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Section 7.1: **Completing the square to solve quadratic equations**

Square root property:	**Perfect square patterns:**
If $x^2 = a$ then $x = \pm\sqrt{a}$	$(x+b)^2 = x^2 + 2bx + b^2$
So if $(x+b)^2 = a$ then $x+b = \pm\sqrt{a}$	$(x-b)^2 = x^2 - 2bx + b^2$

Examples

1) Solve for x: $x^2 + 6x - 3 = 0$

The left-hand side cannot be factored. We will rewrite this equation so that the left-hand side has the form of a perfect square trinomial:

Move the constant term to the other side (add 3 to both sides) and leave space on the left to add something:

$$x^2 + 6x + (\underbrace{}) = 3 + \underbrace{}$$

Find half of the coefficient of x, and square it: add that square to both sides above.

This makes the left-hand side have the form of a perfect square:

$$\left(x + \underbrace{}\right)^2 = \underbrace{}$$

Solve using the square root property:

2) Solve for x: $x^2 + 5x - 2 = 0$

The left-hand side cannot be factored. We will rewrite this equation so that the left-hand side has the form of a perfect square trinomial:

Move the constant term to the other side (add 2 to both sides) and leave space on the left to add something:

$$x^2 + 5x + (\underbrace{}) = 2 + \underbrace{}$$

Find half of the coefficient of x, and square it: add that square to both sides above.

This makes the left-hand side have the form of a perfect square:

$$\left(x + \underbrace{}\right)^2 = \underbrace{}$$

Solve using the square root property:

3) Solve for x: $3x^2 - 8x + 7 = 0$

The left-hand side cannot be factored. We will rewrite this equation so that the left-hand side has the form of a perfect square trinomial:

Move the constant term to the other side (subtract 7 from both sides)

$3x^2 - 8x + = -7$

Since the leading coefficient is not 1, we will divide both sides by that number before completing the square:

$$\underbrace{\frac{3x^2}{\quad}} - \underbrace{\frac{8x}{\quad}} = \underbrace{\frac{-7}{\quad}}$$

Simplify, and leave space to add something on the left-hand side:

Find half of the coefficient of x, and square it: add that square to both sides above.

This makes the left-hand side have the form of a perfect square:

$$\left(x + \underbrace{\quad}\right)^2 = \underbrace{\quad}$$

Solve using the square root property: