TSC | WILLIAM D. LAW, JR. LEARNING COMMONS

The Quadratic Formula

Using the q**uadratic formula, we** can solve all quadratic equations.

If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Solve the equations $6x - 1 = x^2$

First, we put the equation in **standard form** by subtracting 6x and adding 1 to both sides. Re-write in descending order: $x^2 - 6x + 1 = 0$

$a^2 + b^2 = c^2$ (standard form of a quadratic equation)

$using\ this\ we\ see\ that\ a = 1, b = -6\ and\ c = 1$

Next, we substitute these values into the quadratic formula and then begin to simplify.

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

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

Substitute ***a* = 1, *b* = -6, *c* = 1** into the formula. Place the parentheses on the numbers to avoid making mistakes on "signs"
Simplify.

$x = \frac{6 \pm \sqrt{36 - 4}}{2}$

Note: the fact that $b^2 - 4ac$ is not equal to a perfect square indicates that it is not possible to solve this equation by factoring.

$x = \frac{6 \pm \sqrt{32}}{2}$

Next, we need to simplify the radical: $\sqrt{32} = \sqrt{16}\sqrt{2}$;

$which\ give\ us: 4\sqrt{2}$

$x = \frac{6}{2} \pm \frac{4\sqrt{2}}{2}$

then we simplify

$x = 3 \pm 2\sqrt{2}$

thus, our two solutions: $3 + 2\sqrt{2}, 3 - 2\sqrt{2}$

Exercises: Solve the equations using quadratic formula.

1. $x^2 + 2x - 24 = 0$

2. $2x(x - 3) = 2$

3. $\frac{1}{2}x^2 + \frac{3}{2}x - 2 = 0$

4. $7x^2 + 4 = 2x$

Answers:

1. {4. 6} 2. $\left\{\frac{3\pm\sqrt{13}}{2}\right\}$ 3. {-4. 1} 4. $\left\{\frac{1\pm3i\sqrt{3}}{7}\right\}$