$$h(t) = \tfrac{1}{2} g t^2 + v_0 t + s_0$$

g is the acceleration due to gravity

$(-32\ feet/sec^2\ or\ -9.8\ meters/sec^2)$

v_0 is the initial velocity,

s_0 is the initial position,

t is the time

1) A person is standing on top of the Tower of Pisa and throws a ball directly upward with an initial velocity of 96 feet per second. The height of the Tower of Pisa is 176 feet.

a) What are the functions for the position, velocity, and the acceleration of the ball?

b) When does the ball hit the ground and at what velocity?

c) What is its velocity when its position is 150 feet?

d) How far does the ball travel during its flight?

n is standing on top of the Tower of Pisa and throws
ctly upward with an initial velocity of 96 feet per
he height of the Tower of Pisa is 176 feet.
at are the functions for the position, velocity, and
celeration of the ball?
en does the ball hit the ground and at what
ty? (h = 0)
at is its velocity when its position is 150 feet?
w far does the ball travel during its flight?

$v_0 = 96$ ft/sec
$s_0 = 176$ ft
$g = -32$ ft/sec^2

a) $h(t) = \frac{1}{2}gt^2 + v_0 t + s_0$

$s(t) = \frac{1}{2}(-32)t^2 + 96t + 176$

$s(t) = -16t^2 + 96t + 176$

$v(t) = -32t + 96$

$a(t) = -32$

b) $-16t^2 + 96t + 176 = 0$

$t = 7.472$ sec.

$v(7.472) = -32(7.472$

$v(7.472) = -143.10$

her person is standing on top of a different building
112 feet high. This person throws a rock vertically
with an initial velocity of 84 feet per second.
What are the functions for the position, velocity, and
acceleration of the rock?
When does the rock hit the ground and at what is the
act velocity?
When is the velocity zero? What is the significance of
time?
How far does the rock travel during its flight?

a) $s(t) = -16t^2 + 84t + 112$

$v(t) = -32t + 84$

$a(t) = -32$

b) $0 = -16t^2 + 84t + 112$

$t = 6.352$ sec

$v(6.352) = -32(6.352) + 84$

$= -119.264$ ft/s

c) $v(t) = -32t + 84$

$0 = -32t + 84$

$-84 = -32t$

$t = 2.625$ sec

d) $s(2.625) = 222.25$

up = 110.25

down = 222.25

332.5 ft

PVA (Position/Velocity/Acceleration)

- each equation is based on time (t)

Position - gives the location of the object at a given time. ($f(x)$)
$s(t)$

Velocity: how fast the object is moving at a given time. ($f'(x)$)
$v(t)$

Acceleration: how fast the object's velocity is increasing at a given time
$a(t)$

is its velocity when its position is 150 feet?
ar does the ball travel during its flight?

c) $s(t) = \underset{a}{-16}t^2 + \underset{b}{96}t + \underset{c}{176}$

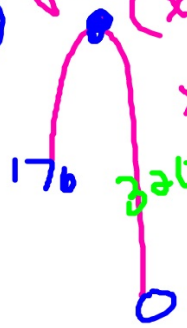
$150 = -16t^2 + 96t + 176$

$t = 6.260$ sec

$v(6.260) = -32(6$

$= -164.32$ f

d) vertex $(\underset{x}{3}, \underset{y}{320})$



$x = \frac{-b}{2a} = \frac{-96}{-32} = 3 = t$

$s(3) = -16 \cdot 3^2 + 96 \cdot 3 + 176$

$= 320$ ft.

$s(0) = 176$

$s(3) = 320$

$s(\text{ond.}) = 0$

Total = 464 ft.