

**WHAT YOU KNOW:** We learned to solve systems of equations. We solved linear and nonlinear systems in two variables by the substitution method and by the addition method. We solved linear systems in three variables by eliminating a variable, reducing the system to two equations in two variables. We saw that some linear systems, called inconsistent systems, have no solution, whereas other linear systems, called dependent systems, have infinitely many solutions. We applied systems to a variety of situations, including finding the break-even point for a business, solving problems involving mixtures, finding a quadratic function from three points on its graph, and finding a rational function's partial fraction decomposition.

*In Exercises 1–12, solve each system by the method of your choice.*

$$1. \begin{cases} x = 3y - 7 \\ 4x + 3y = 2 \end{cases}$$

$$2. \begin{cases} 3x + 4y = -5 \\ 2x - 3y = 8 \end{cases}$$

$$3. \begin{cases} \frac{2x}{3} + \frac{y}{5} = 6 \\ \frac{x}{6} - \frac{y}{2} = -4 \end{cases}$$

$$4. \begin{cases} y = 4x - 5 \\ 8x - 2y = 10 \end{cases}$$

$$5. \begin{cases} 2x + 5y = 3 \\ 3x - 2y = 1 \end{cases}$$

$$6. \begin{cases} \frac{x}{12} - y = \frac{1}{4} \\ 4x - 48y = 16 \end{cases}$$

$$7. \begin{cases} 2x - y + 2z = -8 \\ x + 2y - 3z = 9 \\ 3x - y - 4z = 3 \end{cases}$$

$$8. \begin{cases} x - 3z = -5 \\ 2x - y + 2z = 16 \\ 7x - 3y - 5z = 19 \end{cases}$$

$$9. \begin{cases} x^2 + y^2 = 9 \\ x + 2y - 3 = 0 \end{cases}$$

$$10. \begin{cases} 3x^2 + 2y^2 = 14 \\ 2x^2 - y^2 = 7 \end{cases}$$

$$11. \begin{cases} y = x^2 - 6 \\ x^2 + y^2 = 8 \end{cases}$$

$$12. \begin{cases} x - 2y = 4 \\ 2y^2 + xy = 8 \end{cases}$$

*In Exercises 13–16, write the partial fraction decomposition of each rational expression.*

$$13. \frac{x^2 - 6x + 3}{(x - 2)^3}$$

$$14. \frac{10x^2 + 9x - 7}{(x + 2)(x^2 - 1)}$$

$$15. \frac{x^2 + 4x - 23}{(x + 3)(x^2 + 4)}$$

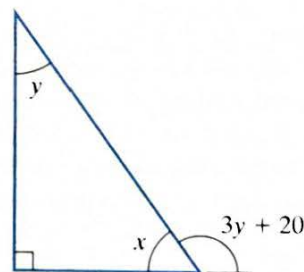
$$16. \frac{x^3}{(x^2 + 4)^2}$$

17. A company is planning to manufacture PDAs (personal digital assistants). The fixed cost will be \$400,000 and it will cost \$20 to produce each PDA. Each PDA will be sold for \$100.

- Write the cost function,  $C$ , of producing  $x$  PDAs.
- Write the revenue function,  $R$ , from the sale of  $x$  PDAs.
- Write the profit function,  $P$ , from producing and selling  $x$  PDAs.
- Determine the break-even point. Describe what this means.

18. The manager of a gardening center needs to mix a plant food that is 13% nitrogen with one that is 18% nitrogen to obtain 50 gallons of a plant food that is 16% nitrogen. How many gallons of each of the plant foods must be used?

19. Find the measure of each angle whose degree measure is represented with a variable.



- Find the quadratic function  $y = ax^2 + bx + c$  whose graph passes through the points  $(-1, 0)$ ,  $(1, 4)$ , and  $(2, 3)$ .
- Find the length and width of a rectangle whose perimeter is 21 meters and whose area is 20 square meters.