac{r}{3} + \frac{s}{11} = \frac{39}{33} \text{ and } s = 2. \Rightarrow \frac{r}{3} + \frac{2}{11} = \frac{39}{33}$$

To simplify the equation, multiply both sides of the equation by 33, which is the LCD of 3 and 11.

$$33\left(\frac{r}{3} + \frac{2}{11}\right) = 33 \cdot \frac{39}{33} \Rightarrow 11r + 6 = 39 \\ \Rightarrow 11r = 33 \Rightarrow r = 3$$

4. 3

$$\frac{9-2k}{3} = k-2$$

To simplify the equation, multiply both sides of the equation by 3.

$$3\left(\frac{9-2k}{3}\right) = 3(k-2) \Rightarrow 9-2k = 3k-6 \\ \Rightarrow -2k-3k = -6-9 \Rightarrow -5k = -15 \\ \Rightarrow k = 3$$

5. 52

Let p = the cost of a pair of pants.

Since a \$48 shirt costs \$22 more than one half the cost of a pair of pants, you can set up the following equation.

$$48 = \frac{1}{2}p + 22 \\ \Rightarrow 26 = \frac{1}{2}p \Rightarrow 52 = p$$

6. 5

$$\underbrace{2n+11}_{\substack{\text{twice a number} \\ \text{increased by 11}}} = \underbrace{6n-9}_{\substack{\text{six times the number} \\ \text{decreased by 9}}}$$

$$2n+11 = 6n-9 \Rightarrow 20 = 4n \Rightarrow n = 5$$

7. 48

$$\underbrace{\frac{1}{2}n+3}_{\substack{\text{one half of a number} \\ \text{increased by three}}} = \underbrace{\frac{2}{3}n-5}_{\substack{\text{five less than two thirds} \\ \text{of the number}}}$$

To simplify the equation, multiply both sides of the equation by 6, which is the LCD of 2 and 3.

$$6\left(\frac{1}{2}n+3\right) = 6\left(\frac{2}{3}n-5\right) \\ 3n+18 = 4n-30 \\ \text{Solving for } n \text{ yields } n = 48.$$

8. 19

Let n be the first of the three consecutive odd integers, so n , $n+2$, and $n+4$ are the three

consecutive odd integers.

$$\underbrace{4(n+4)}_{\substack{\text{4 times the greatest of 3} \\ \text{consecutive odd integers}}} = \underbrace{3n}_{\substack{\text{3 times the least of 3} \\ \text{consecutive odd integers}}} + \underbrace{31}_{\substack{\text{exceeds} \\ \text{by 31}}}$$

$$4(n+4) = 3n+31 \\ 4n+16 = 3n+31 \Rightarrow n = 15$$

The greatest of the three consecutive odd integers is $n+4 = 15+4 = 19$.

Section 2-4

1. D

$$\frac{1}{3}(9-6x) = 5-2x \\ 3-2x = 5-2x \quad \text{Distributive Property} \\ 3-2x+2x = 5-2x+2x \quad \text{Add } 2x \text{ to each side.} \\ 3 = 5$$

The given equation is equivalent to the false statement $3 = 5$. Therefore the equation has no solution.

2. D

$$5(x-2)-3x = 2(x-10) \\ 5x-10-3x = 2x-20 \quad \text{Distributive Property} \\ 2x-10 = 2x-10 \quad \text{Simplify.}$$

The given equation is equivalent to $2x-10 = 2x-10$, which is true for all values of x .

3. A

$$\frac{1}{3}(15-6x) = 5-ax \\ 5-2x = 5-ax \quad \text{Distributive Property}$$

If the linear equation is an identity, the value of a is 2.

4. C

$$4x+13 = 7(x-2)+bx \\ 4x+13 = 7x-14+bx \\ 4x+13 = (7+b)x-14 \\ \text{If } 4 = 7+b, \text{ the linear equation has no solution.} \\ \text{Solving for } b \text{ yields } b = -3.$$

5. $\frac{1}{2}$

$$-\frac{7}{2}(2n-3)+4n = \frac{3}{2}(5+2n)$$

To simplify the equation, multiply both sides of the equation by 2.

$$2\left[-\frac{7}{2}(2n-3)+4n\right]=2\left[\frac{3}{2}(5+2n)\right]$$

$$-7(2n-3)+8n=3(5+2n) \quad \text{Distributive Property}$$

$$-14n+21+8n=15+6n \quad \text{Simplify.}$$

$$-6n+21=15+6n \quad \text{Simplify.}$$

$$-6n+21+6n=15+6n+6n \quad \text{Add } 6n \text{ to each side.}$$

$$21=15+12n$$

$$21-15=15+12n-15 \quad \text{Subtract 15.}$$

$$6=12n \text{ or } 12n=6 \quad \text{Simplify.}$$

$$n=\frac{6}{12}=\frac{1}{2}$$

6. $\frac{3}{4}$

$$\frac{13-7(k+1)}{3}=3k-2$$

To simplify the equation, multiply both sides of the equation by 3.

$$3\left[\frac{13-7(k+1)}{3}\right]=3[3k-2]$$

$$13-7(k+1)=9k-6 \quad \text{Simplify.}$$

$$13-7k-7=9k-6 \quad \text{Distributive Property}$$

$$6-7k=9k-6 \quad \text{Simplify.}$$

$$6-7k-6=9k-6-6 \quad \text{Subtract 6.}$$

$$-7k=9k-12 \quad \text{Simplify.}$$

$$-7k-9k=9k-12-9k \quad \text{Subtract } 9k.$$

$$-16k=-12$$

$$k=\frac{-12}{-16}=\frac{3}{4}$$

7. 2

$$-2[3-(x-4)]+5x=2-x$$

$$-2[3-x+4]+5x=2-x$$

$$-2[7-x]+5x=2-x$$

$$-14+2x+5x=2-x$$

$$-14+7x=2-x$$

$$8x=16$$

$$x=2$$

8. 0.8

$$0.4(5m-9)=-5m-4(0.3-m)$$

$$2m-3.6=-5m-1.2+4m$$

$$2m-3.6=-m-1.2$$

$$3m=2.4$$

$$m=0.8$$

Section 2-5

1. B

$$2x+3y=18$$

$$2x+3y-2x=18-2x \quad \text{Subtract } 2x \text{ from each side.}$$

$$3y=18-2x \quad \text{Simplify.}$$

$$\frac{3y}{3}=\frac{18}{3}-\frac{2x}{3} \quad \text{Divide each side by 3.}$$

$$y=6-\frac{2}{3}x \quad \text{Simplify.}$$

2. C

$$P=2l+2w$$

$$P-2l=2l+2w-2l \quad \text{Subtract } 2l \text{ from each side.}$$

$$P-2l=2w \quad \text{Simplify.}$$

$$\frac{P}{2}-\frac{2l}{2}=\frac{2w}{2} \quad \text{Divide each side by 2.}$$

$$\frac{P}{2}-l=w \quad \text{Simplify.}$$

3. A

$$c=\frac{a}{a+b}$$

$$(a+b)c=(a+b)\frac{a}{a+b} \quad \text{Multiply each side by } a+b.$$

$$ac+bc=a \quad \text{Simplify.}$$

$$ac+bc-ac=a-ac \quad \text{Subtract } ac \text{ from each side.}$$

$$bc=a-ac \quad \text{Simplify.}$$

$$bc=a(1-c) \quad \text{Factor.}$$

$$\frac{bc}{1-c}=a \quad \text{Divide each side by } 1-c.$$

4. A

$$\frac{ab-1}{3}=c$$

$$3\left[\frac{ab-1}{3}\right]=3c \quad \text{Multiply each side by 3.}$$

$$ab-1=3c \quad \text{Simplify.}$$

$$ab-1+1=3c+1 \quad \text{Add 1 to each side.}$$

$$ab=3c+1 \quad \text{Simplify.}$$

$$\frac{ab}{a}=\frac{3c+1}{a} \quad \text{Divide each side by } a.$$

$$b=\frac{3c+1}{a} \quad \text{Simplify.}$$

5. D

$$gh - f = g - h$$

$$gh - f + f = g - h + f \quad \text{Add } f \text{ to each side.}$$

$$gh = g - h + f \quad \text{Simplify.}$$

$$gh - g = g - h + f - g \quad \text{Subtract } g \text{ from each side.}$$

$$gh - g = f - h \quad \text{Simplify.}$$

$$g(h - 1) = f - h \quad \text{Factor.}$$

$$g = \frac{f - h}{h - 1} \quad \text{Divide each side by } h - 1.$$

6. D

$$n = a + (k - 1)d$$

$$n = a + kd - d \quad \text{Distributive Property}$$

$$n - a + d = a + kd - d - a + d$$

$$\quad \text{Add } -a + d \text{ to each side.}$$

$$n - a + d = kd \quad \text{Simplify.}$$

$$\frac{n - a + d}{d} = k \quad \text{Divide each side by } d.$$

Chapter 2 Practice Test

1. C

$$\frac{5}{6}x = \frac{4}{5}$$

$$\frac{6}{5} \cdot \frac{5}{6}x = \frac{6}{5} \cdot \frac{4}{5} \quad \text{Multiply each side by } \frac{6}{5}.$$

$$x = \frac{24}{25}$$

2. B

$$\underbrace{\frac{1}{2}n}_{\frac{1}{2} \text{ of a number } n} \quad \underbrace{-4}_{\text{decreased by 4}} = \underbrace{-6}_{\text{negative 6}}$$

$$\frac{1}{2}n - 4 + 4 = -6 + 4 \quad \text{Add 4 to each side.}$$

$$\frac{1}{2}n = -2 \quad \text{Simplify.}$$

$$2 \cdot \frac{1}{2}n = 2 \cdot -2 \quad \text{Multiply each side by 2.}$$

$$n = -4 \quad \text{Simplify.}$$

Three times n added to 7 is $3n + 7$.

$$3n + 7$$

$$= 3(-4) + 7 \quad \text{Substitute } -4 \text{ for } n.$$

$$= -5$$

3. C

$$\underbrace{4 - 7x = 23 - 5}_{4 - 7x \text{ is 5 less than 23}}$$

$$4 - 7x = 18 \Rightarrow -7x = 14 \Rightarrow x = -2$$

$$3x = 3(-2) = -6$$

4. D

$$P = F\left(\frac{1}{2}v^2 + 1\right)$$

$$\frac{P}{F} = \frac{F}{F}\left(\frac{1}{2}v^2 + 1\right) \quad \text{Divide each side by } F.$$

$$\frac{P}{F} = \frac{1}{2}v^2 + 1 \quad \text{Simplify.}$$

$$\frac{P}{F} - 1 = \frac{1}{2}v^2 + 1 - 1 \quad \text{Subtract 1 from each side.}$$

$$\frac{P}{F} - 1 = \frac{1}{2}v^2 \quad \text{Simplify.}$$

$$2\left(\frac{P}{F} - 1\right) = 2 \cdot \frac{1}{2}v^2 \quad \text{Multiply each side by 2.}$$

$$2\left(\frac{P}{F} - 1\right) = v^2 \quad \text{Simplify.}$$

$$2\left(\frac{P}{F} - \frac{F}{F}\right) = v^2 \quad \frac{F}{F} = 1$$

$$2\left(\frac{P - F}{F}\right) = v^2 \quad \text{The common denominator is } F.$$

Combine the numerators.

5. C

$$\underbrace{\frac{1}{2}n + 10}_{\frac{1}{2} \text{ of the number } n \text{ increased by 10}} = \underbrace{2n - 4}_{\text{four less than twice the number}}$$

6. A

$$a = \underbrace{\frac{1}{2}c - b}_{a \text{ is } b \text{ less than } \frac{1}{2} \text{ of } c}$$

$$a - \frac{1}{2}c = \frac{1}{2}c - b - \frac{1}{2}c \quad \text{Add } -\frac{1}{2}c \text{ to each side.}$$

$$a - \frac{1}{2}c = -b \quad \text{Simplify.}$$

$$(-1)\left[a - \frac{1}{2}c\right] = (-1)(-b) \quad \text{Multiply each side by } -1.$$

$$-a + \frac{1}{2}c = b \quad \text{or} \quad \frac{1}{2}c - a = b$$

7. B

$$\begin{array}{ll} x = 1 - y & \text{First equation} \\ 3x = 8 - 5y & \text{Second equation} \end{array}$$

Solving the first equation for y yields $y = 1 - x$.
Substitute $1 - x$ for y in the second equation.

$$\begin{array}{ll} 3x = 8 - 5(1 - x) & \text{Substitution} \\ 3x = 8 - 5 + 5x & \text{Distributive property} \\ 3x = 3 + 5x & \text{Simplify.} \\ 3x - 5x = 3 + 5x - 5x & \text{Subtract } 5x \text{ from each side.} \\ -2x = 3 & \text{Simplify.} \\ \frac{-2x}{-2} = \frac{3}{-2} & \text{Divide each side by } -2. \\ x = -\frac{3}{2} & \text{Simplify.} \end{array}$$

8. D

$$\underbrace{\frac{x}{5}}_{\substack{\text{the quotient of} \\ \text{of a number and 5}}} = \underbrace{\frac{1}{2}x - 9}_{\substack{\text{nine less than one} \\ \text{half of the number}}}$$

$$\begin{array}{ll} 10\left(\frac{x}{5}\right) = 10\left(\frac{1}{2}x - 9\right) & \text{Multiply each side by 10.} \\ 2x = 5x - 90 & \text{Distributive Property} \\ 2x - 5x = 5x - 90 - 5x & \text{Subtract } 5x \text{ from each side.} \\ -3x = -90 & \text{Simplify.} \\ \frac{-3x}{-3} = \frac{-90}{-3} & \text{Divide each side by } -3. \\ x = 30 & \text{Simplify.} \end{array}$$

9. 0

$$\begin{array}{ll} \frac{a}{b} = 1 & \\ b\left(\frac{a}{b}\right) = b(1) & \text{Multiply each side by } b. \\ a = b & \text{Simplify.} \\ a - b = b - b & \text{Subtract } b \text{ from each side.} \\ a - b = 0 & \text{Simplify.} \end{array}$$

10. 1.43

As the object moves upward, its speed decreases continuously and becomes 0 as it reaches its maximum height.

$v = v_0 - 9.8t$ is the given equation. Substituting 14 for v_0 and 0 for v gives $0 = 14 - 9.8t$.

Solving the equation for t gives $t = \frac{14}{9.8} = 1.428$

seconds, which is 1.43 to the nearest hundredth of a second.

11. 3

When the object hits the ground, the height is 0. Substitute 0 for h and 144 for s in the equation

$0 = -16t^2 + 144$. Solving the equation for t^2 gives $t^2 = \frac{144}{16} = 9$.

Therefore, $t = \sqrt{9} = 3$.