Lesson 13: Solving Quadratic Equations by Completing the Square

Classwork

Opening Exercises

1. Solve the equation for b: $2b^2 - 9b = 3b^2 - 4b - 14$.

2. Rewrite the expression by completing the square: $\frac{1}{2}b^2 - 4b + 13$.

Example 1

Solve for x.

$$12 = x^2 + 6x$$

Rational and Irrational Numbers

The *sum or product of two rational numbers* is always a *rational number*.

The *sum of a rational number and an irrational number* is always an *irrational number*.

The *product of a rational number and an irrational number* is an *irrational number* as long as the rational number is not zero.

Example 2

Now try this one.

$$4x^2 - 40x + 94 = 0$$

Exercises

Solve each equation by completing the square.

1. $x^2 - 2x = 12$

2. $\frac{1}{2}r^2 - 6r = 2$

3. $2p^2 + 8p = 7$

4. $2y^2 + 3y - 5 = 4$

> **Lesson Summary**
>
> When a quadratic equation is not conducive to factoring, we can solve by completing the square.
>
> Completing the square can be used to find solutions that are irrational, something very difficult to do by factoring.

Problem Set

Solve each equation by completing the square.

1. $p^2 - 3p = 8$

2. $2q^2 + 8q = 3$

3. $\frac{1}{3}m^2 + 2m + 8 = 5$

4. $-4x^2 = 24x + 11$