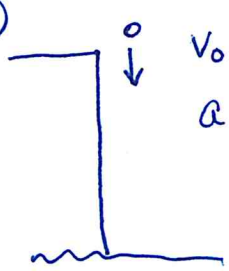
p 55 # 43, 44, 45, 46, 48 10/6/15

(43)



(a) $a = -9.8$ m/s
the pebble is in free fall, so acceleration is due to gravity.

(b) $V_f = V_0 + at$

$V_f = -9 + (-9.8)(0.5s)$

$V_f = -13.9$ m/s didn't really need this

$x_f = x_i + v_i t + \frac{1}{2} a t^2$

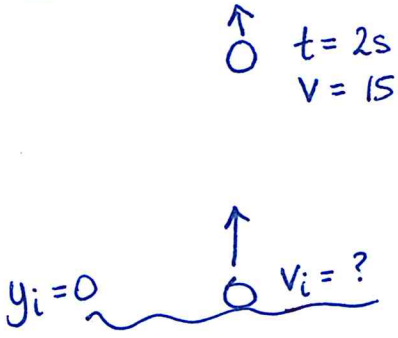
$(x_f - x_i) = \Delta x = v_i t + \frac{1}{2} a t^2$

$= -9(.5) + \frac{1}{2}(-9.8)(.5)^2$

$\Delta x = -5.725$ m

the pebble will be 5.725 m below the cliff top at 5s.

(44)



(a) $V = V_i + at$

$15 = V_i + (-9.8)(2)$

$15 + 19.6 = V_i$

$\boxed{V_i = 34.6 \text{ m/s}}$

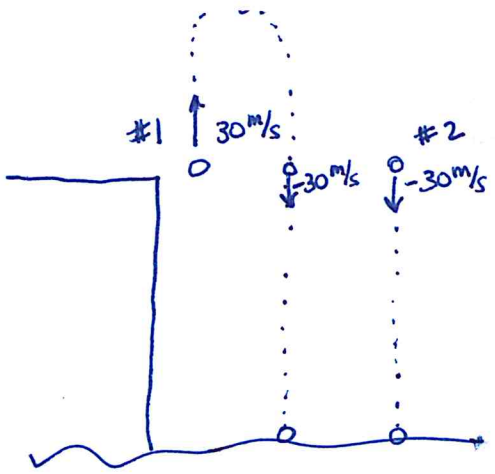
(b) at $t = 5s$

$V = V_i + at$

$V = 34.6 + (-9.8)(5)$

$\boxed{V = -14.4 \text{ m/s}}$ the rock is moving in the downward direction at $t = 5s$.

(45)



Note:
The time it takes pellet #1 to fall from the top of the cliff to the ground is the same as the time it takes pellet #2 to fall from the top to the ground because they both have the same speed at the top of the cliff.

The difference in time is going to come from how long it takes pellet #1 to rise into the air and fall back down to the top of the cliff.

pellet 1: $y_i = 0$

$y_f = 0$

$V_i = 30\ m/s$

method 2:

$y_i = 0$

$y_f = 0$

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

$V_i = 30\ m/s$

$$y_f = y_i + V_i t + \frac{1}{2}at^2$$

$$0 = 0 + 30t + \frac{1}{2}(-9.8)t^2$$

$$4.9t^2 - 30t = 0$$

$$t(4.9t - 30) = 0$$

$t = 0$ or $4.9t - 30 = 0$

$$t = \frac{30}{4.9} = \boxed{6.12\ s}$$

method 1: at the apex, the pellet's velocity = 0. The time it takes to get to the apex is $\frac{1}{2}$ the total time it is rising & falling to the height of the top of the cliff

$$V_f = V_i + at$$

$$0 = 30 + (-9.8)t$$

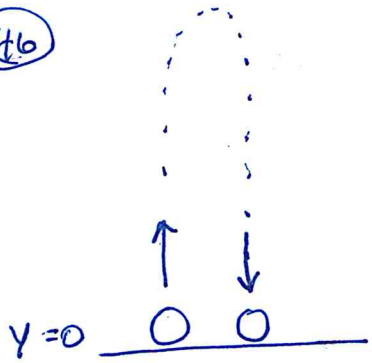
$$9.8t = 30$$

$$t = 3.06\ s$$

time = $2(3.06)$

$= \boxed{6.12\ s}$

(46)



$t = 8s$

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

$v_i = ?$

$y_f = 0$

$y_i = 0$

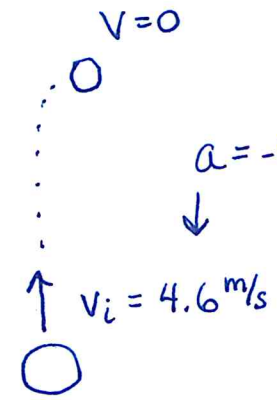
$$y_f = y_i + v_i t + \frac{1}{2}at^2$$

$$0 = 0 + v_i(8) + \frac{1}{2}(-9.8)(8)^2$$

$$-8v_i = -313.6$$

$$\boxed{v_i = 39.2\ m/s}$$

(48)



find t when $v_f = 0$

$$v_f = v_i + at$$

$$0 = 4.6 + (-9.8)t$$

$$9.8t = 4.6$$

$$\boxed{t = 0.47s}$$