COMPLETING THE SQUARE

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

$$x+2 = \pm 5$$

$$x = -2 \pm 5$$

$$\boxed{x = -7 \qquad x = 3}$$

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

$$(x-7)^2 = x^2 - 14x + 49$$

-7

$$x^2 + 10x + 25 = (x+5)^2$$

$+5$

$$x^2 - 20x + 100 = (x-10)^2$$

-10

$$x^2 - 7x + \frac{49}{4} = \left(x - \frac{7}{2}\right)^2$$

$-\frac{7}{2}$

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

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

-3

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

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

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

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

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

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

$+5$

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

$9 \cdot 5$

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

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

October 30, 2024

QUADRATIC FORMULA

$$\frac{ax^2}{a} + \frac{bx}{a} + \frac{c}{a} = \frac{0}{a}$$

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

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

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

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

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

$$\underset{a}{4}x^2 + \underset{b}{2}x \underset{c}{-1} = 0$$

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

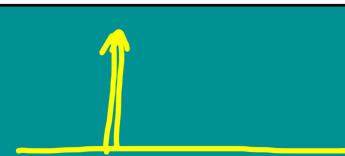
$$x = \frac{-2 \pm \sqrt{4 + 16}}{8}$$

$$= \frac{-2 \pm \sqrt{20}}{8} \quad 4 \cdot 5$$

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

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

PROJECTILE MOTION

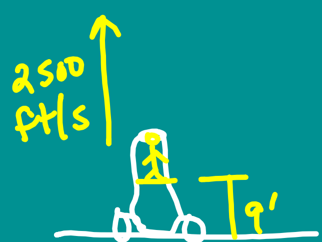


$$h(t) = \frac{1}{2}at^2 + V_0 t + S_0$$

h ← height; t ← time; a ← accel. of gravity; V_0 ← initial velocity; S_0 ← initial position

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

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



$$h(t) = \frac{1}{2}(-32)t^2 + 2500t + 9$$
$$= -16t^2 + 2500t + 9$$

Find maximum height.

Find Vertex. $t = -b/2a$

$$t = \frac{-b}{2a} = \frac{-2500}{2(-16)}$$

$$t = 78.125 \text{ sec}$$

$$h(78.125) = -16(78.125)^2 + 2500(78.125) + 9$$
$$= 97{,}665.25 \text{ ft}$$

How long to ground?

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

Solve.

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

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

$t = 156.25 \text{ sec}$

$\approx 2.6 \text{ min}$