

## Algebra 1

Our Goal: To learn to solve quadratic equations using the Quadratic Formula

Warm Up: Check and discuss homework

Today's Homework

9.5 Exercises, p.521: 10-22 (evens)

Previous Homework

9.4 Exercises, p.511: 12-32 (evens)

$$\begin{aligned}
 x^2 - 5x &= 8 \\
 x^2 - 5x + \left(\frac{5}{2}\right)^2 &= 8 + \frac{25}{4} \\
 \left(x - \frac{5}{2}\right)^2 &= \frac{32}{4} + \frac{25}{4} \\
 \left(x - \frac{5}{2}\right)^2 &= \frac{57}{4} = \frac{\sqrt{57}}{\sqrt{4}} \\
 x - \frac{5}{2} &= \frac{\pm\sqrt{57}}{2} \\
 x &= \frac{5 \pm \sqrt{57}}{2}
 \end{aligned}$$

$\frac{5}{2} + \frac{\sqrt{57}}{2}$   
 $\frac{5 \pm \sqrt{57}}{2}$

**Solve the inequality. Graph the solution, if possible.**

1.  $3|2w-9|-11 \geq 4$

2.  $-4|3+3u|-6 > -14$

3.  $7|-f-2|-8 < 6$

4.  $\frac{3}{2}|5v-5|+3 \geq 9$

5.  $|x-5| < 12$

6.  $|n+6| < 0$

$$\underline{a}x^2 + \underline{b}x + \underline{c} = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

 **Core Concept****Quadratic Formula**

The real solutions of the quadratic equation  $ax^2 + bx + c = 0$  are

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

where  $a \neq 0$  and  $b^2 - 4ac \geq 0$ .

Solve  $2x^2 - 5x + 3 = 0$  using the Quadratic Formula.

$$\begin{array}{r} 6 \\ -5 \\ \hline (-2, -3) \end{array}$$

Solve the equation using the Quadratic Formula. Round your solutions to the nearest tenth, if necessary.

1.  $x^2 - 6x + 5 = 0$

2.  $\frac{1}{2}x^2 + x - 10 = 0$

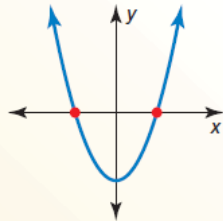
3.  $-3x^2 + 2x + 7 = 0$

4.  $4x^2 - 4x = -1$

## Core Concept

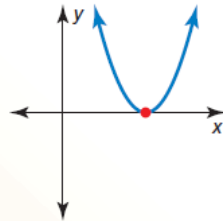
### Interpreting the Discriminant

$$b^2 - 4ac > 0$$



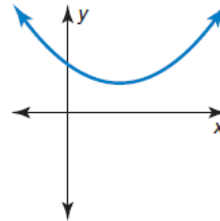
- two real solutions
- two  $x$ -intercepts

$$b^2 - 4ac = 0$$



- one real solution
- one  $x$ -intercept

$$b^2 - 4ac < 0$$



- no real solutions
- no  $x$ -intercepts

a. Determine the number of real solutions of  $x^2 + 8x - 3 = 0$ .

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

$$\frac{-8 \pm \sqrt{8^2 - 4(1)(-3)}}{2(1)}$$

$$a = 1$$

$$b = 8$$

$$c = -3$$

b. Determine the number of real solutions of  $9x^2 + 1 = 6x$ . Write the equation in standard form:  $9x^2 - 6x + 1 = 0$ .

$$\frac{-8 \pm \sqrt{64 + 12}}{2}$$

$$\frac{-8 \pm \sqrt{76}}{2}$$

$$\frac{-8 \pm 2\sqrt{19}}{2 \div 2}$$

$$-4 \pm \sqrt{19}$$

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

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

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

$$x = \frac{5 \pm \sqrt{25 - 12}}{2}$$

$$x = \frac{5 \pm \sqrt{13}}{2}$$

$$x = \frac{5 \pm \sqrt{13}}{2}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{13}}{2}$$

$$5x^2 - 4x - 2 = 0$$

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

$$x = \frac{4 \pm \sqrt{16 + 40}}{10}$$

$$x = \frac{4 \pm \sqrt{56}}{10}$$

$$x = \frac{4 \pm \sqrt{4} \cdot \sqrt{14}}{10}$$

$$x = \frac{4 \pm 2 \cdot \sqrt{14}}{10}$$

$$x = \frac{2 \pm \sqrt{14}}{5}$$

Determine the number of real solutions of the equation.

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

8.  $6x^2 + 2x = -1$

9.  $\frac{1}{2}x^2 = 7x - 1$

Find the number of  $x$ -intercepts of the graph of  $y = 2x^2 + 3x + 9$ .

**Find the number of  $x$ -intercepts of the graph of the function.**

**10.**  $y = -x^2 + x - 6$

**11.**  $y = x^2 - x$

**12.**  $f(x) = x^2 + 12x + 36$


**Core Concept**
**Methods for Solving Quadratic Equations**

Method	Advantages	Disadvantages
Factoring (Lessons 7.5–7.8)	<ul style="list-style-type: none"> <li>• Straightforward when the equation can be factored easily</li> </ul>	<ul style="list-style-type: none"> <li>• Some equations are not factorable.</li> </ul>
Graphing (Lesson 9.2)	<ul style="list-style-type: none"> <li>• Can easily see the number of solutions</li> <li>• Use when approximate solutions are sufficient.</li> <li>• Can use a graphing calculator</li> </ul>	<ul style="list-style-type: none"> <li>• May not give exact solutions</li> </ul>
Using Square Roots (Lesson 9.3)	<ul style="list-style-type: none"> <li>• Use to solve equations of the form <math>x^2 = d</math>.</li> </ul>	<ul style="list-style-type: none"> <li>• Can only be used for certain equations</li> </ul>
Completing the Square (Lesson 9.4)	<ul style="list-style-type: none"> <li>• Best used when <math>a = 1</math> and <math>b</math> is even</li> </ul>	<ul style="list-style-type: none"> <li>• May involve difficult calculations</li> </ul>
Quadratic Formula (Lesson 9.5)	<ul style="list-style-type: none"> <li>• Can be used for any quadratic equation</li> <li>• Gives exact solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Takes time to do calculations</li> </ul>

Solve the equation using any method. Explain your choice of method.

a.  $x^2 - 10x = 1$

b.  $2x^2 - 13x - 24 = 0$

c.  $x^2 + 8x + 12 = 0$



**Solve the equation using any method. Explain your choice of method.**

**13.**  $x^2 + 11x - 12 = 0$

**14.**  $9x^2 - 5 = 4$

**15.**  $5x^2 - x - 1 = 0$

**16.**  $x^2 = 2x - 5$