**FACTORING EXPRESSIONS** **Factor out the greatest common monomial factor.**

40. $20x^2y^2 - 4xy$
41. $8a^2b - 6ab^2$
42. $18s^2t^5 - 2s^3t$
43. $v^3 - 5v^2 + 9v$
44. $-2g^4 + 14g^2 + 6g$
45. $6q^5 - 21q^4 - 15q^2$

**HINT**
For help with finding zeros of functions, see p. 335.

**FINDING ZEROS OF FUNCTIONS** **Find the zeros of the function.**

46. $f(x) = x^2 - 15x$
47. $f(x) = -2x^2 + x$
48. $f(x) = 3x^2 - 27x$

49. **CHALLENGE** Consider the equation $ab = 0$. Assume that $a \neq 0$ and solve the equation for $b$. Then assume that $b \neq 0$ and solve the equation for $a$. What conclusion can you draw about the values of $a$ and $b$?

50. **CHALLENGE** Consider the equation $z = x^2 - xy$. For what values of $x$ and $y$ does $z = 0$?

## PROBLEM SOLVING

**EXAMPLE 5**
on p. 577 for Exs. 51–53

51. **MOTION** A cat leaps from the ground into the air with an initial vertical velocity of 11 feet per second. After how many seconds does the cat land on the ground?

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52. **SPITTLEBUG** A spittlebug jumps into the air with an initial vertical velocity of 10 feet per second.

   a. Write an equation that gives the height of the spittlebug as a function of the time (in seconds) since it left the ground.

   b. The spittlebug reaches its maximum height after 0.3125 second. How high can it jump?

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53. **TAKS REASONING** A penguin jumps out of the water while swimming. This action is called porpoising. The height $h$ (in feet) of the porpoising penguin can be modeled by $h = -16t^2 + 4.5t$ where $t$ is the time (in seconds) since the penguin jumped out of the water. Find the zeros of the function. *Explain* what the zeros mean in this situation.

**VERTICAL MOTION** **In Exercises 54 and 55, use the information below.**

The height $h$ (in meters) of a projectile can be modeled by $h = -4.9t^2 + vt + s$ where $t$ is the time (in seconds) the object has been in the air, $v$ is the initial vertical velocity (in meters per second), and $s$ is the initial height (in meters).

54. **SOCCER** A soccer ball is kicked upward from the ground with an initial vertical velocity of 3.6 meters per second. After how many seconds does it land?

55. **RABBIT HIGH JUMP** A rabbit in a high jump competition leaves the ground with an initial vertical velocity of 4.9 meters per second.

   a. Write an equation that gives the height of the rabbit as a function of the time (in seconds) since it left the ground.

   b. What is a reasonable domain for the function? *Explain* your answer.