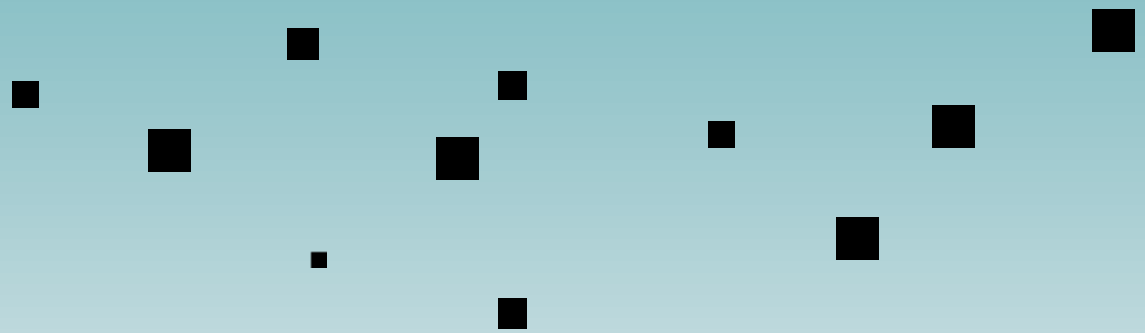
Choosing a Solution Method



Extension 9.4

Methods for Solving $ax^2 + bx + c = 0$

Factoring (Lessons 7.6-7.9)---an efficient way to solve IF the equation is easily factored, which isn't always the case.

Graphing (Lesson 9.1)---can be used for any quadratic, but may give only approximate solutions.

Find the Square Root (Lesson 9.2)---an efficient way to solve $x^2 = d$

Completing the Square (Lesson 9.3)----can be used for any quadratic, but easiest when "a" is 1 and "b" is an even number.

Quadratic Formula (Lesson 9.4)---useful for any quadratic; gives exact solutions.

White Board Practice

Round to the nearest tenth if necessary.

Choose a method and solve the quadratic equation.

1) $x^2 + 6x = 7$

$x^2 + 6x - 7 = 0$

$(x + 7)(x - 1) = 0$

$x = -7 \qquad x = 1$

Choose a method and solve the quadratic equation.

2) $x^2 + 4x - 1 = 0$

$x^2 + 4x + \_\_\_ = 1$

$x^2 + 4x + \underline{4} = 1 + 4$

(half of 4)²

$x^2 + 4x + 4 = 5$

$(x+2)^2 = 5$

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

$x + 2 = \pm\sqrt{5}$

$x = -2 \pm \sqrt{5}$

0.2, −4.2

Choose a method and solve the quadratic equation.

3) $3x^2 - 12 = 0$

$3x^2 = 12$

$x^2 = 4$

$\sqrt{x^2} = \pm\sqrt{4}$

$x = \pm 2$

Choose a method and solve the quadratic equation.

4) $3x^2 - 2x - 8 = 0$

$(3x + 4)(x - 2) = 0$

$x = -\frac{4}{3}$ $x = 2$

Choose a method and solve the quadratic equation.

5) $x^2 + 6x - 4 = 0$

$x^2 + 6x + \_\_\_ = 4$

$x^2 + 6x + 9 = 4 + 9$

(half of 6)²

$x^2 + 6x + 9 = 13$

$(x+3)^2 = 13$

$\sqrt{(x+3)^2} = \pm\sqrt{13}$

$x + 3 = \pm\sqrt{13}$

$x = -3 \pm \sqrt{13}$

0.6, −6.6

Choose a method and solve the quadratic equation.

6) $x^2 + x - 5 = 0$

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

$$x = -\frac{1 \pm \sqrt{21}}{2}$$

$-2.8, 1.8$

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

x equals negative *b*,
plus or minus square root
b squared minus 4*ac*,
all over 2*a*."

$$x^2 + x + \frac{1}{4} = 5 + \frac{1}{4}$$

$$x^2 + x + \frac{1}{4} = \frac{20}{4} + \frac{1}{4}$$

$$\left(x + \frac{1}{2}\right)^2 = \frac{21}{4}$$

$$\sqrt{\left(x + \frac{1}{2}\right)^2} = \pm\sqrt{\frac{21}{4}}$$

$$x + \frac{1}{2} = \pm\frac{\sqrt{21}}{2}$$

$$x = -\frac{1}{2} \pm \frac{\sqrt{21}}{2}$$

$$x = -\frac{1 \pm \sqrt{21}}{2}$$

$-2.8, 1.8$

Choose a method and solve the quadratic equation.

7) $x^2 - 12x + 20 = 0$

$(x - 10)(x - 2) = 0$

$x = 10 \qquad x = 2$

Choose a method and solve the quadratic equation.

8) $6x^2 + 12x = 0$

$6x(x + 2) = 0$

$6x = 0 \qquad x + 2 = 0$

$x = 0 \qquad x = -2$

Choose a method and solve the quadratic equation.

9) $x^2 - 10x - 23 = 0$

$x^2 - 10x + \_\_\_ = 23$

$x^2 - 10x + 25 = 23 + 25$

(half of -10)²

$x^2 - 10x + 25 = 48$

$(x-5)^2 = 48$

$\sqrt{(x-5)^2} = \pm\sqrt{48}$

$x - 5 = \pm\sqrt{48}$

$x = 5 \pm \sqrt{48}$

11.9, −1.9

Choose a method and solve the quadratic equation.

10) $x^2 + 9x + 20 = 0$

$(x + 5)(x + 4) = 0$

$x = -5 \qquad x = -4$

Choose a method and solve the quadratic equation.

11) $2x^2 + 15x - 8 = 0$

$(x + 8)(2x - 1) = 0$

$x = -8 \qquad x = \frac{1}{2}$

Choose a method and solve the quadratic equation.

12) $5x^2 + 20x = 0$

$5x(x + 4) = 0$

$5x = 0 \quad x + 4 = 0$

$x = 0 \quad x = -4$

Choose a method and solve the quadratic equation.

13) $x^2 - 4x = 14$

$x^2 - 4x + \_\_\_ = 14$

$x^2 - 4x + 4 = 14 + 4$

(half of -4)²

$x^2 - 4x + 4 = 18$

$(x-2)^2 = 18$

$\sqrt{(x-2)^2} = \pm\sqrt{18}$

$x - 2 = \pm\sqrt{18}$

$x = 2 \pm \sqrt{18}$

$6.2, -2.2$

Choose a method and solve the quadratic equation.

14) $x^2 + 14x = 15$

$x^2 + 14x - 15 = 0$

$(x + 15)(x - 1) = 0$

$x = -15 \qquad x = 1$

Choose a method and solve the quadratic equation.

15) $x^2 - 8x - 4 = 0$

$x^2 - 8x + \_\_\_ = 4$

$x^2 - 8x + 16 = 4 + 16$

(half of -8)²

$x^2 - 8x + 16 = 20$

$(x-4)^2 = 20$

$\sqrt{(x-4)^2} = \pm\sqrt{20}$

$x - 4 = \pm\sqrt{20}$

$x = 4 \pm \sqrt{20}$

$8.5, -0.5$

To solve a quadratic by "Completing the Square", follow these steps:

1. Make sure the coefficient of x^2 is 1.
2. Move everything to the LEFT side of the equation EXCEPT the constant.
3. Make the left hand side of the equation into a PERFECT SQUARE TRINOMIAL.
4. Remember, if you add a number to one side of an equation, you must add the same number to the other side of the equation.
5. Factor the left side into the SQUARE OF A BINOMIAL.
6. Take the square root of each side. Remember to add the ± symbol to the right side.
7. Solve for x.