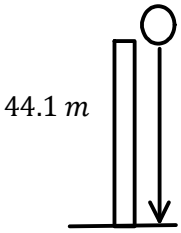
C12 - 2.3 - Ball Drop hva vs t Notes

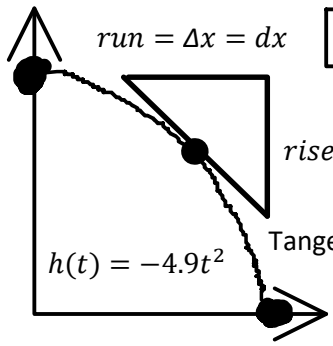
$$\frac{dy}{dx} = y' = f'(x)$$

A ball is dropped off a 44.1 m cliff. Graph height, velocity and acceleration versus time of the ball.



Physics 11

$$\Delta h = v_i t + \frac{1}{2}at^2$$
$$-44.1 = \cancel{0 \times t} + \frac{1}{2}(-9.8)t^2$$
$$-44.1 = \frac{1}{2}(-9.8)t^2$$
$$-44.1 = -4.9t^2$$
$$9 = t^2$$
$$t = 3s$$



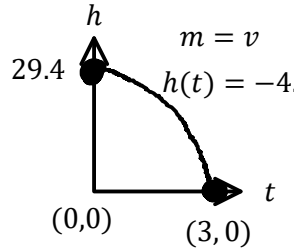
$\Delta = change\ in$

$$m = slope = \frac{rise}{run} = \frac{dy}{dx}$$

Infinitesimally Small

$$\lim_{\Delta x \to 0} f'(x) = m = \frac{dy}{dx}$$

h vs t



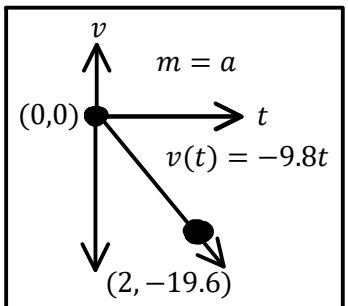
t	h
0	44.1
1	39.2
2	24.5
3	0

$$\Delta h = 4.9t^2$$
$$\Delta h = 4.9(1)^2$$
$$\Delta h = 4.9\ m$$

$$\Delta h = 4.9t^2$$
$$\Delta h = 4.9(2)^2$$
$$\Delta h = 19.6\ m$$

$$\Delta h = 4.9t^2$$
$$\Delta h = 4.9(3)^2$$
$$\Delta h = 44.1\ m$$

v vs t



$m = a = -9.8$
Obviously!

t	v
0	0
1	−9.8
2	−19.6

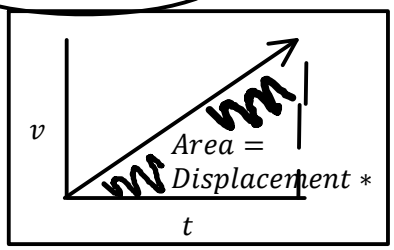
Physics 10

$$v_f = v_i + at$$
$$v_f = at$$
$$v_f = (-9.8)(2)$$
$$v_f = -19.6\frac{m}{s}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{-19.6 - (-9.8)}{2 - 1}$$
$$m = -9.8\frac{m}{s^2}$$

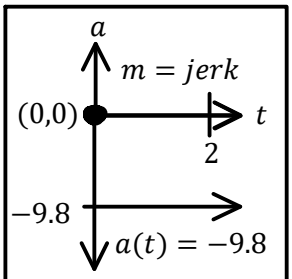
$$A = \frac{bh}{2}$$
$$A = \frac{(2)(-19.6)}{2}$$
$$A = -19.6$$

$$h = -19.6m$$



$$A = lw$$
$$A = vt$$
$$A = d$$

a vs t

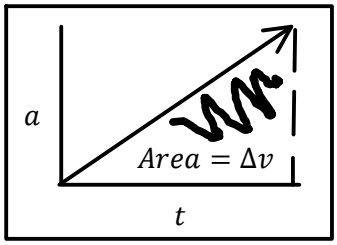


$m = 0\,; \Delta a = 0$
"a" is constant

t	a
0	−9.8
1	−9.8
2	−9.8

$$A = lw$$
$$A = (2)(-9.8)$$
$$A = -19.6$$

$$v = -19.6\frac{m}{s^2}$$



$$A = lw$$
$$A = at$$
$$A = v$$

Derivative

$$h = v_i t + \frac{1}{2}at^2$$
$$v(t) = \frac{d}{dt}h(t) = h'(t) = v_i + at$$
$$a(t) = \frac{d}{dt}v(t) = v'(t) = a = \frac{\Delta v}{\Delta t}$$