The given system of equations has been simplified to

$$12x + y = 8 \quad (3)$$
$$2x + 3y = -10. \quad (4)$$

Solve the system by the substitution method. Equation (3) can be solved for y by subtracting $12x$ on each side.

$$12x + y = 8 \quad (3)$$
$$y = -12x + 8$$

Now substitute the result for y in equation (4).

$$2x + 3(-12x + 8) = -10 \quad \text{Let } y = -12x + 8.$$
$$2x - 36x + 24 = -10 \quad \text{Distributive property}$$
$$-34x = -34 \quad \text{Combine terms; subtract 24.}$$
$$x = 1 \quad \text{Divide by } -34.$$

Using $x = 1$ in $y = -12x + 8$ gives $y = -4$. The solution is $(1, -4)$. Check by substituting 1 for x and -4 for y in the original equations. ■

7.2 EXERCISES

1. If you were to solve the system

$$3x + 2y = 7$$
$$5x - y = 4$$

by substitution, which variable would probably be easier to solve for in the first step? In which equation would you solve for it? Why?

2. Which one of the following systems would be easier to solve using the substitution method? Why?

$$5x - 3y = 7 \qquad 7x + 2y = 4$$
$$2x + 8y = 3 \qquad y = -3x$$

Solve the system by the substitution method. Check the solution. See Examples 1–4.

3. $x + y = 12$
$y = 3x$

4. $x + 3y = -28$
$y = -5x$

5. $3x + 2y = 27$
$x = y + 4$

6. $4x + 3y = -5$
$x = y - 3$

7. $3x + 5y = 25$
$x - 2y = -10$

8. $5x + 2y = -15$
$2x - y = -6$

9. $3x + 4 = -y$
$2x + y = 0$

10. $2x - 5 = -y$
$x + 3y = 0$

11. $7x + 4y = 13$
$x + y = 1$

12. $3x - 2y = 19$
$x + y = 8$

13. $3x - y = 5$
$y = 3x - 5$

14. $4x - y = -3$
$y = 4x + 3$

15. $6x - 8y = 6$
$-3x + 2y = -2$

16. $3x + 2y = 6$
$-6x + 4y = -8$

17. $2x + 8y = 3$
$x = 8 - 4y$

18. $2x + 10y = 3$
$x = 1 - 5y$

19. $12x - 16y = 8$
$3x = 4y + 2$

20. $6x + 9y = 6$
$2x = 2 - 3y$

EXERCISES **3.** (3, 9) **5.** (7, 3) **7.** (0, 5) **9.** (−4, 8) **11.** (3, −2) **13.** infinite number of solutions **15.** $\left(\frac{1}{3}, -\frac{1}{2}\right)$ **17.** no solution **19.** infinite number of solutions **25.** (2, −3) **27.** (3, 2) **29.** (−2, 1) **31.** In both equations we get 4 = 4. **33.** (2, 4) **35.** (1, 5)

37. (5, −3); The equations to input are $y_1 = \frac{5 - 4x}{5}$ and $y_2 = \frac{1 - 2x}{3}$.

39. Change the x- and y-minimum and maximum values as necessary. **41.** $16x$ **43.** 0 **45.** $-6y$