

# Solving Quadratic Equations by Factoring

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## Examples of Quadratic Equations.

$$x^2 + 7x + 12 = 0, \quad x^2 = 25, \quad x^2 - 2x = 24$$

$$x^2 = 25$$

$$x = \sqrt{25} = 5$$

$$x = -5$$

$$x^2 = 25$$

$$x = \pm \sqrt{25}$$

$$x = \pm 5$$

A quadratic equation is any equation that can be written in the form  $ax^2 + bx + c = 0$  where  $a, b, c$  are real numbers and  $a \neq 0$ .

$$x^2 + 2x - 15 = 0$$

$$(x + 5)(x - 3) = 0 \quad \text{Zero product property.}$$

$$\text{either } \begin{array}{ccc} x + 5 = 0 & \text{or} & x - 3 = 0 \\ -5 & -5 & +3 & +3 \\ x = -5 & & x = 3 \end{array}$$

$$x^2 + 2x - 15 = 0$$

$$\begin{array}{cccc} (-5)^2 & + & 2(-5) & - & 15 \\ 25 & - & 10 & - & 15 \\ 25 & - & 10 & - & 15 & = & 0 \end{array}$$

$$\begin{array}{cccc} (3)^2 & + & 2(3) & - & 15 \\ 9 & + & 6 & - & 15 \\ 9 & + & 6 & - & 15 & = & 0 \end{array}$$

$$\text{Eg } (x - 12)(x + 1) = -40$$

$$x^2 - 11x - 12 = -40$$

$$+40 \quad +40$$

$$x^2 - 11x + 28 = 0$$

$$(x-4)(x-7) = 0$$

either  $x-4=0$  or  $x-7=0$   
 $x=4$   $x=7$

Try  $(y-6)(y+1) = -10$

$$y^2 - 5y - 6 = -10$$

$+10$   $+10$

$$y^2 - 5y + 4 = 0$$

$$(y-4)(y-1) = 0 \quad y = 4, 1$$

Solve  $2x^2 + 40 = 18x$   
 $2x^2 - 18x + 40 = 0$   
 $2(x^2 - 9x + 20) = 0$   
 $2(x-4)(x-5) = 0$   
 $x = 4, 5$

- ① Set = 0
- ② Factor.
- ③ Solve

Try Solve  $6x^2 = 4x$   
 $6x^2 - 4x = 0$   
 $2x(3x-2) = 0$

$$\frac{2x}{2} = 0 \quad \text{or} \quad 3x - 2 = 0$$

$x = 0$

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

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

Try  $3x^2 + 5 = 8x$

$$3x^2 - 8x + 5 = 0$$

$$(3x-5)(x-1)$$

$p = 15$   
 $q = -8$   
 $-2 \quad -5$

$$3x - 5 = 0$$

$$3x = 5$$

$$x = \frac{5}{3} \quad x = 1$$

$$4x^2 + 12x + 9 = 0$$
$$(2x + 3)(2x + 3) = 0$$
$$x = -\frac{3}{2}$$

Solve  $\sqrt{2x+1} + 7 = x$   $2x+1 \geq 0$   
 $2x \geq -1$   
 $x \geq -\frac{1}{2}$

$$\left(\sqrt{2x+1}\right)^2 = (x-7)^2$$

$$2x+1 = x^2 - 14x + 49$$
$$\sqrt{2(4)+1} + 7 = 4.$$
$$\sqrt{9+7}$$
$$3+7 \neq 4$$
$$0 = x^2 - 16x + 48$$
$$0 = (x-4)(x-12)$$

$$\sqrt{2(12)+1} + 7 = 12.$$
$$\sqrt{25+7}$$
$$5+7 = 12.$$
$$x = 1, 12.$$

is extraneous.

$$x = 12.$$

Pg 209-215 #4-16, 18-20