*Factoring
*Square Root   b=0
*Completing the Square a=1
*Quadratic Formula   b even
                     *Any time!

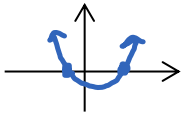**QUADRATIC FUNCTION-   Vertex Form:**

$$y = a(x-h)^2 + k$$
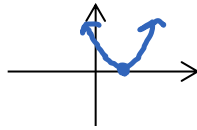
Standard Form:

$$y = ax^2 + bx + c$$

Draw a <u>parabola</u> for a quadratic equation that meets the following conditions:
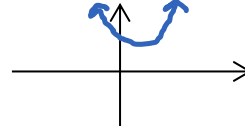
2 Solutions	**1 Solution**	**No real solutions**

Simplify all radicals in solutions.

$x = ?$

1. **Solve** $x^2 = 9x - 8$ *Factoring
$-9x | -9x +8$
$+8$

$x^2 - 9x + 8 = 0$

$(x-8)(x-1) = 0$
$-8x$
$-1x$

$x - 8 = 0$ $x - 1 = 0$ *2 Real
$+8 +8$ $+1 +1$ Solutions
$\boxed{x = 8}$ $\boxed{x = 1}$ Rational

$x = ?$

2. **Solve** $x^2 - 6 = 2$ 2 1 *b=0
$-2 -2$ √

$x^2 - 8 = 0$
$+8 +8$
$\sqrt{x^2} = \sqrt{8}$

② 4
√2·√2

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

$\boxed{x = \pm 2\sqrt{2}}$ 2 Real
                                Irrational

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

*Memorize

Discriminant:
$$*D = b^2 - 4ac$$

$D > 0$ 2 Real Solutions
$D < 0$ 0 Real Solutions
$D = 0$ 1 Real Solution

$x = ?$

4. **Solve** $x^2 - x + 6 = 0$

$a = 1$ $b = -1$ $c = 6$

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

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

$x = \frac{1 \pm \sqrt{-23}}{2}$

$\boxed{x = \frac{1 \pm i\sqrt{23}}{2}}$ 2 Complex

$x = \frac{1 + i\sqrt{23}}{2}$ $x = \frac{1 - i\sqrt{23}}{2}$

$x = ?$

5. **Solve** $x^2 - 4x + 2 = 0$

$a = 1$ $b = -4$ $c = 2$

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

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

$x = \frac{4 \pm \sqrt{8}}{2}$

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

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

$\boxed{x = 2 \pm \sqrt{2}}$ 2 Real
                                Irrational

$x = ?$

6. **Solve** $x^2 + 6x = -9$
$+9 +9$

$x^2 + 6x + 9 = 0$
$a = 1$ $b = 6$ $c = 9$

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

$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(1)(9)}}{2(1)}$

$x = \frac{-6 \pm \sqrt{0}}{2}$

$x = \frac{-6 \pm 0}{2}$ $x = \frac{-6 + 0}{2}$

$x = \frac{-6 - 0}{2}$

$\boxed{x = -3}$ $\boxed{x = -3}$

1 Real Solt.

Evaluate the <u>discriminant</u> for each equation. Determine the <u>number of real solutions</u>.

$D = b^2 - 4ac$

$D > 0$ 2, $D < 0$ None,
$D = 0$ One

6.) $-12x^2 + 5x + 2 = 0$

$a = -12$ $b = 5$ $c = 2$

$D = b^2 - 4ac$

$D = (5)^2 - 4(-12)(2)$

$\boxed{D = 121}$

$\boxed{\text{2 Real Solutions}}$

7.) $6x + 9 = -x^2$
$+y^2$ $+x^2$

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

$a = 1$ $b = 6$ $c = 9$

$D = b^2 - 4ac$

$D = (6)^2 - 4(1)(9)$

$\boxed{D = 0}$ $\boxed{\text{One Real Solution}}$

3.4 Quadratic Formula (Day 1)   Name_____

1. Solve $x^2 - 13x = -40$ 2. $x^2 - 7 = 5$ 3. Solve $9x^2 - 6x = -1$

4. Solve $x^2 - 5x - 3 = 0$ 5. Solve $x^2 + 4x - 4 = 0$ 6. Solve $4x^2 - 3x + 1 = 0$

Evaluate the discriminant for each equation. Determine the number of real solutions.

7.) $2x^2 - 8x + 8 = 0$ 8.) $4x + 4 = -x^2$ 9.) $x^2 - x + 9 = 0$

10.) How can you tell by looking at the discriminant if the quadratic equation will have one solution, two solutions, or no solutions?

Warm-UP:

Solve $x^2-8x+3=0$ by completing the square.