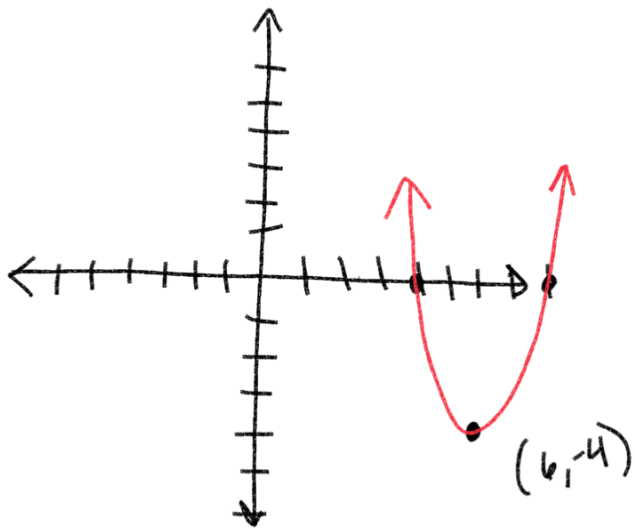


S-A2 Algebra 2

Session 18 8/2

1.) $x^2 - 12x + 32$



a) Find the vertex (h, k)

$$h = \frac{-b}{2a}$$

$$a=1 \quad b=-12 \quad c=32$$

$$h = \frac{-(-12)}{2(1)} = \frac{12}{2} = 6$$

$$h=6$$

$$x^2 - 12x + 32 = y$$

$$(6)^2 - 12(6) + 32 = y$$

$$36 - 72 + 32 = y$$

$$-36 + 32 = y$$

$$-4 = y$$

$$k=-4$$

b) Put into vertex form

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

$$y = (x-6)^2 - 4$$

c) Find the zeros.

$$y = (x-6)^2 - 4$$

$$y=0$$

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

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

$$x-6 = \pm 2$$

$$x = 6 \pm 2$$

$$6+2 \quad 6-2$$

$$x = 8 \text{ and } 4$$

$$1.) \quad x^2 - 12x + 32 = 0$$

$$\left. \begin{array}{l} -8 + -4 = -12 \\ -8 * -4 = +32 \end{array} \right\}$$

Note: \oplus same sign!
both are negative

$$x^2 - 12x + 32 = (x-8)(x-4) = 0$$

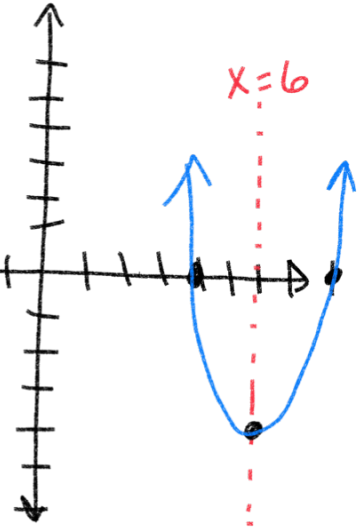
$$(x-8)(x-4) = 0$$

$$\begin{array}{r} x-8=0 \\ +8 \quad +8 \\ \hline x=8 \end{array}$$

$$\begin{array}{r} x-4=0 \\ +4 \quad +4 \\ \hline x=4 \end{array}$$

$$x=8$$

$$x=4$$



General property of parabolas
symmetrical

Average of the zeros

$$\frac{8+4}{2} = \frac{12}{2} = \boxed{6} \quad h=6$$

$$h=6 \quad k=-4$$

$$\text{Vertex: } (6, -4)$$

$$\begin{array}{l} x^2 - 12x + 32 = (x-8)(x-4) \\ (6)^2 - 12(6) + 32 \\ 36 - 72 + 32 \\ -36 + 32 = \boxed{-4} \end{array} \quad \begin{array}{l} (6-8)(6-4) \\ \downarrow \quad \downarrow \\ (-2)(2) \\ \boxed{-4} \end{array}$$

2.) $X^2 - 6X - 16 = 0$
 $\rightarrow ax^2 - bx + c$

a) Find vertex (3, -25)
 $a=1$ $b=-6$ $c=-16$
 $h = \frac{-b}{2a}$

$h = \frac{-(-6)}{2(1)} = \frac{6}{2} = 3$ h=3

$(3)^2 - 6(3) - 16$
 $9 - 18 - 16$
 $-9 - 16 = -25$ $k = -25$

c) Find zeros/roots
 $y=0$

$(x-3)^2 - 25 = 0$
 $\quad \quad \quad +25 \quad +25$
 $\sqrt{(x-3)^2} = \sqrt{25}$

$x-3 = \pm 5$ $x = 3+5$ $3-5$
 $\quad \quad \quad +3 \quad +3$ 8, -2

$x^2 - 6x - 16 = 0$ θ different signs
Factor

$\frac{-8}{-8} + \frac{2}{2} = \frac{-6}{-6}$

$\frac{-8}{-8} * \frac{2}{2} = \frac{-16}{-16}$

$(x-8)(x+2) = 0$
 $\downarrow \quad \quad \downarrow$
 $x-8=0$ $x+2=0$
 $\quad \quad +8 \quad +8$ $\quad \quad -2 \quad -2$
x=8 x=-2

$\left\{ h = \text{average of zeros} = \frac{8+(-2)}{2} = \frac{6}{2} = 3 \right.$

$$x^2 + 10x + 3 = -18$$

$$x^2 + 10x + 21 = 0$$

axis of symmetry now factor!

$$h = \frac{-7 + (-3)}{2} = \frac{-10}{2} = -5$$

$$h = \frac{-b}{2a} = \frac{-10}{2(1)} = -5$$

$$x + 7 = 0$$

$$x = -7$$

Factor → finding zeros

$$\underline{7} + \underline{3} = \underline{10}$$

$$\underline{7} * \underline{3} = \underline{21}$$

$$(x+7)(x+3) = 0$$

$$x+3 = 0$$

$$x = -3$$

$$x^2 - 2x + 35 = 50$$

$$x^2 - 2x - 15 = 0$$

$$(x-5)(x+3) = 0$$

$$x-5 = 0$$

$$x = 5$$

$$x+3 = 0$$

$$x = -3$$

Factor / find zeros.

$$\underline{-5} + \underline{3} = \underline{-2}$$

$$\underline{-5} * \underline{3} = \underline{-15}$$

$$\frac{2x^2}{2} + \frac{18x}{2} + \frac{40}{2} = \boxed{\frac{0}{2}}$$

$$\underline{4} + \underline{5} = 9$$

$$x^2 + \boxed{9x} + \boxed{20} = 0$$

$$\underline{4} * \underline{5} = 20$$

$$2(x+4)(x+5) = 0$$

$$x+4=0$$

$$\begin{matrix} -4 & -4 \end{matrix}$$

$$\boxed{x = -4}$$

$$x+5=0$$

$$\begin{matrix} -5 & -5 \end{matrix}$$

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

square
↓
difference
perfect square

$$x^2 - 49 = 0$$

$$\begin{matrix} +49 & +49 \end{matrix}$$

$$\sqrt{x^2} = \sqrt{49}$$

$$\boxed{x = \pm 7}$$

two possible answers

$$x^2 - 81 = 0$$

$$\begin{matrix} +81 & +81 \end{matrix}$$

$$\sqrt{x^2} = \sqrt{81}$$

$$x = \pm 9$$

$$\boxed{x = -9, 9}$$

Difference of Squares

$$x^2 - 49 = 0$$

$$\downarrow \quad \downarrow$$

$$(x)^2 - (7)^2 = 0$$

$$(x-7)(x+7) = 0$$

$$x^2 - 81 = (x-9)(x+9)$$

$$\frac{3x^2}{3} - \frac{75}{3} = \frac{0}{3}$$

$$x^2 - 25 = 0$$

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

$$\boxed{x = \pm 5}$$

$$x^2 - 25 = 0$$
$$+25 \quad +25$$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5$$

PANIC BUTTON

Quadratic Formula

$$2x^2 - x - 45 = 0$$

$$a = 2 \quad b = -1 \quad c = -45$$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-45)}}{2(2)}$$

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

$$\frac{1 \pm \sqrt{1 + 360}}{4} = \frac{1 \pm \sqrt{361}}{4} = \frac{1 \pm 19}{4}$$

$$\frac{1+19}{4} = \frac{20}{4} = 5 \quad \frac{1-19}{4} = \frac{-18}{4} = \boxed{\frac{-9}{2}}$$

$$3x^2 - 8x - 12 = 0$$

$$a=3 \quad b=-8 \quad c=-12$$

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

$$\frac{-(-8) \pm \sqrt{(-8)^2 - 4(3)(-12)}}{2(3)} =$$

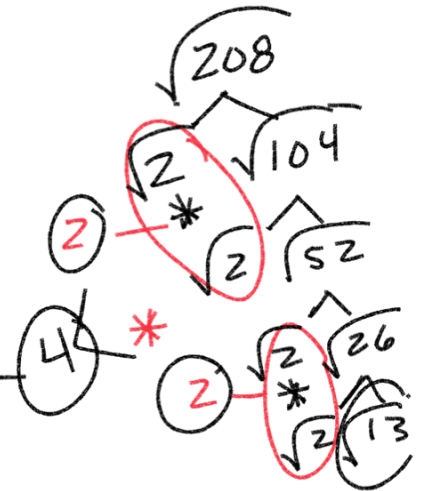
$$\sqrt{208} = 4\sqrt{13}$$

$$\frac{8 \pm \sqrt{64 + 144}}{6}$$

$$= \frac{8 \pm \sqrt{208}}{6}$$

$$\frac{8 \pm 4\sqrt{13}}{6}$$

$$\boxed{\frac{4 \pm 2\sqrt{13}}{3}}$$



$$\sqrt{208}$$

$$\sqrt{16 \cdot 13}$$

$$4\sqrt{13}$$