

## 1. Review Quadratics

In this section we will review how to factor quadratics.

**Definition.** Let  $a$ ,  $b$ , and  $c$  be real numbers with  $a \neq 0$ . A **quadratic equation** in the variable  $x$  is

To solve a quadratic means

Examples:

**Solving using the zero property and factoring**

**Example 1.** Solve the following quadratic equations.

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

2.  $2x(2x - 7) = 0$

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

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

5.  $x^2 + 10x + 24 = 0$

## **Solving quadratics using the Square Root Property**

When we can bring the equation in the form  $x^2 = k$ , we can solve by square rooting both sides.

**Example 2.** Solve using the square root property.

1.  $x^2 = 64$

2.  $2y^2 + 36 = 0$

3.  $(w + 3)^2 = 8$

## Solving quadratics by completing the square

We can manipulate the quadratic equation  $ax^2 + bx + c = 0$  with  $a \neq 0$  to write as the square of a binomial equal to a constant.

**Example 3.** Solve by completing the square.

1.  $x^2 - 3 = -10x$

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

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

## Solving quadratics by using the quadratic formula

**Example 4.** Use quadratic formula to solve  $x^2 - 6x = 3$

Next, we will start graphing specific categories of equations such as circles, ellipses, hyperbolas and parabola. We begin with circles.

**Definition.** A circle is the set of all points in a plane that are equidistant from a fixed point called \_\_\_\_\_. The fixed distance from any point on the circle to the center is called the \_\_\_\_\_.

### Standard form of an equation of a circle

Given a circle centered at  $(h, k)$  with radius  $r$ , the standard form is

#### Example 5.

1.  $(x - 4)^2 + (y + 3)^2 = 25$

2.  $x^2 + (y - 1/2)^2 = 12$

3.  $x^2 + y^2 = 7$

**Example 6.** Write the standard form of an equation of a circle with center  $(-4, 6)$  and radius 2. Graph the circle.

**Example 7.** Write the standard form of an equation of a circle with the endpoints of the diameter as  $(-1, 0)$  and  $(3, 4)$ . Graph the circle.

### General form of an Equation of a circle

An equation of a circle written in the form  $x^2 + y^2 + Ax + By + C = 0$  is called the general form of an equation of a circle.

**Example 8.** Write the equation of the circle in standard form.

$$x^2 + y^2 + 10x - 6y + 25 = 0$$