Physics Practice

DIRECTIONS: Use diagrams, formulas and significant figures to solve these problems

$\bar{V} = -6$ m/s 1. At t = 6 s, the position of a particle on the x-axis was x = 38m. At t = 10 s, the particle was only 14 m to the right of the origin. Find the average velocity of the particle between t = 6 and t = 10 seconds.

x_6 $t_0 = 6$ $x_0 = 38$

$t_1 = 10$ $x_1 = 14$

$\bar{V} = \frac{14-38}{10-6} =$

12.7 m/s² 2. An object is moving along the x-axis with a velocity of 20.0 m/s. In 3.00 s, its velocity increases to 58.0 m/s. Find the average acceleration.

$V_0 = 20.0$ m/s $t = 3.00$s $a = \frac{58 - 20.0 \text{ m/s}}{3.00\text{s}}$

$V_1 = 58.0$m/s

t = 5.64s 3. A truck is traveling at 32.0 m/s. Because of an obstruction on the road, it is forced to stop with a constant deceleration of 5.67 m/s².

Δx = 90.3m

$V_1^2 - V_0^2 = 2a\Delta x$

a) How long will it take the truck to stop?

b) How far does the truck travel before it stops?

$V_0 = 32.0$m/s

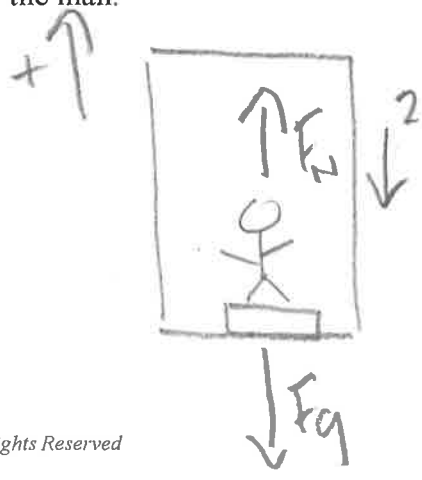
$V_1 = 0$ m/s

$a = -5.67$m/s²

$\frac{0-32}{-5.67} = t$ $\frac{0^2 - 32^2}{2(-5.67)} = \Delta x$

$t = 5.64$s

F_N = 922 N 4. A young man whose mass is 118 kg is standing in an elevator. The elevator is accelerating downward at 2.0 m/s². Find the apparent weight F_n of the man.



$F_N + F_g = ma$

$F_N + mg = ma$

$F_N = m(g+a)$

$= 118(+9.81 - 2.0)$

$= 922$ N

$t = 10.2\text{s}$

$V_i = -50.1\text{ m/s}$

$\Delta y = -1.00\text{m}$

5. A ball is thrown upward with an initial velocity of 50.0 m/s.

a) How long will it take the ball to strike the ground?
b) What will the velocity be just before impact?

$t = \frac{50 \pm \sqrt{50^2 + 4(4.905)}}{9.81}$

$V_f = 50 - 9.81(10.25)$

$\Delta y = V_y + \frac{1}{2}gt^2$

$-1 = 50t - 4.90t^2$

$4.905t^2 - 50t - 1$

$t = 10.5\text{s}$

$\Delta x = 6.01 \times 10^4\text{ m}$

$V_i = 770.\text{ m/s}$

6. A cannon was shot upward at an angle of 42.0° from the horizontal. The initial velocity of the shell was 770. m/s.

a) How long was the shell in the air?
b) How far did it travel horizontally?
c) What was the impact velocity?

$V_x = 770.\cos 42 = 572\text{ m/s}$

$V_y = 770.\sin 42 = 515\text{ m/s}$

$0 = 515t - 4.905t^2$

$\frac{515}{4.905} = t$

$\Delta x = 572(105)$

$\Delta x = 60060\text{ m}$

$t = 4.69\text{s}$

$\Delta x = 49.7$

$h = 26.3\text{m}$

7. Courtney threw a softball upward at an angle of 65.0° from the horizontal. The initial velocity of the ball was 25.0 m/s and the initial height was 1.50 m.

a) How long was the ball in the air?
b) How far did the ball travel horizontally?
c) What was the maximum height the ball attained?

$V_x = 25\cos 65 = 10.6\text{m/s}$

$V_y = 25\cos 65 = 22.7\text{m/s}$

$-1.5 = 22.7 - 4.905t^2$

$t = \frac{22.7 + \sqrt{22.7^2 + (4.905)(4)(1.5)}}{9.81}$

$t = 4.69\text{s}$

$h = \frac{V_0^2}{2a}$

$\Delta x = (10.6)(4.69)$

$h = \frac{22.7^2}{2(9.81)}$

"It's what you learn after you know it all that counts." ~ John Wooden