

## Quadratic Equations — 1.2

Homework:  
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### General Form of a Quadratic Equation

$$ax^2 + bx + c = 0 \qquad a \neq 0$$

### Solving Quadratic Equations

Quadratic equations may be solved in various ways:

- By **factoring**. This is the easiest way, IF it works! Get a zero on one side, factor, set each factor equal to zero and solve.
- By using the **square root principle**. If  $x^2 = d$ , then  $x = \pm\sqrt{d}$ . Use only if the equation is written (or can easily be written) in the form:  $(\text{expression})^2 = \text{constant}$ .
- By **completing the square**. Get the variable terms on one side and the constant term on the other side. Add  $\left(\frac{b}{2}\right)^2$  to both sides of the equation. Rewrite the perfect square binomial. Solve using the square root principle.
- By using the **quadratic formula**. The quadratic formula comes from completing the square on the general form of a quadratic equation. Once derived, you can simply write any equation in standard form, plug in the values of  $a$ ,  $b$ , and  $c$  into the quadratic formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ , and simplify to get the solutions to that equation.

*Solve by factoring.*

1.  $2x^2 = x$

2.  $x(3x + 10) = 77$

*Solve by the square root principle.*

3.  $x^2 = 50$

4.  $3(x + 2)^2 = 15$

Solve by completing the square.

5.  $x^2 - 8x + 11 = 0$

6.  $4x^2 + 20x + 13 = 0$

### Quadratic Formula and the Discriminant

The discriminant is the radicand of the Quadratic Formula. The discriminant,  $b^2 - 4ac$ , indicates what kind of solutions or roots (distinct, real, complex, etc.) the quadratic equation has.

<b>Value of the Discriminant</b> $b^2 - 4ac$	<b>Nature of Roots (Solutions)</b>
Positive	Two real distinct roots
Zero	One real repeated root
Negative	Two complex roots (complex conjugates)

Solve by using the quadratic formula. State the value of the discriminant and the type of solutions.

7.  $x^2 - 6x - 3 = 0$

8.  $9x^2 - 30x + 25 = 0$

9.  $x^2 - 2x = -26$

*Use the quadratic formula to solve for x in terms of y.*

10.  $2x^2 - xy = 3y^2 + 1$

*Solve for the specified variable.*

11.  $s = \frac{1}{2}gt^2 + v_0t$  for  $t$

*Solve.*

12. A farmer plans to enclose a rectangular region, using part of his barn for one side and fencing for the other three sides. If the side parallel to the barn is to be twice the length of an adjacent side, and the area of the region is to be  $128 \text{ ft}^2$ , how many feet of fencing should be purchased?