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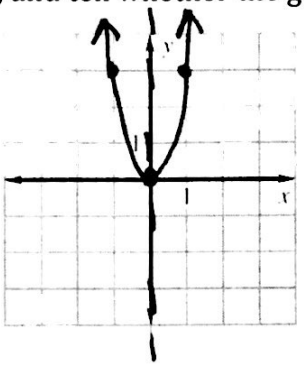
NOTES: Section 9.6 – Solving Quadratic Equations by the Quadratic Formula

Goals: #1 - I can use the quadratic formula to solve a quadratic equation.

Homework: Section 9.6 Worksheet

Warm Up: Graph the function by completing the table. Identify the graph's axis of symmetry (AOS), vertex, and tell whether the graph opens up or down.

1. $y = \overset{a}{3}x^2 + \overset{b}{0}x + \overset{c}{0}$



AOS: $x = 0$

vertex: $(0,0)$

y-int: $(0,0)$

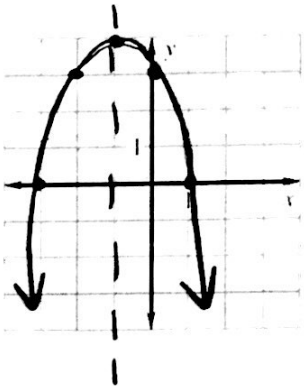
opens: up

solution/s: 0

x	-2	-1	0	1	2
y	12	3	0	3	12

$x = \frac{-b}{2a} = \frac{-(0)}{2(3)} = 0$

2. $y = \overset{a}{-}x^2 - \overset{b}{2}x + \overset{c}{3}$



AOS: $x = -1$

vertex: $(-1,4)$

y-int: $(0,3)$

opens: down

solution/s: $-3, 1$

x	-3	-2	-1	0	1
y	0	3	4	3	0

$x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)} = \frac{2}{-2} = -1$

Review:

A quadratic equation in standard form: $y = ax^2 + bx + c$

To put a quadratic equation in standard form, we set the equation equal to 0.

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Let's practice: Write the equation in standard form. Identify the values of a, b, and c.

1. $3x^2 = 3x + 6$

$-3x \quad -3x$

$3x^2 - 3x = 6$

$-6 \quad -6$

$3x^2 - 3x - 6 = 0$

$a =$ 3

$b =$ -3

$c =$ -6

2. $-2x^2 = -8$

$+8 \quad +8$

$-2x^2 + 8 = 0$

$a =$ -2

$b =$ 0

$c =$ 8

3. $-x^2 + 5x = 6$

$-6 \quad -6$

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

$a =$ -1

$b =$ 5

$c =$ -6

4. $-24x + 45 = -3x^2$

$+3x^2 \quad +3x^2$

$3x^2 - 24x + 45 = 0$

$a =$ 3

$b =$ -24

$c =$ 45

Notes:

We can Solve ANY quadratic equations by using the quadratic formula.

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

Step 1: Set the quadratic equation equal to 0.

Step 2: Plug and chug!

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Example #1: Use the quadratic formula to solve the equation. Round the solutions to the nearest tenth, if necessary.

1. $x^2 + 9x + 14 = 0$

$a = 1$
$b = 9$
$c = 14$

① $x^2+9x+14=0$ ✓

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

$x = \frac{-(9) \pm \sqrt{(9)^2-4(1)(14)}}{2(1)}$

$x = \frac{-9 \pm \sqrt{81-56}}{2}$

$x = \frac{-9 \pm \sqrt{25}}{2}$

$x = \frac{-9 \pm 5}{2}$

$x = \frac{-9+5}{2} = \frac{-4}{2} = -2$ $\quad x = \frac{-9-5}{2} = \frac{-14}{2} = -7$

$x = -2$
$x = -7$

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

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

① $2x^2-3x=8$
$-8 \quad -8$
$2x^2-3x-8=0$ ✓

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

$x = \frac{-(-3) \pm \sqrt{(-3)^2-4(2)(-8)}}{2(2)}$

$x = \frac{3 \pm \sqrt{9+64}}{2}$

$x = \frac{3 \pm \sqrt{73}}{2}$

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You practice: Use the quadratic formula to solve the equation. Round the solutions to the nearest tenth, if necessary.

3. $7x^2 - 1 = -2x$

$a = 7$

$b = 2$

$c = -1$

① $7x^2 - 1 = -2x$

$+2x \quad +2x$

$7x^2 + 2x - 1 = 0$ ✓

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

$x = \dfrac{-(2) \pm \sqrt{(2)^2 - 4(7)(-1)}}{2(7)}$

$x = \dfrac{-2 \pm \sqrt{4 + 28}}{14}$

$x = \dfrac{-2 \pm \sqrt{32}}{14} < \dfrac{\sqrt{16}}{\sqrt{2}}$

$x = \dfrac{-2 \pm 4\sqrt{2}}{14}$

$\boxed{x = \dfrac{-1 \pm 2\sqrt{2}}{7}}$

You practice: Write down the quadratic 5 times!

1. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

3. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

5. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$