# Station 1: Factor Completely

1. $25x^2 - 81$

$(5x - 9)(5x + 9)$

2. $x^2 + 8x + 16$

$(x + 4)(x + 4)$

3. $2x^2 - 7x + 6$

$$
\begin{array}{c|c|c}
 & x & -2 \\
\hline
2x & 2x^2 & -4x \\
\hline
-3 & -3x & +6 \\
\end{array}
$$

$(2x - 3)(x - 2)$

4. $12x^2 - 17x - 5$

$$
\begin{array}{c|c|c}
 & 4x & +1 \\
\hline
3x & 12x^2 & 3x \\
\hline
-5 & -20x & -5 \\
\end{array}
$$

$(3x - 5)(4x + 1)$

# Station 2: Use the Quadratic Formula to find the x-intercepts

1. $y = 3x^2 - 4x + 5$

$$\frac{4 \pm \sqrt{(-4)^2 - 4(3)(5)}}{2(3)} = \frac{4 \pm \sqrt{16 - 60}}{6} = \frac{4 \pm \sqrt{-44}}{6} = \frac{4 \pm 2i\sqrt{11}}{6}$$

$$\left( \frac{2 \pm i\sqrt{11}}{3}, 0 \right)$$

2. $y = -x^2 + 3x - 1$

$$\frac{-3 \pm \sqrt{(3)^2 - 4(-1)(-1)}}{2(-1)} = \frac{-3 \pm \sqrt{9 - 4}}{-2} = \frac{-3 \pm \sqrt{5}}{-2} = \left( -\frac{3 \pm \sqrt{5}}{2}, 0 \right)$$

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

$$\frac{3 \pm \sqrt{(-3)^2 - 4(2)(-1)}}{2(2)} = \frac{3 \pm \sqrt{9 + 8}}{4} = \left( \frac{3 \pm \sqrt{17}}{4}, 0 \right)$$

4. $y = -2x^2 + 2x - 3$

$$\frac{-2 \pm \sqrt{(2)^2 - 4(-2)(-3)}}{2(-2)} = \frac{-2 \pm \sqrt{4 - 24}}{-4} = \frac{-2 \pm \sqrt{-20}}{-4} = \frac{-2 \pm 2i\sqrt{5}}{-4}$$

$$\left( -\frac{1 \pm i\sqrt{5}}{2}, 0 \right)$$

# Station 3: Converting Forms

1. Convert to Vertex form: $y = -2x^2 + 4x - 3$

$AoS = \dfrac{-4}{2(-2)} = -\dfrac{4}{-4} = 1$

$y = -2(1)^2 + 4(1) - 3$

$y = -1$

$Vertex = (1, -1)$

$\boxed{y = -2(x-1)^2 - 1}$

2. Convert to Standard form: $y = 2(x - 3)^2 - 3$

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

$y = 2(x^2 - 6x + 9) - 3$

$y = 2x^2 - 12x + 18 - 3$

$\boxed{y = 2x^2 - 12x + 15}$

3. Convert to Standard form: $y = (x + 2)(x - 3)$

$y = x^2 - 3x + 2x - 6$

$\boxed{y = x^2 - x - 6}$

4. Convert to Vertex form: $y = 3x^2 - 2x - 1$

$AoS = \dfrac{2}{3(2)} = \dfrac{2}{6} = \dfrac{1}{3}$

$vertex = \left(\dfrac{1}{3}, -\dfrac{4}{3}\right)$

$\boxed{y = 3\left(x - \dfrac{1}{3}\right)^2 + \dfrac{4}{3}}$

$y = 3\left(\dfrac{1}{3}\right)^2 - 2\left(\dfrac{1}{3}\right) - 1$

$y = 3\left(\dfrac{1}{9}\right) - \dfrac{2}{3} - 1$

$y = \dfrac{1}{3} - \dfrac{2}{3} - 1$

$y = -\dfrac{4}{3}$

# Station 4: Simplify the following radical expressions

1. $2\sqrt{8} + 5\sqrt{2} + 6\sqrt{27}$

$2\sqrt{4}\sqrt{2} + 5\sqrt{2} + 6\sqrt{9}\sqrt{3}$

$2(2)\sqrt{2} + 5\sqrt{2} + 6(3)\sqrt{3}$

$4\sqrt{2} + 5\sqrt{2} + 18\sqrt{3}$

$$\boxed{9\sqrt{2} + 18\sqrt{3}}$$

2. $-3\sqrt{72} + 4\sqrt{32}$

$-3\sqrt{36}\sqrt{2} + 4\sqrt{16}\sqrt{2}$

$-3(6)\sqrt{2} + 4(4)\sqrt{2}$

$-18\sqrt{2} + 16\sqrt{2}$

$$\boxed{-2\sqrt{2}}$$

3. $\sqrt{-8} + \sqrt{-2}$

$\sqrt{-1}\sqrt{4}\sqrt{2} + \sqrt{-1}\sqrt{2}$

$i(2)\sqrt{2} + i\sqrt{2}$

$2i\sqrt{2} + i\sqrt{2}$

$$\boxed{3i\sqrt{2}}$$

4. $-3\sqrt{-16} + 5\sqrt{-1} + 6\sqrt{4}$

$-3\sqrt{-1}\sqrt{16} + 5\sqrt{-1} + 6\sqrt{4}$

$-3(i)(4) + 5(i) + 6(2)$

$-12i + 5i + 12$

$$\boxed{-7i + 12}$$

# Station 5: Graphing

1. Describe the graph. Does it open up or down, is it wide or narrow and explain how you know this. Then, graph the equation.
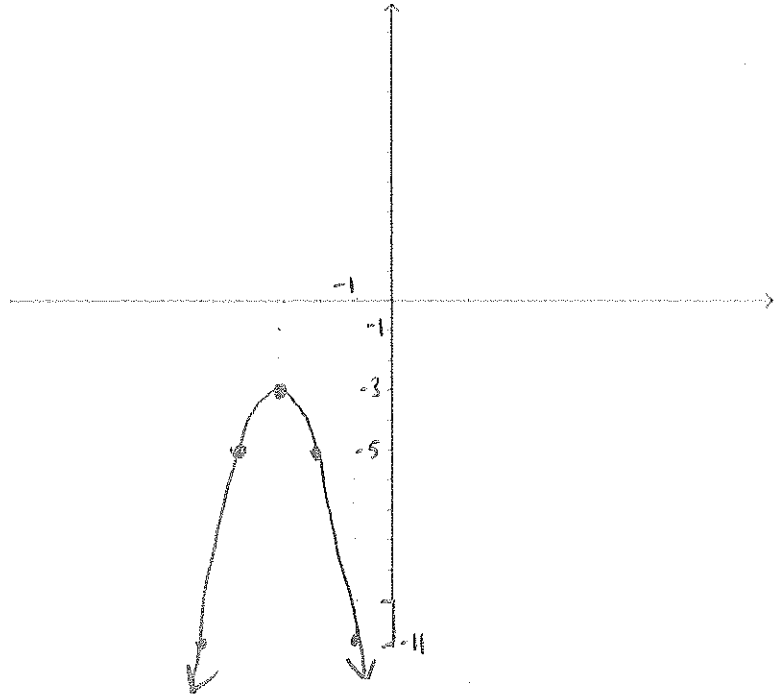
$$y = -2(x + 3)^2 - 3$$

Because a is negative it opens down

Because a > 1, it is narrow.

V: $(-3, -3)$

| x | y |
|---|---|
| -5 | -11 |
| -4 | -5 |
| -3 | -3 |
| -2 | -5 |
| -1 | -11 |



2. Describe the graph. Does it open up or down, is it wide or narrow and explain how you know this. Then, graph the equation.
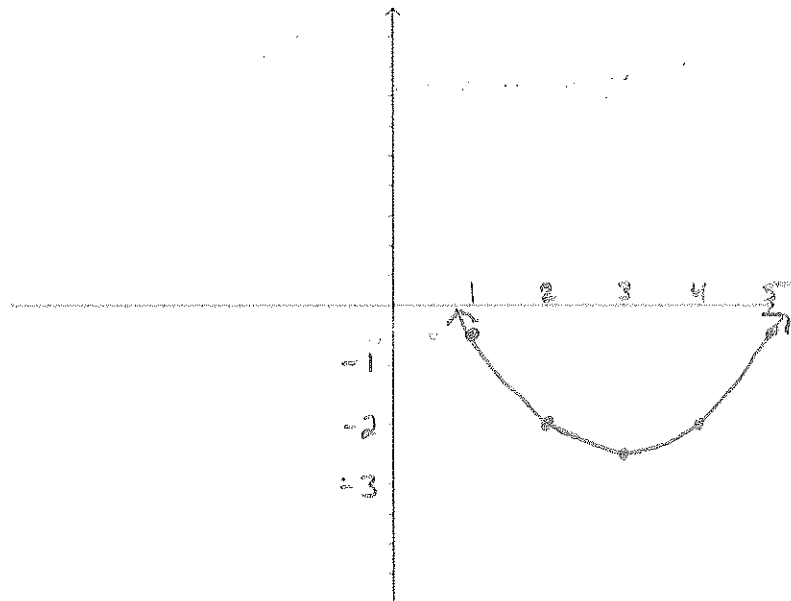
$$y = \frac{1}{2}x^2 - 3x + 2$$

Because a is possitive it opens up.

Because a < 1, it is wide.

AoS = $\frac{3}{2(\frac{1}{2})}$ = 3

V: $(3, -2.5)$

| x | y |
|---|---|
| 1 | -0.5 |
| 2 | -2 |
| 3 | -2.5 |
| 4 | -2 |
| 5 | -0.5 |

# Station 6: Solve the following

By Factoring:

1. $16x^2 - 9 = 0$

$$(4x - 3)(4x + 3) = 0$$

$$4x - 3 = 0 \qquad 4x + 3 = 0$$

$$x = \frac{3}{4} \qquad x = -\frac{3}{4}$$

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

$$x^2 - 10x + 25 = 0$$

$$(x - 5)(x - 5) = 0$$

$$x - 5 = 0 \qquad x - 5 = 0$$

$$x = 5 \qquad x = 5$$

By Square roots (leave your answer in simplest radical form.

3. $-4x^2 + 2 = -14$

$$\phantom{-4x^2} -2 \quad -2$$

$$\frac{-4x^2}{-4} = \frac{-16}{-4}$$

$$\sqrt{x^2} = \sqrt{4}$$

$$x = \pm 2$$

4. $75 = -x^2$

$$\frac{}{-1} \qquad \frac{}{-1}$$

$$\sqrt{-75} = \sqrt{x^2}$$

$$\pm \sqrt{-1}\sqrt{25}\sqrt{3} = x$$

$$\pm 5i\sqrt{3} = x$$