

CHAPTER 2 Fundamentals of Algebra

SECTION 2.1 Writing and Evaluating Algebraic Expressions

1. Commutative Property of Multiplication

2. Additive Inverse Property

3. Distributive Property

4. Associative Property of Addition

$$5. 10 - |-7| = 10 - 7 = 3$$

$$6. 6 - (10 - 12) = 6 - (-2) \\ = 6 + 2 \\ = 8$$

$$7. \frac{3 - (5 - 20)}{4} = \frac{3 - (-15)}{4} \\ = \frac{18}{4} \\ = \frac{9}{2}$$

$$8. \frac{6}{7} - \frac{4}{7} = \frac{6 - 4}{7} \\ = \frac{2}{7}$$

$$9. -\frac{3(28)}{4(33)} = -\frac{3(4)(7)}{4(3)(11)} \\ = -\frac{7}{11}$$

$$10. \frac{5}{8} \div \frac{3}{16} = \frac{5}{8} \cdot \frac{16}{3} \\ = \frac{5(8)(2)}{8(3)} \\ = \frac{10}{3}$$

$$11. 50(12)(10) = 6000$$

You will set aside \$6000 during the 10 years.

$$12. \frac{120}{8} = 15$$

Each piece of rope will be 15 feet long.

SECTION 2.2 Simplifying Algebraic Expressions

$$1. a^m \cdot a^n = a^{m+n}$$

2. Distributive Property

$$3. 0 - (-12) = 0 + 12 \\ = 12$$

$$4. 60 - (-60) = 60 + 60 \\ = 120$$

$$5. -12 - 2 + |-3| = -12 - 2 + 3 \\ = -11$$

$$6. -730 + 1820 + 3150 + (-10,000) = -5760$$

$$7. 72 + (-37) = 35$$

$$8. 250 - 600 = -350$$

$$\begin{aligned} 9. \frac{5}{16} - \frac{3}{10} &= \frac{5(5)}{16(5)} - \frac{3(8)}{10(8)} \\ &= \frac{25}{80} - \frac{24}{80} \\ &= \frac{1}{80} \end{aligned}$$

$$\begin{aligned} 10. \frac{9}{16} + 2\frac{3}{12} &= \frac{9}{16} + \frac{27}{12} \\ &= \frac{9(3)}{16(3)} + \frac{27(4)}{12(4)} \\ &= \frac{27}{48} + \frac{108}{48} \\ &= \frac{135}{48} \\ &= \frac{45}{16} \end{aligned}$$

$$\begin{aligned} 11. 832,000 - (-1,530,000) &= 832,000 + 1,530,000 \\ &= 2,362,000 \end{aligned}$$

The profit during the last two quarters was \$2,362,000.

$$12. \frac{676}{13} = 52$$

The average speed was 52 miles per hour.

SECTION 2.3 Algebra and Problem Solving

1. The other factor is negative.

$$2. 7 + 4 + 4 = 15$$

Because 15 is divisible by 3, 744 is divisible by 3.

3. False

$$-4^2 = -16$$

4. True

$$(-4)^2 = 16$$

$$5. (-6)(-13) = 78$$

$$\begin{aligned} 6. |4(-6)(5)| &= |-120| \\ &= 120 \end{aligned}$$

$$\begin{aligned} 7. \left(-\frac{4}{3}\right)\left(-\frac{9}{16}\right) &= \frac{4(\cancel{3})(3)}{\cancel{3}(4)(4)} \\ &= \frac{3}{4} \end{aligned}$$

$$\begin{aligned} 8. \frac{7}{8} \div \frac{3}{16} &= \frac{7}{8} \cdot \frac{16}{3} \\ &= \frac{7(\cancel{8})(2)}{\cancel{8}(3)} \\ &= \frac{14}{3} \end{aligned}$$

$$\begin{aligned} 9. \left|-\frac{5}{9}\right| + 2 &= \frac{5}{9} + \frac{18}{9} \\ &= \frac{23}{9} \end{aligned}$$

$$\begin{aligned} 10. -7\frac{3}{5} - 3\frac{1}{2} &= -\frac{38}{5} - \frac{7}{2} \\ &= -\frac{76}{10} - \frac{35}{10} \\ &= -\frac{111}{10} \end{aligned}$$

11. $30(4) = 120$

After saving for 4 weeks, you would not have enough for the coat.

$$30(5) = 150$$

$$150 - 133.50 = 16.50$$

You must save for 5 weeks to buy the coat, and you will have \$16.50 left.

12. Width = 8 meters

$$\text{Length} = 1.5(8) = 12 \text{ meters}$$

$$\text{Perimeter} = 2(\text{Length}) + 2(\text{Width})$$

$$= 2(12) + 2(8)$$

$$= 24 + 16$$

$$= 40$$

The perimeter of the rectangle is 40 meters.

SECTION 2.4 Introduction to Equations

1. Negative

2. Positive

The product of an even number of negative factors is positive.

3. $6 + 10 = 10 + 6$

4. Multiplicative Inverse Property

5. $t^2 \cdot t^5 = t^{2+5}$
 $= t^7$

6. $(-3y^3)y^2 = -3y^{3+2}$
 $= -3y^5$

7. $(u^3)^2 = u^{3(2)}$
 $= u^6$

8. $2(ab)^5 = 2a^5b^5$

9. $(3a^2)(4ab) = 12a^{2+1}b$
 $= 12a^3b$

10. $2(x + 3)^2(x + 3)^3 = 2(x + 3)^{2+3}$
 $= 2(x + 3)^5$

11. Perimeter: $4\left(\frac{3x}{2}\right) = \frac{12x}{2} = 6x$

Area: $\left(\frac{3x}{2}\right)^2 = \frac{(3x)^2}{2^2} = \frac{9x^2}{4}$

12. Perimeter: $(2x + 1) + (2x + 1) + (5x - 4) = 2x + 1 + 2x + 1 + 5x - 4$
 $= 9x - 2$

Area: $\frac{1}{2}(2x)(5x - 4) = x(5x - 4)$
 $= 5x^2 - 4x$