1.2 Evaluate and Simplify Algebraic Expressions

EXAMPLE 1 Evaluate powers

a. $(-5)^4$

$(-5)(-5)(-5)(-5)$

$25 \quad 25$

625

b. -5^4

$-1 \cdot 5^4$

$-1 \cdot (5 \cdot 5 \cdot 5 \cdot 5)$

$-1 \cdot (625)$

-625

EXAMPLE 2 **Evaluate an algebraic expression**

Evaluate $-4x^2 - 6x + 11$ when $x = -3$.

$-4(-3)^2 - 6(-3) + 11$

$-4(9) - 6(-3) + 11$

$-36 + 18 + 11$

$-18 + 11$

$\boxed{-7}$

EXAMPLE 3 Use a verbal model to solve a problem

CRAFT FAIR You are selling homemade candles at a craft fair for $3 each. You spend $120 to rent the booth and buy materials for the candles.

- Write an expression that shows your profit from selling c candles.

$P = R - C$

$P = 3c - 120$

- Find your profit if you sell 75 candles.

$P = 3(75) - 120$

$= 225 - 120$

$P = \$105$

EXAMPLE 4 **Simplify by combining like terms**

$5p^2 + p - 2p^2$

$3p^2 + p$

$3(y + 2) - 4(y - 7)$

$3y + 6 - 4y + 28$

$-y + 34$

$2x - 3y - 9x + y$

$-7x - 2y$

1.3 Solve Linear Equations

EXAMPLE 1 Solve an equation with a variable on one side

Solve $\frac{4}{5}x + 8 = 20$.

$-8 \quad -8$

$\frac{5}{4}\cdot\frac{4}{5}x = (12)\frac{5}{4}$

$x = \frac{12}{1}\cdot\frac{5}{4} = \frac{60}{4} = 15$

EXAMPLE 2 **Write and use a linear equation**

RESTAURANT During one shift, a waiter earns wages of $30 and gets an additional 15% in tips on customers' food bills. The waiter earns $105. What is the total of the customers' food bills?

$30 + 0.15x = \$105$

$-30 \quad -30$

$0.15x = \$75$

$\frac{0.15x}{0.15} = \frac{\$75}{0.15}$

$x = \$500$

EXAMPLE 3

What is the solution of $7p + 13 = 9p - 5$?

(A) -9 (B) -4 (C) 4 (D) 9

$7(9)+13=9(9)-5$

$63+13=81-5$

$76=76$

EXAMPLE 4

Solve $3(5x - 8) = -2(-x + 7) - 12x$.

$15x - 24 = 2x - 14 - 12x$

$15x - 24 = -10x - 14$

$+10x \quad +10x$

$25x - 24 = -14$

$+24 \quad +24$

$\frac{25x}{25} = \frac{10}{25}$

$x = \frac{10}{25} = \boxed{\frac{2}{5}}$

EXAMPLE 5

CAR WASH It takes you 8 minutes to wash a car and it takes a friend 6 minutes to wash a car. How long does it take the two of you to wash 7 cars if you work together?

$$\frac{3}{3}\cdot\frac{1}{8}t + \frac{4}{4}\frac{1}{6}t = 7$$

$$\frac{3}{24}t + \frac{4}{24}t = 7$$

$$\frac{7}{24}t = 7\left(\frac{24}{7}\right)$$

$t = 24$ mins

THE DISTRIBUTIVE PROPERTY Solve the equation. Check your solution.

36. $-4(n+2) = 3(n-4)$

$-4n - 8 = 3n - 12$

$+4n \quad +4n$

$-8 = 7n - 12$

$+12 \quad +12$

$\frac{4}{7} = \frac{7n}{7}$

$n = \frac{4}{7}$

EQUATIONS WITH FRACTIONS Solve the equation. Check your solution.

45. $\frac{2}{3}m - \frac{3}{5}m = 4$

$15\left(\frac{2}{3}m - \frac{3}{5}m\right) = (4)15$

$10m - 9m = 60$

$m = 60$

EQUATIONS WITH DECIMALS Solve the equation. Check your solution.

57. $0.4k - 0.6 = 1.3k + 1.2$

$10(0.4k - 0.6) = (1.3k + 1.2)10$

$4k - 6 = 13k + 12$