Bellwork: Algebra 1

1. Happy Tuesday!!
2. Write down your work for the week in your planner.
3. Take out your homework from Friday.
4. You need a calculator and Algebra Nation Book.
5. Answer the following question on your TUESDAY Bellwork:

Simplify the following equation

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(3)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 - 12}}{2} = \frac{-4 \pm \sqrt{4}}{2}$$

$$\frac{-4 \pm 2}{2} \rightarrow \frac{-4+2}{2}, \frac{-4-2}{2}$$

$$-1, -3$$

$$x = \{-3, -1\}$$

2. $x^2 - 10x + 25 = 64$

$\sqrt{(X-5)^2} = \sqrt{64}$

$X - 5 = \pm 8$

$X = 5 \pm 8$

$\boxed{X = \{-3, 13\}}$

3. $x^2 - 16x + 64 = 4$

$\sqrt{(X-8)^2} = \sqrt{4}$

$X - 8 = \pm 2$

$X = 8 \pm 2$

$\boxed{X = \{6, 10\}}$

4. $x^2 + 2x + 1 = 49$

$\sqrt{(X+1)^2} = \sqrt{49}$

$X + 1 = \pm 7$

$X = -1 \pm 7$

$\boxed{X = \{-8, 6\}}$

6. $x^2 - 20x + 19 = 0$

$X^2 - 20X = -19$

$\downarrow$

$(-10)^2 = 100$

$X^2 - 20X + 100 = -19 + 100$

$\sqrt{(X-10)^2} = \sqrt{81}$

$X - 10 = \pm 9$

$X = 10 \pm 9$

$X = \{1, 19\}$

7. $x^2 + 4x + 14 = 46$

$X^2 + 4X = 32$

$\downarrow$

$2^2 = 4$

$X^2 + 4X + 4 = 32 + 4$

$\sqrt{(X+2)^2} = \sqrt{36}$

$X + 2 = \pm 6$

$X = -2 \pm 6$

$X = \{-8, 4\}$

8. $x^2 + 14x + 32 = -8$

$X^2 + 14X = -40$

$\downarrow$

$7^2 = 49$

$X^2 + 14X + 49 = -40 + 49$

$\sqrt{(X+7)^2} = \sqrt{9}$

$X + 7 = \pm 3$

$X = -7 \pm 3$

$X = \{-10, -4\}$

8. $2x^2 - 16x - 50 = 16$

$2x^2 - 16x = 66$

$2(x^2 - 8x + 16) = 66 + 32$

$\frac{2(x-4)^2}{2} = \frac{98}{2}$

$\sqrt{(x-4)^2} = \sqrt{49}$

$x - 4 = 7 \quad x - 4 = -7$

$+4 \quad +4 \quad +4 \quad +4$

$x = 11 \quad x = -3$

$x = \{-3, 11\}$

9. $4x^2 + 42x = 2x - 8$

$4x^2 - 40x = -8$

$4(x^2 - 10x + 25) = -8 + 100$

$\frac{4(x-5)^2}{4} = \frac{92}{4}$

$\sqrt{(x-5)^2} = \sqrt{23}$

$x - 5 = \sqrt{23} \quad x - 5 = -\sqrt{23}$

$x = 5 + \sqrt{23} \quad x = 5 - \sqrt{23}$

$x = \{5 \pm \sqrt{23}\}$

10. $3x^2 + 36x + 48 = 0$

$3x^2 + 36x = -48$

$3(x^2 + 12x + \underline{36}) = -48 + \underline{108}$

$\frac{3(x+6)^2}{3} = \frac{60}{3}$

$\sqrt{(x+6)^2} = \sqrt{20}$

$\sqrt{20}$ → $\sqrt{4}\ \sqrt{5}$

$x + 6 = \pm 2\sqrt{5}$

$-6 \quad -6$

$x = \{-6 \pm 2\sqrt{5}\}$

12. $5x^2 = 40x + 5$

$5x^2 - 40x - 5 = 0$

$5(x^2 - 8x + \underline{16}) = 5 + \underline{80}$

$\frac{5(x-4)^2}{5} = \frac{85}{5}$

$\sqrt{(x-4)^2} = \sqrt{17}$

$x - 4 = \sqrt{17} \quad x - 4 = -\sqrt{17}$

$x = 4 + \sqrt{17} \quad x = 4 - \sqrt{17}$

$x = \{4 \pm \sqrt{17}\}$

Section 5 – Topic 9
Solving Quadratic Equations Using the Quadratic Formula

p.140

For any quadratic equation $ax^2 + bx + c = 0$, where $a \neq 0$,

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

To use the quadratic formula:

Step 1: Set the quadratic equation equal to zero.

Step 2: Identify a, b, and c.

Step 3: Substitute a, b, and c into the quadratic formula and evaluate to find the zeros.

Let's Practice!

$ax^2+bx+c=0$

1. Use the quadratic formula to solve $x^2 - 4x + 3 = 0$.

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

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

$\frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(3)}}{2(1)}$

$(-4)(3)$

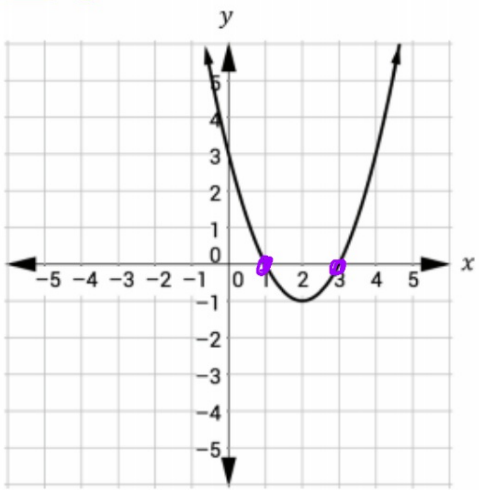
$= \frac{4 \pm \sqrt{16-12}}{2}$

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

$\frac{4 \pm 2}{2} \rightarrow \frac{4+2}{2}, \frac{4-2}{2}$

$X = \{1, 3\}$

2. Consider the graph of the quadratic equation $y = x^2 - 4x + 3$.



Does the graph verify the solutions we found using the quadratic formula?

yes

3. Use the quadratic formula to solve $2w^2 + w = 5$.

$-5 \quad -5$ $\quad 2w^2+w-5=0$

$a=2$
$b=1$
$c=-5$

$$x=\frac{-1\pm\sqrt{1-4(2)(-5)}}{2(2)} \quad (-8)(-5)$$

$$=\frac{-1\pm\sqrt{1+40}}{4}=\left\{\frac{-1\pm\sqrt{41}}{4}\right\}$$

Try It!

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

4. Use the quadratic formula to solve $3q^2 - 11 = 20q$.

$-20q \quad -20q$

$3q^2-20q-11=0$

$a=3$
$b=-20$
$c=-11$

$$=\frac{-(-20)\pm\sqrt{(-20)^2-4(3)(-11)}}{2(3)}$$

$\sqrt{532}$

$\sqrt{4} \quad \sqrt{133}$

$2\sqrt{133}$

$$=\frac{20\pm\sqrt{400+132}}{6}$$

$$=\frac{20\pm\sqrt{532}}{6}$$

$$=\frac{20\pm2\sqrt{133}}{6}=\left\{\frac{10\pm1\sqrt{133}}{3}\right\}$$

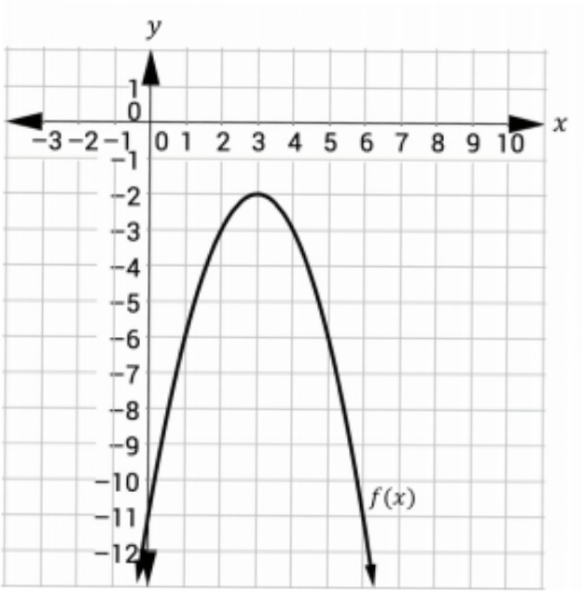
BEAT THE TEST!

1. Your neighbor's garden measures 12 meters by 16 meters. He plans to install a pedestrian pathway all around it, increasing the total area to 285 square meters. The new area can be represented by $4w^2 + 56w + 192$. Use the quadratic formula to find the width, w, of the pathway.

   Part A: Write an equation that can be used to solve for the width of the pathway.

   Part B: Use the quadratic formula to solve for the width of the pathway.

Consider the graph of the function $f(x) = -x^2 + 6x - 11$.



Where does the parabola intersect the x-axis?

Use the quadratic formula to find the zero(s) of the function.

Let's Practice!

1. Use the discriminant to determine if the following quadratic equations have complex or real zero(s).

   a. $2x^2 - 3x - 10 = 0$

   b. $x^2 - 6x + 9 = 0$

   c. $g(x) = x^2 - 8x + 20$

BEAT THE TEST!

1. Which of the following quadratic equations have real zeros? Select all that apply.

- ☐ $f(x) = -3x^2 + 5x - 11$
- ☐ $f(x) = -x^2 - 12x + 6$
- ☐ $f(x) = 2x^2 + x + 6$
- ☐ $f(x) = 5x^2 - 10x - 3$
- ☐ $f(x) = x^2 - 2x + 8$