

FOIL

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

$$8i^2 - 10i + 12i - 15$$

$$8i^2 + 2i - 15$$

$$8(-1) + 2i - 15$$

$$-8 + 2i - 15 =$$

$$\boxed{i^2} = i \cdot i = \boxed{-1}$$

$$\downarrow$$

$$\sqrt{-1} \cdot \sqrt{-1} = -1$$

$$\begin{array}{cc} \text{real} & \text{imaginary} \\ \downarrow & \downarrow \\ \boxed{-23 + 2i} \end{array}$$

$$(8 - 3i)(4 + 2i)$$

$$32 + 16i - 12i - 6i^2$$

$$\downarrow \downarrow$$

$$-6(-1)$$

$$32 + 16i - 12i + 6$$

$$\boxed{38 + 4i}$$

$$ax^2 + bx + c$$
$$x^2 + 20x + 75 = 0$$

Find the vertex
Quadratic Formula

$$1.) \boxed{h = \frac{-b}{2a}}$$

$$a=1 \quad b=20 \quad c=75$$

$$\frac{-20}{2(1)} = \frac{-20}{2} = -10$$

h

Vertex: (h, k) **Discriminant**

to find k value

$$x^2 + 20x + 75$$

↓

$$(-10)^2 + 20(-10) + 75$$

$$100 - 200 + 75 = -100 + 75 = -25$$

$$\boxed{(-10, -25)}$$

2.) Find the zeros → take the average

$$x^2 + 20x + 75 = 0$$

$$\frac{5}{5} * \frac{15}{15} = 75$$

$$\frac{5}{5} + \frac{15}{15} = 20$$

$$(x+5)(x+15)$$

$$\downarrow$$
$$-5$$

$$\downarrow$$
$$-15$$

$$h = \frac{-5 + (-15)}{2} = \frac{-20}{2} = -10$$

$$k = \frac{-10}{-10} \frac{-10}{-10} (x+5)(x+15)$$
$$(-10+5)(-10+15) = (-5)(5) = -25$$
$$\boxed{(-10, -25)}$$

Completing the Square!

$$x^2 + 20x + 75 = 0$$

$$(x^2 + 20x) + 75 = 0$$

$$b=20$$

$$+100$$

$$-100$$

$$\left(\frac{20}{2}\right)^2 = 10^2 = 100$$

1.) 2020 it

*2.) Factor out the "a"

$$3.) \left(\frac{b}{2}\right)^2$$

4.) Square roots

$$(x^2 + 20x + 100) + 75 - 100 =$$

$$(x^2 + 20x + 100) - 25$$

$$(x + 10)^2 - 25$$

opposite

$$(-10, -25) \text{ vertex}$$

vertex form

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

$$\text{vertex: } (h, k)$$

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

$$+25 \quad +25$$

$$\sqrt{(x + 10)^2} = \sqrt{25}$$

$$x + 10 = \pm 5$$

$$x + 10 = \pm 5$$

$$-10 \quad -10$$

$$x = -10 \pm 5$$

$$-10 + 5 \quad -10 - 5$$

$$\textcircled{-5}$$

$$\textcircled{-15}$$

$$x^2 + 16x + 48 = 0$$

$$(x^2 + 16x) + 48 = 0$$

$$\left(\frac{16}{2}\right)^2 = 8^2 = 64$$

$$(x^2 + 16x + 64) + 48 - 64 = 0$$

$$(x^2 + 16x + 64) - 16$$
$$\boxed{(x+8)^2 - 16}$$

Find zeros

$$(x+8)^2 - 16 = 0$$

$$+16 \quad +16$$

$$\sqrt{(x+8)^2} = \sqrt{16}$$

$$x+8 = \pm 4$$

$$-8 \quad -8$$

$$x = -8 \pm 4$$

$$-8 + 4$$
$$\textcircled{-4}$$

$$-8 - 4$$
$$\textcircled{-12}$$

Convert to vertex form.

1.) zero it

2.) factor out "a"

3.) $\left(\frac{b}{2}\right)^2 \rightarrow$ add inside
sub outside

4.) Square root
first and last

Vertex: (h, k)

$$(-8, -16)$$

$$2x^2 + 8x + 6 = 0$$

$$\left(\frac{2x^2}{2} + \frac{8x}{2}\right) + 6 = 0$$

$$2(x^2 + 4x) + 6 = 0$$

$$\left(\frac{4}{2}\right)^2 = 4$$

+4

-4(2)

1.) 2020 it

2.) Factor out "a"

3.) $\left(\frac{b}{2}\right)^2$

4.) Square first ¹/₃ root last

$$2(x^2 + 4x + 4) + 6 - 8 = 0$$

$$2(x^2 + 4x + 4) - 2 = 0$$

$$\sqrt{x^2} \downarrow \downarrow \quad \swarrow \sqrt{4}$$

$$2(x+2)^2 - 2 = 0$$

vertex: (-2, -2)

$$2(x+2)^2 - 2$$

opposite ↪