

COMPLETING THE SQUARE

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

$$x+2 = \pm 5$$

$$x = -2 \pm 5$$

$$x = 3, -7$$

$$(x+3)^2 = x^2 + \underline{6x} + 9$$

$$(x+3)(x+3)$$

$$(x-4)^2 = x^2 - \underline{8x} + 16$$

$$x^2 + 10x + \underline{25} = (x+5)^2$$

$$x^2 - 20x + \underline{100} = (x-10)^2$$

$$x^2 - 7x \quad \quad = (\quad)^2$$

$$x^2 - 6x - 1 = 0$$

$$x^2 - 6x + 9 = 1 + 9$$

$$\sqrt{(x-3)^2} = \sqrt{10}$$

$$x-3 = \pm \sqrt{10}$$

$$x = 3 \pm \sqrt{10}$$

$$\frac{4x^2}{4} + \frac{40x}{4} + \frac{280}{4} = 0$$

$$x^2 + 10x + 70 = 0$$

$$x^2 + 10x + 25 = -70 + 25$$

$$\therefore \sqrt{(x+5)^2} = \sqrt{-45}$$

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

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

QUADRATIC FORMULA

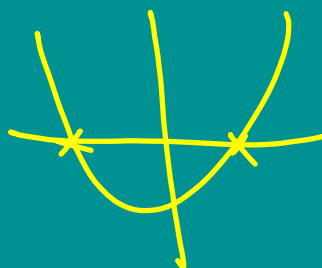
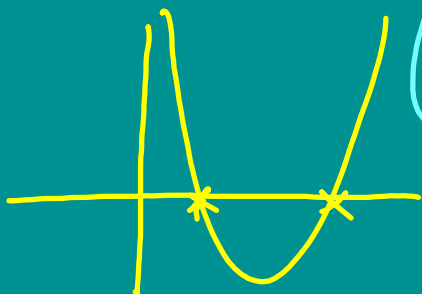
$$ax^2 + bx + c = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = \frac{b^2}{4a^2} - \frac{c}{a} + \frac{b^2}{4a^2}$$

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

$b^2 - 4ac$
Discriminant



$\sqrt{\text{imaginary}}$

$$2x + 4x^2 = 1$$

$$4x^2 + 2x - 1 = 0$$

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

$$= \frac{-2 \pm \sqrt{4 + 16}}{8}$$

$$= \frac{-2 \pm \sqrt{20}}{8} \quad \swarrow 4.5$$

$$= \frac{-2 \pm 2\sqrt{5}}{8}$$

$$= \frac{-1 \pm \sqrt{5}}{4}$$

PROJECTILE MOTION

$$h(t) = \frac{1}{2}at^2 + V_0t + S_0$$

$f(x)$
 $h(t)$ height
 t time
 a accel. of gravity
 V_0 initial Velocity
 S_0 initial position

$$a = -32 \frac{\text{ft}}{\text{s}^2}$$

$$a = -9.8 \frac{\text{m}}{\text{s}^2}$$



$$h(t) = \frac{1}{2}(-32)t^2 + 2500t + 9$$

$$h(t) = -16t^2 + 2500t + 9$$



Find maximum height.

Vertex: $x = t = -\frac{b}{2a}$
 $h = \text{sub in } t$

$$t = x = -\frac{2500}{2(-32)} = 78.125 \text{ sec}$$

$$h(78.125) = -16(78.125)^2 + 2500(78.125) + 9$$

$$= 97,665.25 \text{ ft}$$

How long to ground?

ground $h = 0$

$$0 = -16t^2 + 2500t + 9$$

$$t = \frac{-2500 \pm \sqrt{(2500)^2 - 4(-16)(9)}}{2(-16)}$$

$$t = -\cancel{0.0036}$$

$$t = 156.25 \text{ sec}$$