9-13-15

(1

comment #28), CH 2

Δx = second displacement =

$= x_3 - x_2 = v_2 \Delta t + \frac{1}{2} a (\Delta t)^2$

$a = -3.06$

NOTE: $a = \frac{v_3 - v_2}{\Delta t}$

OR

alternative method to get Δx.

$v_3^2 = v_2^2 + 2 \cdot a \cdot (x_3 - x_2)$

Δx

$0 = (6.7)^2 + 2(-3.06) \cdot \Delta x$

$\Delta x = \frac{(6.7)^2}{(2)(3.06)} = 6.8 \text{ cm}$

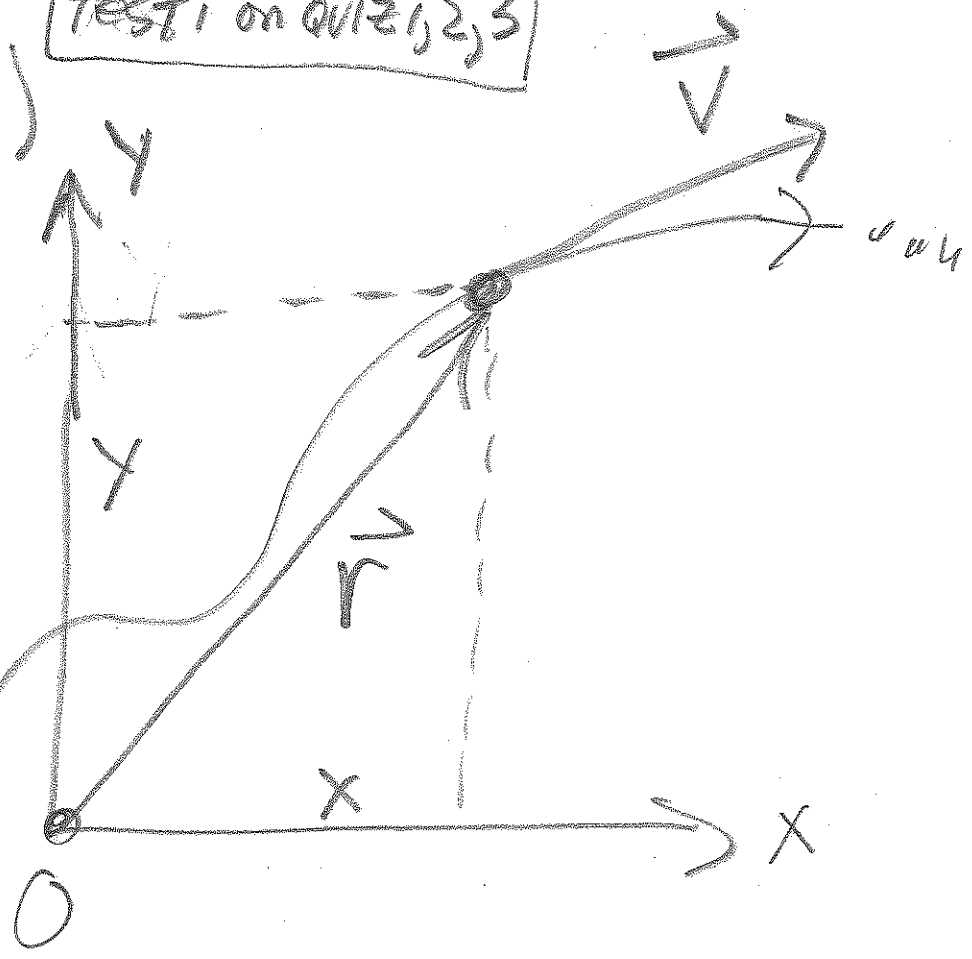
schedule: CH1, 2, 4*, 3 start today.

TEST 1 on Quiz 1, 2, 3

*(more later)

CH3

a fly moves on path shown.

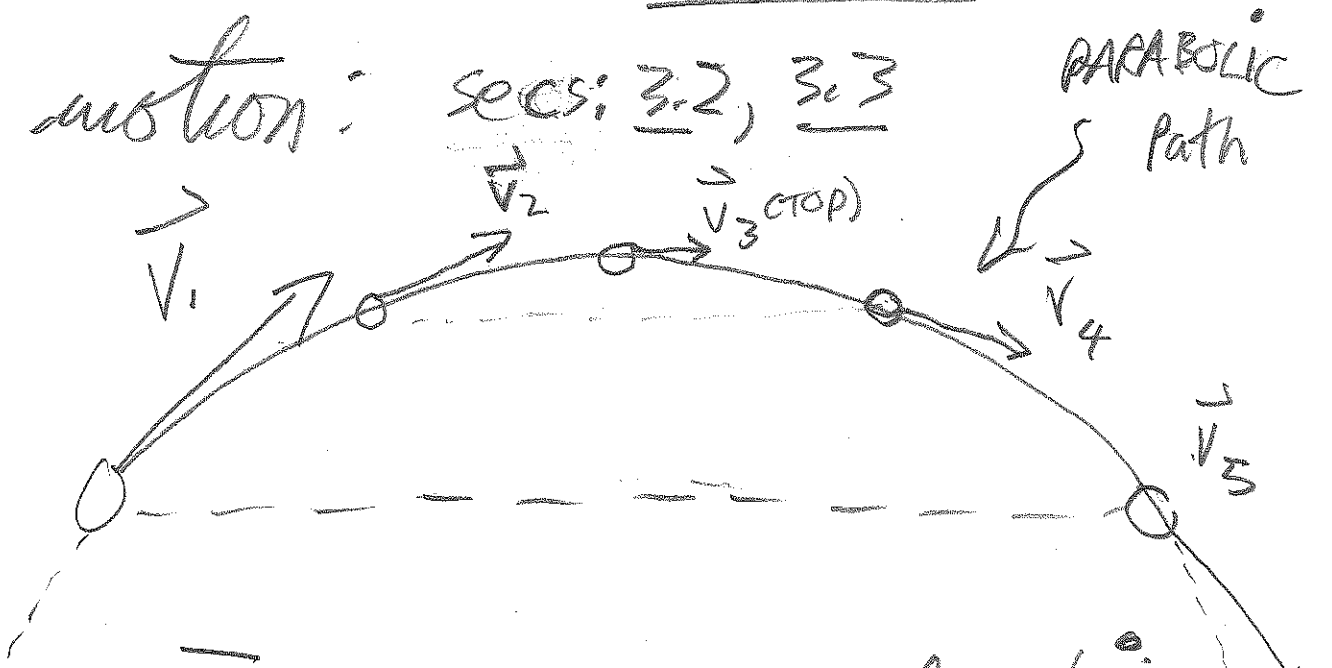


$\vec{r} = (x, y)$

$\vec{v}$ = instantaneous velocity

note: $\vec{v}$ is tangent to curve

acceleration via projectile motion: secs: 3.2, 3.3



$\vec{a}$ = average acceleration.

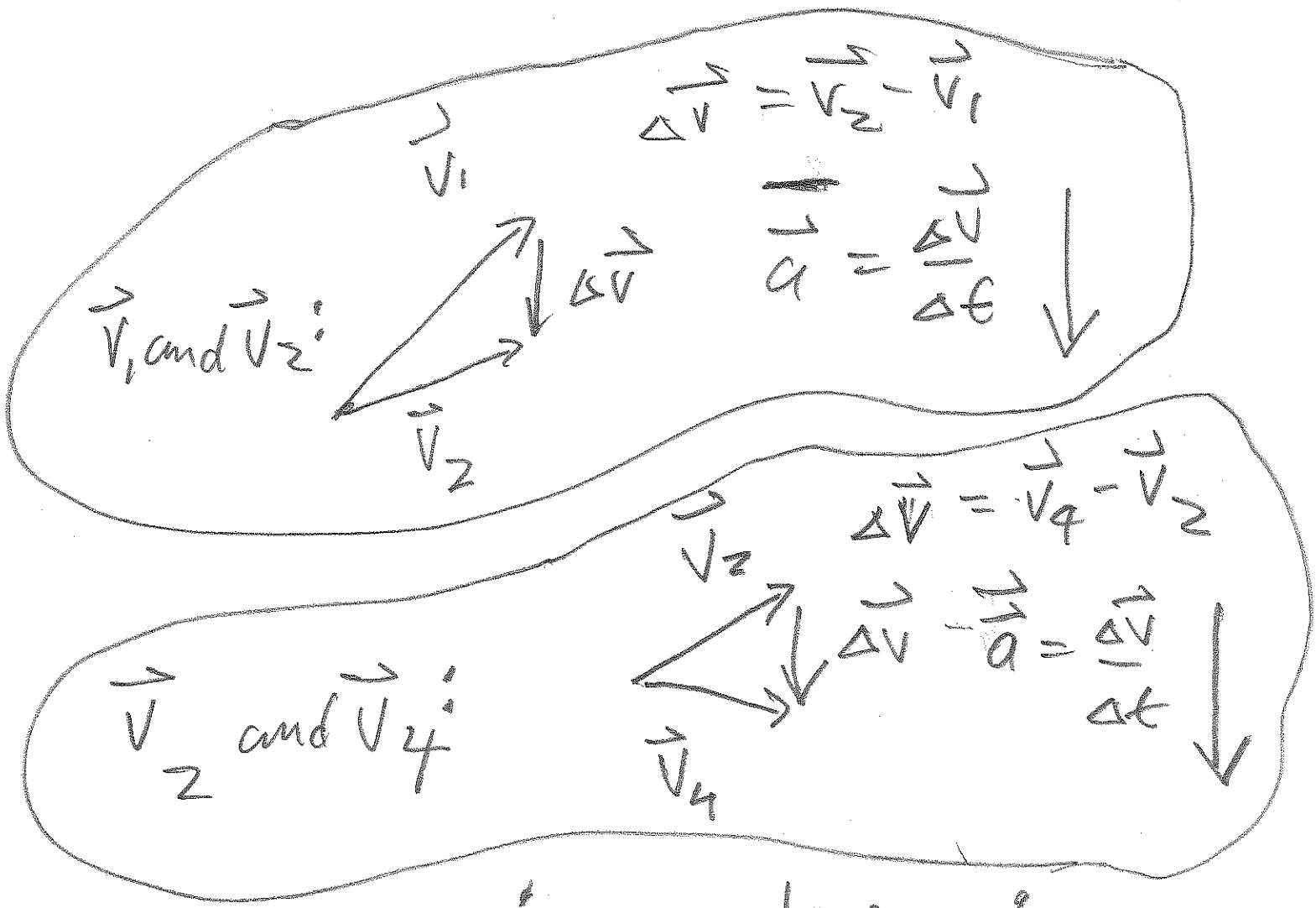
NOTE: only force on ball is its weight, which acts DOWN. Note: weight is constant and $\vec{a}$ is constant. $\vec{a}$ points DOWN.

$\vec{a}$ = instantaneous acceleration.

CH 4, 5: weight = $m\vec{g}$

$|\vec{g}| = 9.8 \frac{m}{s^2}$ $\downarrow \vec{g}$

TO FIND $\vec{a}$ use any 2 pairs of velocities



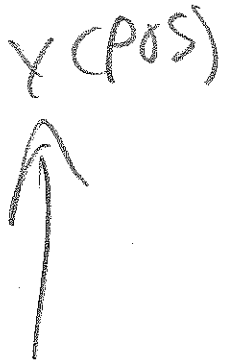
Pick any other pairs: same result. $\vec{a} = \vec{a} = \vec{g}$

$\vec{g} = 9.8 \frac{m}{s^2}$, DOWN

$\vec{g} = (0, -g) = (a_x, a_y)$

$a_x = 0$

$a_y = -g$

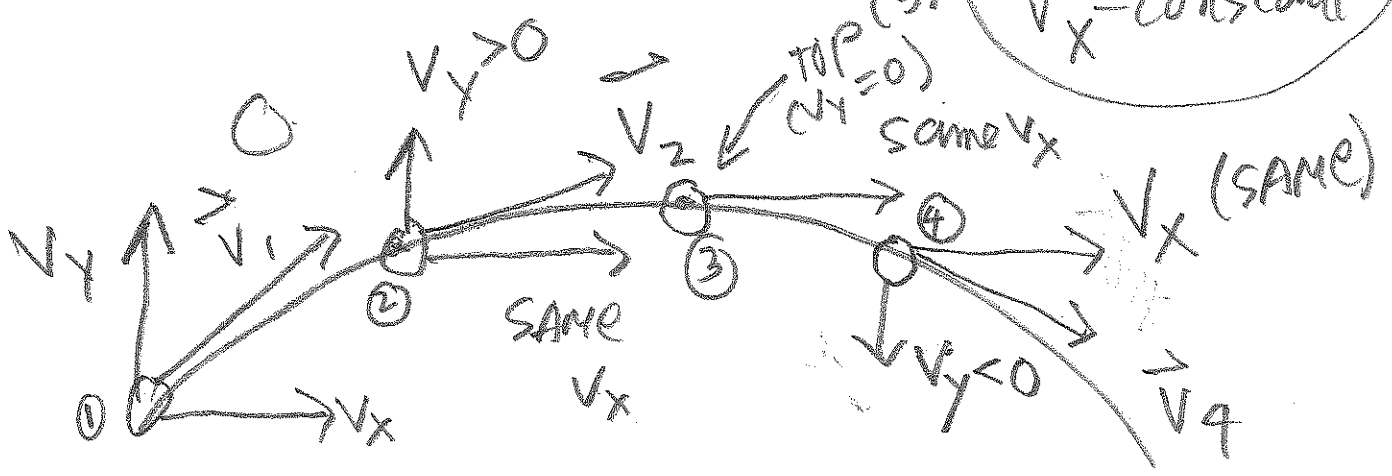


note: IF ↓ y (pos) $\vec{a} = (0, +g)$

IF $a_x = 0$ then V_x = constant

$$a_x = \frac{\Delta V_x}{\Delta t} = 0 \Rightarrow \Delta V_x = 0$$

V_x = constant



classic problems

Equations:

x-motion

$\Delta x = v_x \cdot \Delta t$

v_x = constant

$v_{Ax} = v_{Bx}$

$\Delta t = t_B - t_A$

y-motion

$a_y = -g$

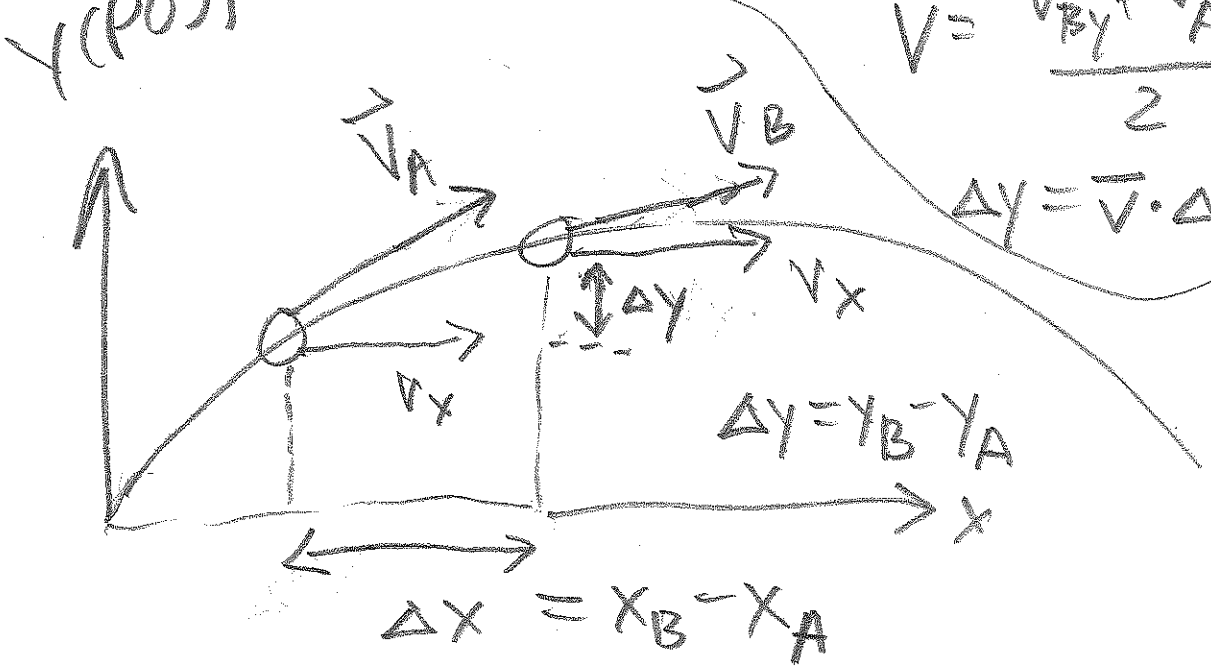
$v_{By} = v_{Ay} - g\Delta t$

$\Delta y = v_{Ay} \cdot \Delta t - \frac{1}{2} g \Delta t^2$

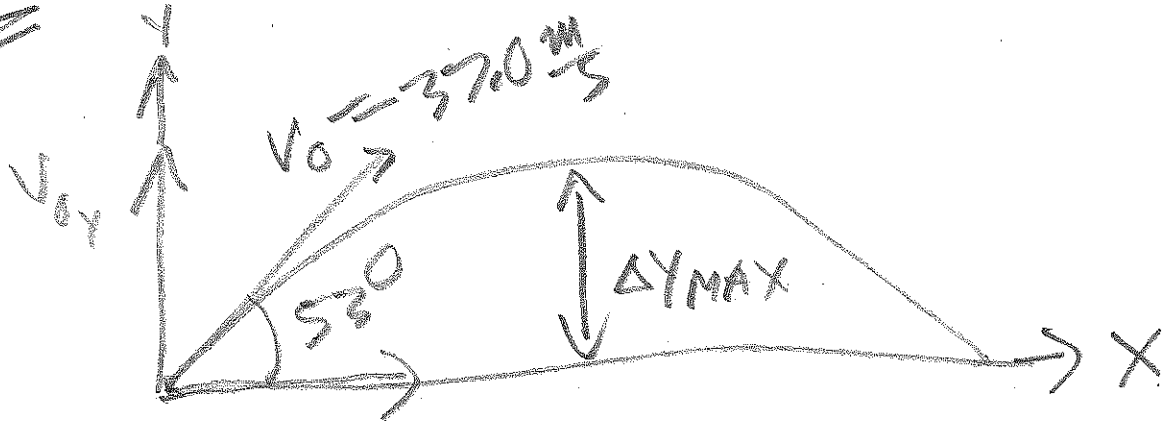
$v_{By}^2 = v_{Ay}^2 - 2g\Delta y$

$\bar{v} = \frac{v_{By} + v_{Ay}}{2}$

$\Delta y = \bar{v} \cdot \Delta t$



Read Example 3.4.



$V_0 = 37.0 \frac{m}{s}$

(b) FIND ΔY_{MAX} and the time to get to top

FAST WAY:

$$V_{TOPY}^2 = V_{0Y}^2 - 2g\Delta Y_{MAX}$$

$$0 = (V_0 \sin 53)^2 - 2g \cdot \Delta Y_{MAX}$$

$V_0 \sin 53 = 29.6 \frac{m}{s}$

$$\Delta Y_{MAX} = \frac{(29.6)^2}{2(9.8)} = 44.7 m$$

Example 3.4 (6

(b) note: $a = -g = \frac{\Delta v_y}{\Delta t}$

$$-g = \frac{v_y(\text{top}) - v_y(0)}{\Delta t}$$

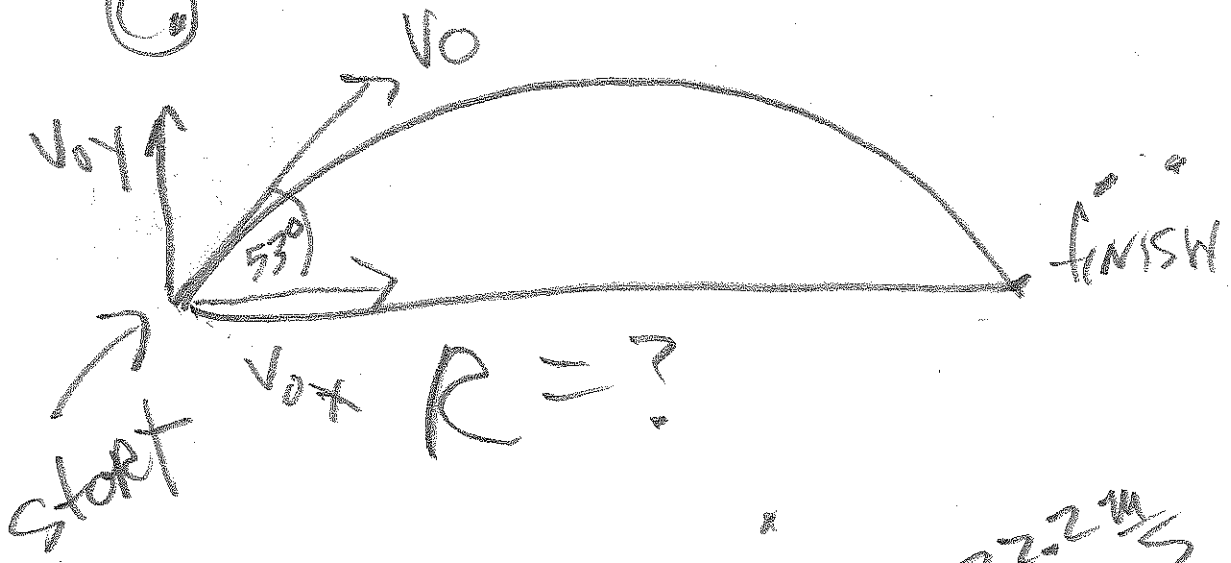
$$\Delta t = \frac{0 - 29.6 \frac{m}{s}}{-g}$$

$$= \frac{0 - 29.6}{-9.8}$$

$$= \frac{-29.6}{-9.8} = 3.02(s)$$

to get to TOP.

(c)



X - MOTION $\approx 22.2 \frac{m}{s}$

$R = \Delta X = V_0 \cos 53 \cdot \Delta t$

Δt = TOTAL TIME

$\Delta y = V_0 \sin 53 \cdot \Delta t - \frac{1}{2} g \Delta t^2$

$0 = \Delta t \cdot \left[V_0 \sin 53 - \frac{1}{2} g \Delta t \right]$

$\Delta t = 0$ (NO) and $\Delta t = \frac{2 \cdot V_0 \sin 53}{g}$

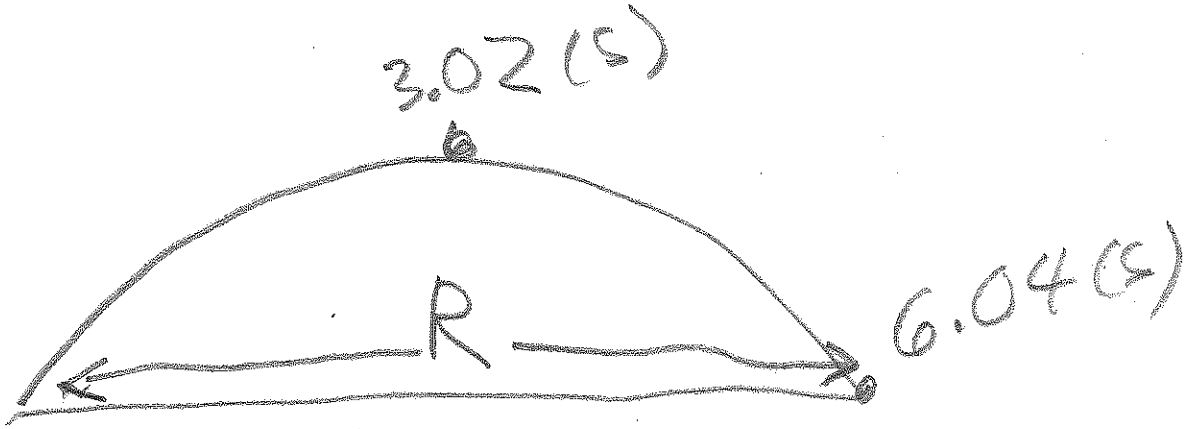
$= 6.04 (s)$

$V_0 \sin 53 = 29.6 \frac{m}{s}$

(10

Note: $6.04 = 2 \cdot (3.02)$

3.02 (s) = time to get to top



$\Delta t_{TOTAL} = 2 \cdot \Delta t_{TOP}$

$R = V_{0x} \cdot \Delta t$

$= 37 \cdot 0.6 \cdot (6.04)$

$= \boxed{134 \text{ (m)}}$