

Algebra 1

Lesson 10.6A

Solve Quadratic Equations by the Quadratic Formula

Warm-Up

Solve by completing the square.

(a) $x^2 - 14x - 51 = 0$
+51 +51

$$x^2 - 14x = 51$$

$$x^2 - [4x + 49] = 51 + [49]$$

$$(x-7)^2 = 100$$

$$x-7 = \pm 10$$

$$x = -7 \pm 10$$

$$x = 3, -17$$

Example 1. Solving Quadratic Equations

Consider the equation $x^2 + 6x - 7 = 0$.

(a) Solve by factoring.

$$(x+7)(x-1) = 0$$

$$x = -7, 1$$

(b) Solve by completing the square.

$$x^2 + 6x - 7 = 0$$

+7 +7

$$x^2 + 6x = 7$$

$$x^2 + 6x + [9] = 7 + [9]$$

$$\sqrt{(x+3)^2} = \sqrt{16}$$

$$x+3 = \pm 4$$

$$x = -3 \pm 4$$

$$x = 1, -7$$

(b) $3x^2 + 12x = 18$
3 3

$$x^2 + 4x = 6$$

$$x^2 + 4x + [4] = 6 + [4]$$

$$(x+2)^2 = 10$$

$$x+2 = \pm\sqrt{10}$$

$$x = -2 \pm \sqrt{10} \leftarrow \text{EXACT}$$

$$x \approx 1.16, -5.16 \leftarrow \text{APPROXIMATE}$$

The Quadratic Formula

Given a quadratic equation in standard form $ax^2 + bx + c = 0$ then the solutions to the equation can be found from:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x^2 + 6x - 7 = 0$$

(c) Solve by using the Quadratic Formula.

a = 1 b = 6 c = -7

$$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(1)(-7)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{36+28}}{2}$$

$$x = \frac{-6 \pm 8}{2}$$

$$x = 1, -7$$

Example 2. Using the Quadratic Formula

Solve.

(a) $2x^2 + 7x - 9 = 0$

a = 2 b = 7 c = -9

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(-9)}}{2(2)}$$

$$x = \frac{-7 \pm \sqrt{121}}{4}$$

$$x = 1, -4.5$$

(b) $x^2 - 8x + 16 = 0$

a = 1 b = -8 c = 16

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(16)}}{2(1)}$$

$$x = \frac{8 \pm \sqrt{0}}{2}$$

$$x = 4$$

Try It!

Solve.

(a) $2x^2 - 3x - 5 = 0$

a = 2 b = -3 c = -5

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-5)}}{2(2)}$$

$$x = \frac{3 \pm \sqrt{49}}{4}$$

$$x = 2.5, -1$$

(b) $3n^2 - 5n + 1 = 0$

a = 3 b = -5 c = 1

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(1)}}{2(3)}$$

$$x = \frac{5 \pm \sqrt{13}}{6}$$

EXACT

$$x \approx 1.43, 0.23$$

APPROXIMATE

Assignment

New: Pages 674 #3 - 11

Review:

Simplify.

1. $\frac{24x^3y^5}{-8x^7y^2}$

2. $\frac{x^{-3}y^{-3}}{x^2y^{-2}}$

3. $\left(\frac{2x^2y^{-1}}{z^{-2}}\right)^2 \left(\frac{y^4z^3}{8x^{-3}}\right)$

4. $(3^{-1} + 4)^2$

5. $\left(\frac{2}{5}\right)^{-3}$