

**Core Connections Algebra Unit 5
Study Guide**

Key

Solve each system of equations algebraically.

1. Solve each system using substitution.

a. $\begin{cases} 2x+3y=13 \\ y=6x-9 \end{cases}$

$$\begin{aligned} 2x+3(6x-9) &= 13 \\ 2x+18x-27 &= 13 \\ 20x &= 40 \\ x &= 2 \end{aligned}$$

$$y = 12 - 9 = 3$$

$(2, 3)$

b. $y = -\frac{2}{5}x + 3$

$6x - 5y = -15$

$6x - 5(-\frac{2}{5}x + 3) = -15$

$6x + 2x - 15 = -15$

$8x = 0$

$x = 0$

$y = 3$

$(0, 3)$

c. $y = 1 - x$

$3x - y = 11$

$3x - (1 - x) = 11$

$3x - 1 + x = 11$

$4x = 12$

$x = 3$

$y = 1 - 3 = -2$

$(3, -2)$

2. Solve each system using elimination.

a. $8x - 4y = 17$

$3x + 4y = 16$

$$\begin{array}{r} 8x - 4y = 17 \\ 3x + 4y = 16 \\ \hline 11x = 33 \end{array}$$

$x = 3$

$24 - 4y = 17$

$-4y = -7$

$y = 7/4$

$(3, 7/4)$

b. $2(5x - 4y = 23) \rightarrow 10x - 8y = 46$

$7x + 8y = 5$

$$\begin{array}{r} 10x - 8y = 46 \\ 7x + 8y = 5 \\ \hline 17x = 51 \end{array}$$

$x = 3$

$21 + 8y = 5$

$8y = -16$

$y = -2$

$(3, -2)$

c. $4x + 3y = 3$ $\times 3$

$3x - 2y = -19$ $\times 3$

$8x + 6y = 6$

$9x - 6y = -57$

$$\begin{array}{r} 8x + 6y = 6 \\ 9x - 6y = -57 \\ \hline 17x = -51 \end{array}$$

$x = -3$

$-9 - 2y = -19$

$-2y = -10$

$y = 5$

$(-3, 5)$

Use systems of equations to help you solve problems.

3. For the following problem write a system of equations that you would use to answer the question. Be sure to identify what each variable in your system represents. Solve the system algebraically and then be sure to answer the questions asked in each problem.

a. The Snow Sports Club from Sierra High School is boarding the tram at Heavenly Valley to ride to the top of the mountain. The tram conductor charges \$10 for each club member and \$1 for each snowboard. Some members are just enjoying the ride up and don't have snowboards. The conductor collected \$179. The number of club members riding the tram is one less than twice the number of snowboards. How many club members and how many snowboards ride up on the tram?

$m = \# \text{ members}$

$m = 2s - 1$

$s = \# \text{ snowboards}$

$10m + 1s = 179$

$10(2s - 1) + 1s = 179$

$20s - 10 + 1s = 179$

$21s = 189$

$s = 9$

$$\left. \begin{array}{l} \rightarrow m = 2s - 1 \\ m = 17 \end{array} \right\}$$

There are 17 members & 9 snowboards.

Core Connections Algebra Unit 5

Study Guide

- b. Claudia works at a sweet shop making chocolate-dipped bananas. Sometimes she drops the chocolate-dipped bananas before she can get them to the freezer. Claudia earns 20 cents for every frozen banana that she makes. She loses 5 cents for each frozen banana that she drops. Last Wednesday, Claudia dipped 48 frozen bananas, but not all of them made it to the freezer. She earned a total of \$7.60. How many bananas were dropped and how many made it to the freezer?

$$f = \# \text{ frozen bananas made it to freezer}$$

$$d = \# \text{ bananas dropped}$$

$$f + d = 48 \quad \rightarrow f = 48 - d$$

$$20f - 5d = 760$$

$$20(48 - d) - 5d = 760$$

$$960 - 20d - 5d = 760$$

$$-25d = -200$$

8 bananas were dropped

40 bananas made it to the freezer

$$d = 8 \quad f = 40$$

Understand that systems of linear equations may yield 1 solution, an infinite number of solutions, or no solution.

4. Anita has the rules for three lines: L, M, and N. When she solves a system with lines L and M, she gets one solution. When she solves a system with lines M and N, she gets no solutions. Sketch a graph that represents this situation. Be sure to label the lines. Use your graph to find out how many solutions Anita will get with lines L and N as a system. Write the equations for each of the 3 lines.

Answers will vary.

- M & N are parallel. Their equations will have the same slope but different y-int.

Lines L & N will have only one solution. The slope of Line L must be diff. than M & N's.

Simplify numeric expressions.

5. Perform the indicated operation.

a.
$$-\frac{2}{3} + \frac{4}{5}$$

$$-\frac{10}{15} + \frac{12}{15} = \boxed{\frac{2}{15}}$$

b.
$$2\frac{1}{4} - \frac{7}{12}$$

$$2\frac{3}{12} - \frac{7}{12} = \frac{27}{12} - \frac{7}{12} = \frac{20}{12} = \frac{5}{3}$$

$$= 1\frac{2}{3}$$

c.
$$6\frac{1}{8} \left(\frac{9}{11} \right)$$

$$\frac{49}{8} \cdot \frac{9}{11} = \boxed{\frac{441}{88}}$$

d.
$$15 \div \left(-\frac{1}{12} \right)$$

$$15 \cdot \frac{-12}{1} = \boxed{-180}$$

**Core Connections Algebra Unit 5
Study Guide**

Use the distributive property to multiply polynomials

6. Write each of the following expressions as a sum.

a. $3(2x + 1)$
 $6x + 3$

b. $x(x + 2y + 1)$
 $x^2 + 2yx + x$

c. $(x + 4)(2x + 2)$
 $2x^2 + 2x + 8x + 8$
 $2x^2 + 10x + 8$

d. $(2y + 1)(3x + y + 2)$
 $6xy + 2y^2 + 4y + 3x + y + 2$
 $6xy + 2y^2 + 5y + 3x + 2$

e. $(x + 3)^2$
 $(x + 3)(x + 3)$
 $x^2 + 3x + 3x + 9$
 $x^2 + 6x + 9$

Simplify expressions containing exponents.

7. Simplify each expression. All exponents should be positive.

a. $(5x^3y^2) \cdot (2xy^4)^2$
 $5x^3y^2 \cdot 4x^2y^8$
 $20x^5y^{10}$

b. $\frac{12b^7c^5}{4b^2c^9} = 3b^5c^{-4} = \frac{3b^5}{c^4}$

c. $\left(\frac{6y^2x^8}{12x^3y^7}\right)^2$
 $\left(\frac{1}{2}y^{-5}x^5\right)^2$
 $= \frac{1}{4}y^{-10}x^{10}$
 $= \frac{x^{10}}{4y^{10}}$

d. $\frac{(2x^5y^3)^3(4xy^4)^2}{8x^7y^{12}}$
 $\frac{8x^{15}y^9 \cdot 16x^2y^8}{8x^7y^{12}}$
 $= \frac{16x^{17}y^{17}}{x^7y^{12}}$
 $= 16x^{10}y^5$

e. $(7r^3s^2)(-2r^4s^3)$
 $-14r^7s^5$

Core Connections Algebra Unit 5

Study Guide

Solve equations involving absolute value.

8. Solve each equation.

a. $|-8x + 12| = 60$

$$\begin{aligned} -8x + 12 &= 60 & -8x + 12 &= -60 \\ -8x &= 48 & -8x &= -72 \\ x &= -6 & x &= 9 \end{aligned}$$

b. $|-7x + 4| = 0$

$$\begin{aligned} -7x + 4 &= 0 \\ -7x &= -4 \\ x &= \frac{4}{7} \end{aligned}$$

c. $|8 - x| = -2$

No Solution

Solve equations involving the distributive property.

9. Solve each equation.

a. $7x - 5(3x + 7) = -2(x - 5)$

$$\begin{aligned} 7x - 15x - 35 &= -2x + 10 \\ -8x - 35 &= -2x + 10 \\ -6x &= 45 \\ x &= \frac{-45}{6} = \frac{-15}{2} = -7\frac{1}{2} \end{aligned}$$

b. $(x - 6)(x + 4) = -20 + x(x - 2) - 4$

$$\begin{aligned} x^2 + 4x - 6x - 24 &= -20 + x^2 - 2x - 4 \\ -2x - 24 &= -24 - 2x \\ x &\text{ can be any real \#} \end{aligned}$$

Solve literal equations (or equations with more than one variable) for the indicated variable.

10. Solve each equation for the indicated variable.

a. $2x - y = 24$ for y

$$\begin{aligned} -y &= 24 - 2x \\ y &= -24 + 2x \end{aligned}$$

b. Solve for y : $3x + 6y = 24$

$$\begin{aligned} 6y &= 24 - 3x \\ y &= 4 - \frac{1}{2}x \end{aligned}$$

c. Solve for c : $E = mc^2$

$$\begin{aligned} \frac{E}{m} &= c^2 \\ \sqrt{\frac{E}{m}} &= c \end{aligned}$$

d. Solve for x : $2x - 6y = 12$

$$\begin{aligned} 2x &= 12 + 6y \\ x &= 6 + 3y \end{aligned}$$

Evaluate functions.

11. Evaluate each function as indicated.

a. For $f(x) = x^2 - 3x - 31$, find $f(-7)$.

$$\begin{aligned} &= (-7)^2 - 3(-7) - 31 \\ &= 49 + 21 - 31 \\ &= 70 - 31 \\ &= 39 \end{aligned}$$

b. For $f(x) = \frac{4x-8}{6}$, find x when $f(x) = 12$.

$$\begin{aligned} 12 &= \frac{4x-8}{6} \\ 72 &= 4x-8 \\ 80 &= 4x \\ 20 &= x \end{aligned}$$