S-A2 Algebra 2 Session 20 8/8

Complex Numbers (Real ± Imaginary)

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

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

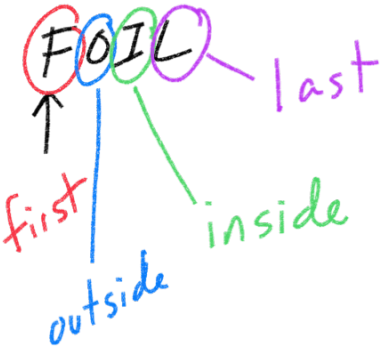
$-8 - 10i + 12i - 15$

$8i^2 = 8(-1) = -8$

$i^2 = -1$

$\boxed{-23 + 2i}$

FOIL



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

FOIL

$i^2 = -1$

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

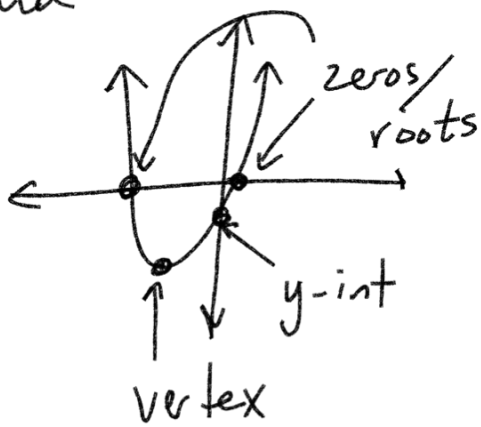
$-6(-1)$

$32 + 16i - 12i + 6$

$\boxed{4i + 38}$

$x^2 + 20x + 75 = 0$ ← Needs to be ϕ

Zeros/roots → factor
→ quadratic formula



Factor

$15 * 5 = 75$

$15 + 5 = 20$

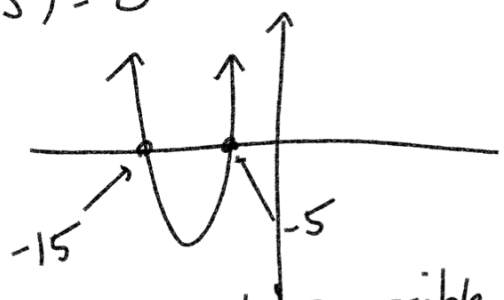
$x^2+20x+75 = (x+15)(x+5) = 0$

$(x+15)(x+5) = 0$

$x+15=0$ $\quad$ $x+5=0$

$-15\ -15$ $\quad$ $-5\ -5$

$\boxed{x=-15}$ $\quad$ $\boxed{x=-5}$



up to 2 possible solutions

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

Quadratic formula

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

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

Discriminant

b^2-4ac

$b^2-4ac>0$ → 2 reals

$b^2-4ac=0$ → 1 real

$b^2-4ac<0$ → 0 reals

$$\frac{-20 \pm \sqrt{(20)^2-4(1)(75)}}{2(1)}$$

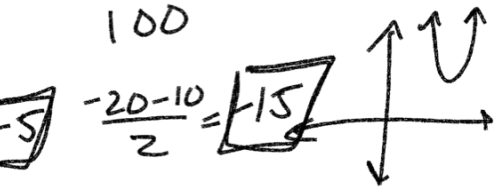
$(20)^2-4(1)(75)$

$400-300$

100

$$\frac{-20 \pm \sqrt{400-300}}{2} = \frac{-20 \pm \sqrt{100}}{2}$$

$\frac{-20 \pm 10}{2}$ $\quad$ $\frac{-20+10}{2} = \boxed{-5}$ $\quad$ $\frac{-20-10}{2} = \boxed{-15}$



$x^2+20x+75=0$ Zeros/Roots: $-5, -15$

$a=1 \quad b=20 \quad c=75$ Vertex: (h,k)

vertex: $(-10,-25)$ since parabola is symmetrical

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

h = average of zeros $= \frac{-5+-15}{2} = \frac{-20}{2} = -10$

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

$100-200+75$

$-100+75=-25$

Vertex form

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

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

Completing the Square → vertex form

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

1.) zero it

2.) factor out "a"

3.) $\left(\frac{b}{2}\right)^2$ and add/sub

4.) factor square

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

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

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

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

$+100 \quad -100$

$(x^2+20x+100)+75-100=0$

$\sqrt{x^2} \quad \sqrt{100}$

$-25=0$

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

Solve for x

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

$+25 \quad +25$

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

$x+10 = \pm 5$

$-10 \quad -10$

$x = -10 \pm 5$

$-10+5 = -5$ $\qquad$ $-10-5 = -15$

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

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

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

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

$+64 \quad -64$

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

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

1.) zero it

2.) Factor out "a"

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

4.) Factor square

vertex: (h,k) $(-8,-16)$

zeros/roots

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

$+16 \quad +16$

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

$x+8 = \pm 4$

$-8 \quad -8$

$x = 4-8 = -4$

$x = -4-8 = -12$

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

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

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

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

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

$+4 \quad 2(-4) = -8$

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

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

$\boxed{2(x+2)^2 - 2 = 0}$ vertex form

1.) zero it

2.) factor out a

3.) $\left(\frac{b}{2}\right)^2$ careful for a add/sub

4.) factor square

$3x^2 + 6x - 12 = 0$

Complete the Square

1.) ✓ 2020 it

2.) ✓ factor out a

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

4.) factor square

$\left(\frac{3x^2}{3} + \frac{6x}{3}\right) - 12 = 0$

$3(x^2 + 2x) - 12 = 0$

$\left(\frac{2}{2}\right)^2 = 1$ $+1$ $3(-1) = -3$

$3(x^2 + 2x + 1) - 12 - 3 = 0$

$\sqrt{x^2}$ $\sqrt{1}$

$\boxed{3(x+1)^2 - 15 = 0}$

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

Vertex: (h, k)

$(-1, -15)$

$3(x+1)^2 - 15 = 0$

$+15 \quad +15$

$\frac{3(x+1)^2}{3} = \frac{15}{3}$

$\sqrt{(x+1)^2} = \sqrt{5}$

$x + 1 = \pm\sqrt{5}$

$-1 \quad -1$

$\boxed{x = -1 \pm \sqrt{5}}$

$-1 + \sqrt{5}$ and $-1 - \sqrt{5}$