Worksheet #1 - Solving Quadratic Equations

Equations such as $x^2 = 64$, $x^2 - 5x = 0$, and $x^2 + 4x = 5$ are called quadratic equations. This is because in each of these equations the greatest exponent of any variable is 2.

Standard Form of Quadratic Equations: $ax^2 + bx + c = 0$

Before you select the method that you will use to solve a quadratic, you must use inverse operations to get the equation to equal **zero** (if necessary).

When solving quadratic equations, we can use two methods:

1) Factoring
2) Quadratic Formula

1. Solving Quadratic Equations Using Factoring:

To Solve a Quadratic Using Factoring:

1) Put the quadratic equation into standard form (above).
2) Factor the quadratic expression.
3) Set each factor equal to zero.
4) Solve each equation.
5) Check each **root** in the original equation.

For example:

$x^2 + 4x = 5$

$-5 \quad -5$

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

$(x + 5)(x - 1) = 0$

$x + 5 = 0 \qquad x - 1 = 0$

$-5 \quad -5 \qquad +1 \quad +1$

$x = -5 \quad$ or $\quad x = 1$ Now, check in the original!!!

Solve each quadratic equation using factoring:

1) $x^2 - 3x + 2 = 0$ 2) $z^2 - 5z + 4 = 0$ 3) $x^2 - 8x + 16 = 0$

4) $r^2 - 12r + 35 = 0$ 5) $c^2 + 6c + 5 = 0$ 6) $m^2 + 10m + 9 = 0$

7) $x^2 - 49 = 0$

8) $z^2 - 4 = 0$

9) $m^2 - 64 = 0$

10) $3x^2 - 12 = 0$

11) $d^2 - 2d = 0$

12) $s^2 - s = 0$

13) $2x^2 - 5x + 2 = 0$

14) $3x^2 - 10x + 3 = 0$

15) $3x^2 - 8x + 4 = 0$

16) $2x^2 + 7 = 5 - 5x$

17) $x(x - 2) = 35$

18) $y(y - 3) = 4$

19) $\frac{x + 2}{2} = \frac{12}{x}$

20) $\frac{y + 3}{3} = \frac{6}{y}$

21) $\frac{x}{3} = \frac{12}{x}$

2. Solving Quadratics Using the Quadratic Formula:

Not every quadratic equation can be solved by factoring. In this case, we need to use the quadratic formula.

Quadratic Formula: $x = \frac{-(b) \pm \sqrt{b^2 - 4ac}}{2a}$

To Solve a Quadratic Using the Quadratic Formula:

1) Put the quadratic equation into standard form (above).
2) Write out the formula and what a, b, & c stand for.
3) Substitute for each variable.
4) Split into two separate equations (setting each equal to zero) and solve.
5) Check each **root** in the original equation.

For example: $2x^2 + x = 6$

$-6 \quad -6$

$2x^2 + x - 6 = 0$ ***Can't be factored, use the formula.

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

$a = 2, b = 1, c = -6 \quad x = \frac{-(1) \pm \sqrt{(1)^2 - 4(2)(-6)}}{2(2)}$

$x = \frac{-1 \pm \sqrt{1 + 48}}{4}$

$x = \frac{-1 \pm \sqrt{49}}{4}$

$x = \frac{-1 \pm 7}{4}$

$x = \frac{-1 + 7}{4} \qquad x = \frac{-1 - 7}{4}$

$x = \frac{6}{4} \qquad x = \frac{-8}{4}$

$x = \frac{3}{2} \qquad x = -2$ *** Now check in original equation!

Solve each equation using the quadratic formula:

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

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

3) $x^2 + 3x + 2 = 0$

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

5) $3x^2 + 5x + 2 = 0$

6) $3x^2 + 5x + 2 = 0$

7) $x^2 + 6x + 9 = 0$

8) $4x^2 - 4x + 1 = 0$

9) $x^2 + 10x = -25$

10) $x^2 + x = 12$

11) $x^2 + 2x = 24$

12) $x^2 = x + 2$