More Applications of Quadratics

Projectile Motion

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

$a = -9.8 \, m/s^2$

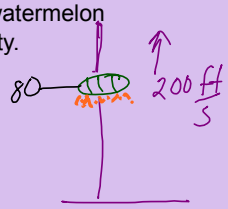
$h(t) = \frac{1}{2} a t^2 + V_0 t + S_0$

height, time, accel of gravity, initial Velocity, initial position

A rocket propelled watermelon launcher lifts a watermelon to 80 ft. before the engine burn out. After that point the watermelon continues to rise and fall due the effects of gravity.

$h(t) = \frac{1}{2}(-32)t^2 + 200t + 80$

$h(t) = -16t^2 + 200t + 80$



How high will it rise?

$t_x = -\frac{b}{2a} = \frac{-200}{2(-16)}$

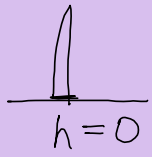
$t = 6.25$ sec

$h(6.25) = -16(6.25)^2 + 200(6.25) + 80$

$= 705$ ft

$-16t^2 + 200t + 800 \mid t = 6.25$ ctrl =

How many seconds will it take it to hit the ground after the rockets burn out?

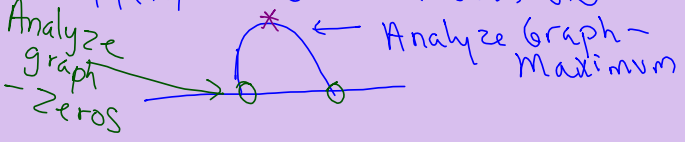


$0 = -16t^2 + 200t + 80$

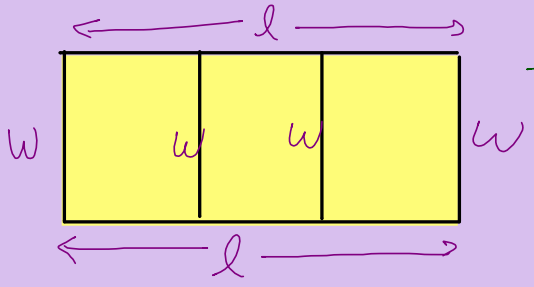
$t = \frac{-200 \pm \sqrt{200^2 - 4(-16)(80}}{2(-16)}$

$t =$

$f_1(x) = -16x^2 + 200x + 80$



Llama Larry raises llamas and plans to create a new fenced in area for the llamas. He plans to build a rectangular pen and then divide it with two additional fences inside to create 3 separate pens. He has 3000 feet of fence to use. What dimensions should he use to build the outer rectangle in order to maximize the area enclosed?



Vertex!

$2l + 4w = 3000$

$A = lw$

$\frac{2l}{2} = \frac{3000}{2} - \frac{4w}{2}$

$l = 1500 - 2w$

$A = (1500 - 2w)w$

$A = 1500w - 2w^2$

$A = -2w^2 + 1500w + 0$

Vertex: $w = -\frac{b}{2a} = \frac{-1500}{2(-2)}$

$w = 375$

$l = 1500 - 2w$

$l = 1500 - 2(375)$

$= 750$

375' x 750'

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