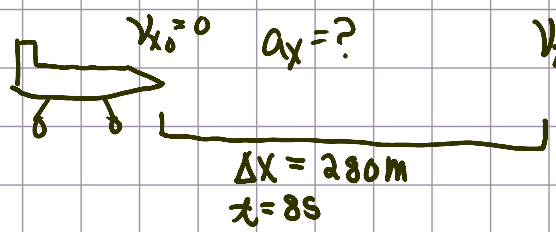
Homework 3
Chapter 2
Problems 36, 48, 53, 54, 56

Monday, September 12, 2011
9:42 AM




$$\Delta x = \left[\frac{\cancel{v_{x_0}}^{0} + v_x}{2}\right] t$$

$$v_x = \frac{2\Delta x}{t} = \frac{2(280m)}{8s} = 70\,m/s$$

# Chapter 2 Problem 48

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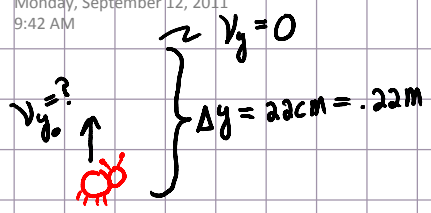


$a_y = -9.8 m/s^2$

a) $v_{y_0} = ?$

$v_y^2 = v_{y_0}^2 + 2a_y \Delta y$ ($v_y = 0$)

$v_{y_0} = \sqrt{-2a_y \Delta y}$

$v_{y_0} = \sqrt{-2(-9.8 m/s^2)(.22m)}$

$v_{y_0} = 2.08 m/s$

b) $v_y = v_{y_0} + a_y t$ ($v_y = 0$)

$t = \frac{-v_{y_0}}{a_y}$

$t = \frac{-(2.08 m/s)}{-9.8 m/s^2}$

$t = 2.1 s$ (up)

$t_{total} = 2(2.1 s) = 4.2 s$

c) always $-9.8 m/s^2$

# Chapter 2 Problem 53

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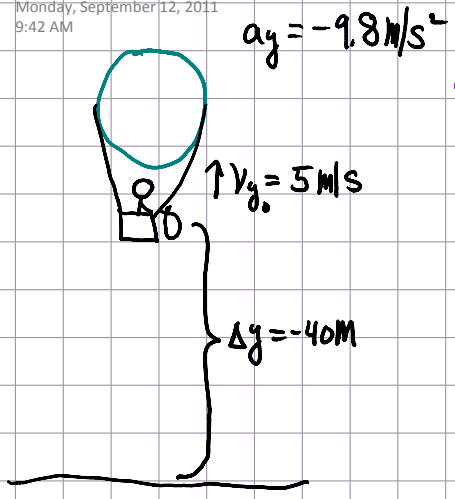



a) $t = .25s$ and $1s$

$\Delta y = v_{y_0} t + \frac{1}{2} a_y t^2$

$\Delta y = (5m/s)(.25s) + \frac{1}{2}(-9.8 m/s^2)(.25s)^2$

$\Delta y = .94m$ or $40.94m$ above ground

$v_y = v_{y_0} + a_y t$

$v_y = 5m/s + (-9.8 m/s^2)(.25s)$

$v_y = 2.53 m/s$

$\Delta y = v_{y_0} t + \frac{1}{2} a_y t^2$

$\Delta y = (5m/s)(1s) + \frac{1}{2}(-9.8 m/s^2)(1s)^2$

$\Delta y = .1m$ or $40.1m$ above ground

$v_y = v_{y_0} + a_y t$

$v_y = 5m/s + (-9.8 m/s^2)(1s)$

$v_y = -4.8 m/s$

b) $t = ?$

$\Delta y = v_{y_0} t + \frac{1}{2} a_y t^2$

$\frac{1}{2} a_y t^2 + v_{y_0} t - \Delta y = 0$

$t^2 + \frac{2 v_{y_0}}{a_y} t - \frac{2 \Delta y}{a_y} = 0$

$t^2 + \frac{2(5m/s)}{-9.8 m/s^2} t - \frac{2(-40m)}{-9.8 m/s^2} = 0$

$t^2 - 1.02s\, t - 8.163 s^2 = 0$

$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$t = \frac{1.02 \pm \sqrt{(-1.02s)^2 - 4(-8.163s^2)}}{2}$

$t = \frac{1.02 \pm 5.80}{2}$

$t = 3.41s$ or $-2.39s$

c) $v_y = v_{y_0} + a_y t$

$v_y = 5 m/s + (-9.8 m/s^2)(3.41s)$

$v_y = -28.4 m/s$

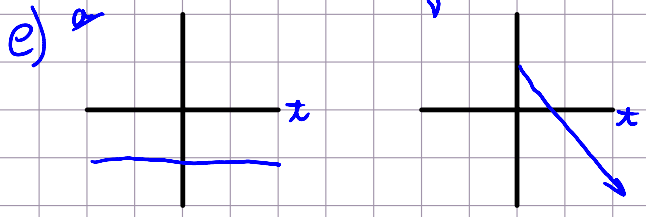
d) $v_y = 0$ (at highest pt)

$v_y^2 = v_{y_0}^2 + 2 a_y \Delta y$

$\Delta y = \frac{-v_{y_0}^2}{2 a_y} = \frac{-(5m/s)^2}{2(-9.8 m/s^2)}$

$\Delta y = 1.28m$ on $41.28m$ above the ground.

e)



# Chapter 2 Problem 54

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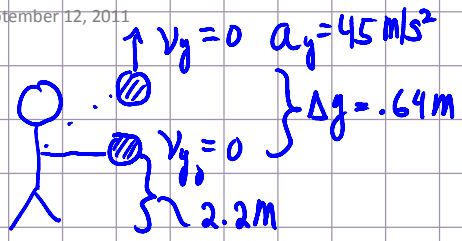
a)



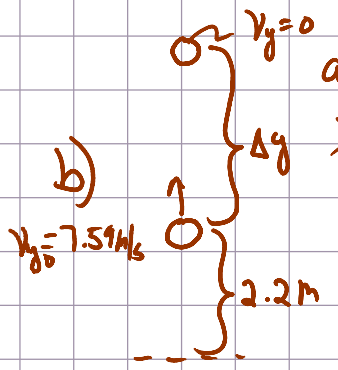

$$v_y^2 = \cancel{v_{y_0}^2}^{\,0} + 2a_y\Delta y$$

$$v_y = \sqrt{2a_y\Delta y}$$

$$v_y = \sqrt{2(45\ m/s^2)(.64m)}$$

$$v_y = 7.59\ m/s$$

b)




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

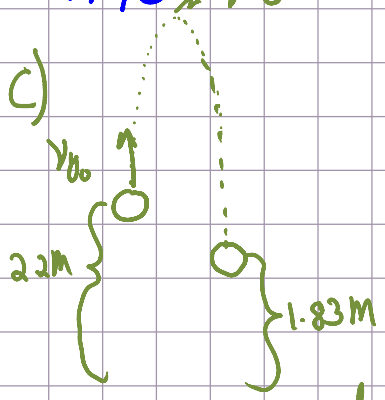
$v_y^2 = v_{y_0}^2 + 2a_y\Delta y$

$$\Delta y = \frac{-v_{y_0}^2}{2a_y}$$

$$\Delta y = \frac{-(7.59\ m/s)^2}{2(-9.8\ m/s^2)}$$

$\Delta y = 2.94m$ or $5.14\ m$ above ground

c)




up

$v_y = v_{y_0} + a_y t$

$$t = \frac{-v_{y_0}}{a_y}$$

$$t = \frac{-7.59\ m/s}{-9.8\ m/s^2}$$

$t = .775$

down

$\Delta y = \cancel{v_{y_0}t}^{\,0} + \frac{1}{2}a_y t^2$

$$t = \pm\sqrt{\frac{2\Delta y}{a_y}} = \pm\sqrt{\frac{2(5.14-1.83m)}{-9.8\ m/s^2}}$$

$t = \pm .825$

$t_{tot} = .775 + .825$
$= 1.595$ //

# Chapter 2 Problem 56

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

a) $v_y = v_{y_0} + a_y t$

$v_y = (-15\ m/s) + (-9.8\ m/s^2)(2s)$

$v_y = -34.6\ m/s$

b) $\Delta y = v_{y_0} t + \frac{1}{2} a_y t^2$

$\Delta y = (-15\ m/s)(2s) + \frac{1}{2}(-9.8\ m/s^2)(2s)^2$

$\Delta y = 49.6\ m$

c) $\Delta y = -10\ m$

$v_y = ?$

$v_y^2 = v_{y_0}^2 + 2 a_y \Delta y$

$v_y = \sqrt{(-15\ m/s)^2 + 2(-9.8\ m/s^2)(-10\ m)}$

$v_y = 20.5\ m/s$ //