

**Example**

Solve each equation by factoring.

a.  $3x^2 = 15x$

$3x^2 = 15x$  Original equation

$3x^2 - 15x = 0$  Subtract  $15x$  from both sides.

$3x(x - 5) = 0$  Factor the binomial.

$3x = 0$  or  $x - 5 = 0$  Zero Product Property

$x = 0$  or  $x = 5$  Solve each equation.

The solution set is  $\{0, 5\}$ .

b.  $4x^2 - 5x = 21$

$4x^2 - 5x = 21$  Original equation

$4x^2 - 5x - 21 = 0$  Subtract 21 from both sides.

$(4x + 7)(x - 3) = 0$  Factor the trinomial.

$4x + 7 = 0$  or  $x - 3 = 0$  Zero Product Property

$x = -\frac{7}{4}$  or  $x = 3$  Solve each equation.

The solution set is  $\left\{-\frac{7}{4}, 3\right\}$ .

**Exercises**

Solve each equation by factoring.

1.  $6x^2 - 2x = 0$

2.  $x^2 = 7x$

3.  $20x^2 = -25x$

4.  $6x^2 = 7x$

5.  $6x^2 - 27x = 0$

6.  $12x^2 - 8x = 0$

7.  $x^2 + x - 30 = 0$

8.  $2x^2 - x - 3 = 0$

9.  $x^2 + 14x + 33 = 0$

10.  $4x^2 + 27x - 7 = 0$

11.  $3x^2 + 29x - 10 = 0$

12.  $6x^2 - 5x - 4 = 0$

13.  $12x^2 - 8x + 1 = 0$

14.  $5x^2 + 28x - 12 = 0$

15.  $2x^2 - 250x + 5000 = 0$

16. **TRAJECTORIES** A cannonball is launched from a cannon at the top of a cliff. If the path of the cannonball is traced on a piece of graph paper aligned so that the cannon is situated on the  $y$ -axis, the equation that describes the path is



$$y = -\frac{1}{1600}x^2 + \frac{1}{2}x + 47,$$

where  $x$  is the horizontal distance from the cliff and  $y$  is the vertical distance above the ground in feet. How high above the ground is the cannon?

17. **ARCHES** An architect decides to use a parabolic arch for the main entrance of a science museum. In one of his plans, the top edge of the arch is described by the graph of  $y = -\frac{1}{4}x^2 + \frac{5}{2}x + \frac{75}{4}$ . What are the coordinates of the vertex of this parabola?