

HW CS.3

Review Pg 111

44, 46, 47, 48, 49, 50, 56, 57, 61, 62, 63, 64

44.) $\vec{v}_0 \rightarrow v_0 = 32 \text{ m/s}$ $v = 96 \text{ m/s}$ $a = \frac{v - v_0}{T}$
 $T = 8.0 \text{ s}$

$A = ?$ $a = \frac{96 \text{ m/s} - 32 \text{ m/s}}{8.0 \text{ s}}$ $A = 8.0 \text{ m/s}^2$

46.) $\vec{v}_0 \rightarrow v_0 = 22 \text{ m/s}$ $a = 1.6 \text{ m/s}^2$ $T = 6.8 \text{ s}$ $v = ?$

$v = v_0 + aT$ $v = 22 \text{ m/s} + 1.6 \text{ m/s}^2 \cdot 6.8 \text{ s}$

$v = 32.88 \text{ m/s}$ $v = 33 \text{ m/s}$

47.) $\vec{v}_0 \rightarrow$

$v_0 = 145 \text{ m/s}$ $A = 23.1 \text{ m/s}^2$ $T = 20.0 \text{ s}$ $v = ?$

A.) $v = 145 \text{ m/s} + 23.1 \text{ m/s}^2 \cdot 20.0 \text{ s}$

$v = 607 \text{ m/s}$

B.) $1.83 \times \text{Speed of Sound}$

48.) $\vec{p} \rightarrow v_0 = 2.35 \times 10^5 \text{ m/s}$

$v = ?$ $a = -1.10 \times 10^{12} \text{ m/s}^2$

$T = 1.50 \times 10^{-7} \text{ s}$

$v = 2.35 \times 10^5 \text{ m/s} + (-1.10 \times 10^{12} \text{ m/s}^2 \cdot 1.50 \times 10^{-7} \text{ s})$

$v = 7.00 \times 10^4 \text{ m/s}$



49.) $d = ?$ $V_0 = 66 \text{ m/s}$ $V = 88 \text{ m/s}$ $T = 12 \text{ s}$

$$d = 0 \text{ m} + \frac{1}{2} (66 \text{ m/s} + 88 \text{ m/s}) 12 \text{ s} = 924 \text{ m}$$


$$d = 9.2 \times 10^2 \text{ m}$$



50.) $d = ?$ $T = 15 \text{ s}$ $V_0 = 145 \text{ m/s}$ $V = 75 \text{ m/s}$

$$d = 0 \text{ m/s} + \frac{1}{2} (145 \text{ m/s} + 75 \text{ m/s}) 15 \text{ s} = 1650 \text{ m}$$

$$d = 1.7 \times 10^3 \text{ m}$$

56.)  $a = -3.0 \times 10^2 \text{ m/s}^2$

$V_0 = 110 \text{ km/h}$ $V^2 = V_0^2 + 2a(d - d_0)$


$V = 0 \text{ km/h}$ $\frac{V^2 - V_0^2}{2a} + d_0 = d$

$d = ?$

$$110 \text{ km/h} = \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = 31 \text{ m/s}$$

$$d = \frac{0 \text{ m/s}^2 - 31 \text{ m/s}^2}{2 \cdot -3.0 \times 10^2 \text{ m/s}^2} + 0 \text{ m} = 1.601 \text{ m}$$

$$d = 1.6 \text{ m}$$

57.)  $V = 44 \text{ m/s}$ $d = 3.5 \text{ m}$ $V^2 = V_0^2 + 2a(d - d_0)$

$V_0 = 0 \text{ m/s}$ $a = ?$

$$a = \frac{V^2 - V_0^2}{2(d - d_0)}$$

$$a = \frac{44 \text{ m/s}^2 - 0 \text{ m/s}^2}{2(3.5 \text{ m} - 0 \text{ m})} = 276.57 \text{ m/s}^2$$

$$a = 2.8 \times 10^2 \text{ m/s}^2$$

28x gravity

$$\frac{2.8 \times 10^2 \text{ m/s}^2}{9.80 \text{ m/s}^2} =$$

Phy
C5.3
HW

61.) 

A) -12 to -13 m/s for 4 ms then $-a$ till $\approx 8 \text{ ms}$ to $\approx 0 \text{ m/s}$

B) $a = \frac{\Delta v}{\Delta t} = \frac{v - v_0}{t - t_0} = \frac{0 \text{ m/s} - (-13 \text{ m/s})}{8 \text{ ms} - 4 \text{ ms}} = \frac{13 \text{ m/s}}{4 \text{ ms}} = \frac{13 \text{ m/s}}{0.004 \text{ s}} = 3250 \text{ m/s}^2 = 3300 \text{ m/s}^2$

$\frac{1000 \text{ m/s}}{1 \text{ s}}$

C) $3250 \text{ m/s}^2 \cdot \frac{1 \text{ g}}{9.80 \text{ m/s}^2} = 331.6 = 330 \text{ g}$



$v_0 = 90.0 \text{ km/h} = 25.0 \text{ m/s}$ $\Delta x_s = ?$

$v = 0 \text{ m/s}$

$\Delta x_T = 40.0 \text{ m}$

$\Delta t_T = .75 \text{ s}$

$a = -10.0 \text{ m/s}^2$

$v^2 = v_0^2 + 2a\Delta d$

$\Delta d_2 = \frac{v^2 - v_0^2}{2a} = \frac{(0 \text{ m/s})^2 - (25.0 \text{ m/s})^2}{2(-10 \text{ m/s}^2)}$

$\Delta d_2 = 31.25 \text{ m}$

$d_1 = vt = (25.0 \text{ m/s})(.75 \text{ s})$

$d_1 = 18.75 \text{ m}$

$\Delta d_T = 18.75 + 31.25$

$\Delta d_T = 50.0 \text{ m}$

Hits Barrier

B) MAX SPEED = ? $\Delta d_2 = 40 \text{ m} - 18.75 \text{ m} = 21.25 \text{ m}$

$v^2 = v_0^2 + 2a\Delta d$

$v_0^2 = v^2 - 2a\Delta d$

$v_0^2 = 0 \text{ m/s}^2 - 2(-10 \text{ m/s}^2)(21.25 \text{ m})$

$v_0 = 20.6 \text{ m/s}$



$v_0 = 0 \text{ m/s}$

$v = v_0 + at$

$v = 61 \text{ m/s}$

$t = \frac{v - v_0}{a}$

$a = 2.5 \text{ m/s}^2$

$= \frac{61 \text{ m/s} - 0 \text{ m/s}}{2.5 \text{ m/s}^2}$

$= 24.4 \text{ s} = 24 \text{ s}$

$v^2 = v_0^2 + 2a\Delta d$

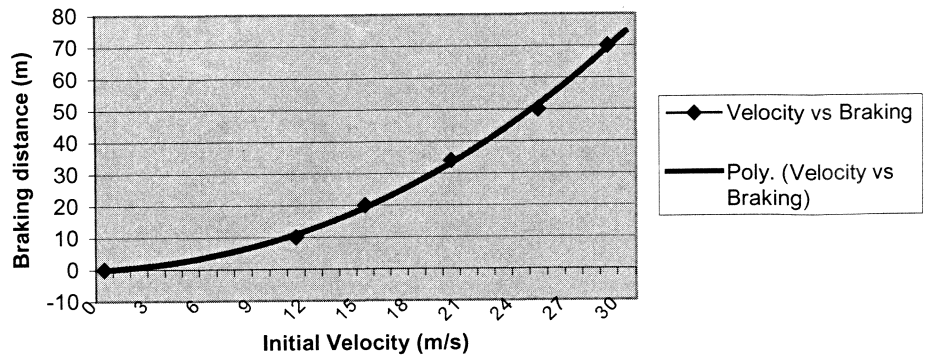
$\Delta d = \frac{v^2 - v_0^2}{2a}$

$= \frac{61 \text{ m/s}^2 - 0 \text{ m/s}^2}{2(2.5 \text{ m/s}^2)}$

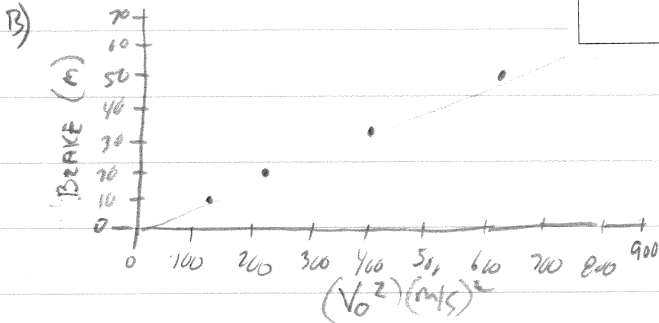
$= 744.2 \text{ m} = 740 \text{ m}$

$\Delta d = 744.2 \text{ m} = 740 \text{ m}$

Initial Velocity vs Braking Distance



63.) Parabolic
A) Curve



e) slope = $\frac{\Delta d}{\Delta v^2} = \frac{70m - 10m}{841m/s^2 - 121m/s^2} = \frac{60m}{720m/s^2} = .08333 \frac{1}{s^2/m} = 12 m/s^2$

d) $v_0^2 = -2ad$ $a = \frac{v_0^2}{-2d} = \frac{25m/s^2}{-2(50m)} = -6.25 m/s^2$


64) $d = d_0 + v_0t + \frac{1}{2}at^2$ $d = \frac{1}{2}at^2$
 $a = 6.0 m/s^2$ $\frac{1}{2}at^2 = v_0t$
 $v_0 = 21 m/s$ $0 = vt - \frac{1}{2}at^2$
 $0 = (21 m/s)t - .5(6 m/s^2)t^2$

a) $d = vt$ $t = 7.0s$
 $d = vt = (21 m/s)(7.0s) = 147m = 150m$

b) $v = v_0 + at = 0 m/s + (6 m/s^2)(7s) = 42 m/s$

Phy
hw 5.4

69)




$a = -9.80 \text{ m/s}^2$
 $\Delta t = 2.0 \text{ s}$
 $V = ?$
 $\Delta d = ?$

$V = V_0 + at$
 $V = 0 \text{ m/s} + (-9.80 \text{ m/s}^2)(2.0 \text{ s})$
 $V = 19.6 \text{ m/s} = 20. \text{ m/s}$

$\Delta d = d_0 + V_0 t + \frac{1}{2} a t^2$
 $d = 0 \text{ m} + (0 \text{ m/s})(2.) + \frac{1}{2} (-9.80 \text{ m/s}^2)(2.0 \text{ s})^2$
 $d = 19.6 \text{ m} = 20. \text{ m}$

70)




$a = -9.80 \text{ m/s}^2$
 $\Delta d = ?$
 $V = -73.5 \text{ m/s}$
 $\Delta t = ?$

$V = V_0 + at$
 $t = \frac{V - V_0}{a} = \frac{-73.5 \text{ m/s} - 0 \text{ m/s}}{-9.80 \text{ m/s}^2}$
 $t = 7.50 \text{ s}$

$d = d_0 + V_0 t + \frac{1}{2} a t^2$
 $d = \frac{1}{2} (-9.80 \text{ m/s}^2)(7.5 \text{ s})^2$
 $d = -276 \text{ m}$

73)



$V_0 = 5.0 \text{ m/s}$
 $a = -9.80 \text{ m/s}^2$
 $\Delta t = 2.0 \text{ s}$
 ΔV_B

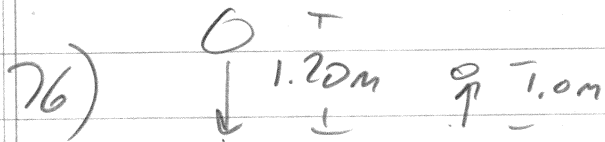
$V = V_0 + at$
 $V = 5.0 \text{ m/s} + (-9.80 \text{ m/s}^2)(2.0 \text{ s})$
 $V = -15 \text{ m/s}$

$\Delta d = d_0 + V_0 t + \frac{1}{2} a t^2$
 $d = 0 \text{ m} + (5.0 \text{ m/s})(2.0 \text{ s}) + \frac{1}{2} (-9.80 \text{ m/s}^2)(2.0 \text{ s})^2$
 $d = -9.6 \text{ m}$

Helicopter Position =

$d = Vt = (5.0 \text{ m/s})(2.0 \text{ s}) = 10. \text{ m}$

d.fference is $10.0 \text{ m} - (-9.6 \text{ m}) = 19.6 \text{ m} \text{ or } 20. \text{ m}$ below Heli.



$$v^2 = v_0^2 + 2a \Delta d$$

A) $v = \sqrt{0 \text{ m/s}^2 + 2(-9.80 \text{ m/s}^2)(1.20 \text{ m})} = -4.85 \text{ m/s}$

B) $v^2 = v_0^2 + 2a \Delta d$

$$v_0 = \sqrt{v^2 - 2a \Delta d} = \sqrt{0 \text{ m/s}^2 - 2(-9.80 \text{ m/s}^2)(-1.0 \text{ m} - 0 \text{ m})}$$

$v_0 = -4.43 \text{ m/s}$

C) $\Delta t = 0.010 \text{ s}$

$$v = v_0 + at$$

$$v_0 = 4.85 \text{ m/s}$$

$$a = \frac{v - v_0}{t} = \frac{-4.43 \text{ m/s} - (-4.85 \text{ m/s})}{0.010 \text{ s}}$$

$$v = -4.43 \text{ m/s}$$

$$a = ?$$

$$a = 928 \text{ m/s}^2 = 930 \text{ m/s}^2$$

$$\frac{930 \text{ m/s}^2}{9.8} = 95 \times \text{gravity}$$