Name: Answer Key / Teacher Guide

Quadratic Formula

is for...

finding solutions of a quadratic equation (even if it cannot be factored)

when in standard form and set equal to zero

where a, b, & c are... the coefficients and constant (in order)

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

The "±" symbol means do both. Add to get your 1st solution, Subtract to get your 2nd.

(Note that there can be one, two or no solutions.)

"x equals negative b plus or minus the square root of b squared minus 4 a c all over 2 a"

Try It ...

Solve $4x^2 - x = 3$ using the quadratic formula.

1. Set equal to 0

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

2. Identify a, b, & c (Standard Form)

a = 4, b = -1, c = -3

3. Substitute & Simplify (Plug Into Formula)

$x = \frac{1 \pm \sqrt{1 - 4(4)(-3)}}{2(4)} \rightarrow x = \frac{1 \pm \sqrt{1 + 48}}{8} \rightarrow x = \frac{1 \pm \sqrt{49}}{8} \rightarrow$

$x = \frac{1 \pm 7}{8} \rightarrow$ SPLIT: $x = \frac{1+7}{8}, x = \frac{1-7}{8} \rightarrow x = 1, -3/4$

Solving Quadratic Equations with the Quadratic Formula

Remember to set the equation equal to zero first!

Solve $x^2 + 1 = 2x$ using the quadratic formula.

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

$a = 1, b = -2, c = 1$

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

$$x = \frac{2 \pm \sqrt{4 - 4}}{2} \rightarrow x = \frac{2 \pm 0}{2} \rightarrow x = 1$$

Factoring SOMETIMES works for solving quadratics, but the quadratic formula ALWAYS works!

The solutions of the quadratic equation are also the x - intercepts of the graph of the quadratic function (also called roots or zeroes).

Solve and interpret the solutions for $3x^2 - 2x = 8$

Quadratic Formula

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

$a = 3, b = -2, c = -8$

$$x = \frac{2 \pm \sqrt{4 - 4(3)(-8)}}{2(3)} \rightarrow x = \frac{2 \pm \sqrt{4 + 96}}{6}$$

$$x = \frac{2 \pm \sqrt{100}}{6} \rightarrow x = \frac{2 \pm 10}{6} \rightarrow x = 2, -1\frac{1}{3}$$

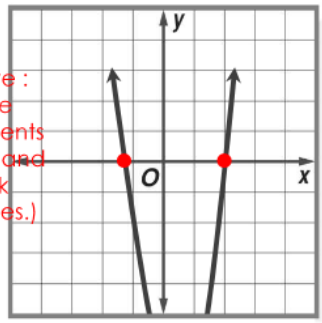
Factoring

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

$(3x + 4)(x - 2) \rightarrow x = -1\frac{1}{3}, 2$

Graph

When does $f(x) = 3x^2 - 2x - 8$ equal zero? (Where does it cross the x - axis?)



(Note: Have students find and mark zeroes.)

Roots (zeroes) of the quadratic function: $x = 2, x = -1\frac{1}{3}$

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