Name _____

Physics 121, Section 1 .....Quiz #1

1. Convert $5.62 \frac{kg \cdot m^2}{s}$ to units of $\frac{g \cdot cm^2}{s}$.

$$5.62 \frac{kg\ m^2}{s} \left(\frac{10^3 g}{1 kg}\right)\left(\frac{10^2 cm}{m}\right)^2 = \boxed{5.62 \times 10^7 \frac{g\ cm^2}{s}}$$

2. A car starts from rest and accelerates to a final speed of $95 \frac{km}{hr}$ in 10.3 s.

a) What was its acceleration?

$$95 \frac{km}{hr} \left(\frac{10^3 m}{km}\right)\left(\frac{1\ hr}{3600\ s}\right) = 26.4 \frac{m}{s}$$

$$v = v_0 + at$$

$$a = \frac{v - v_0}{t} = \frac{26.4 \frac{m}{s} - 0}{10.3 s} = \boxed{2.56 \frac{m}{s^2}}$$

b) Over what distance did it travel in this time?

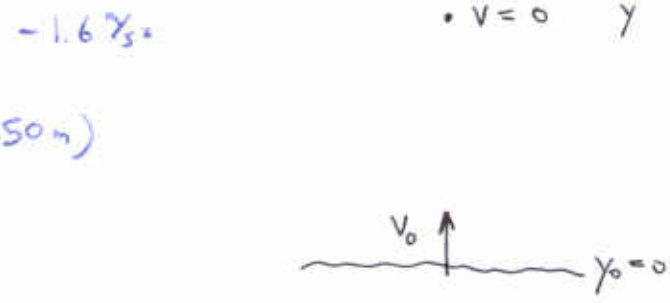
$$X = 0 + 0 + \frac{1}{2}\left(2.56 \frac{m}{s^2}\right)(10.3 s)^2$$

$$= \boxed{136\ m}$$

3. Suppose we are *on the moon* where the acceleration of gravity is $g_{Moon} = 1.6 \frac{m}{s^2}$. A projectile is launched straight up and attains a maximum height of 250 m.

a) What was its initial velocity?

$v^2 = v_0^2 + 2a(y - y_0)$ $\quad a = -g_{moon} = -1.6\ m/s^2$



$v_0^2 = v^2 - 2ay = 0 - 2(-1.6\ m/s^2)(250\ m)$

$= 800\ m^2/s^2$

$v_0 = \boxed{28.3\ m/s}$

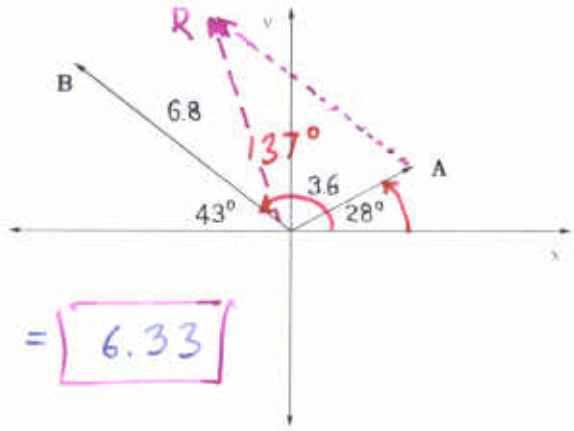
b) How long does it take to reach maximum height?

$v = v_0 + at$

$t = \frac{v - v_0}{a} = \frac{0 - (28.3\ m/s)}{(-1.6\ m/s^2)} = \boxed{17.7\ s}$

4. The vectors **A** and **B** have magnitudes and directions as shown.

a) Find the x and y components on the vector **A** + **B**. $\quad \vec{A} + \vec{B} = \vec{R}$



$R_x = A_x + B_x = 3.6 \cos 28° + 6.8 \cos 137°$

$= \boxed{-1.79}$

$R_y = A_y + B_y = 3.6 \sin 28° + 6.8 \sin 137° = \boxed{6.33}$

b) Find the magnitude and direction of this vector.

Magnitude $= R = \sqrt{R_x^2 + R_y^2} = \boxed{6.58}$

Direction $= \theta = \tan^{-1}\left(\frac{6.33}{-1.79}\right) = -74.2° + 180° = \boxed{105.8°}$

1.00 in = 2.54 cm $\quad$ 1 hr = 60 min $\quad$ 1 min = 60 s $\quad$ $g = 9.80 \frac{m}{s^2}$

$v = v_0 + at \quad x = x_0 + v_0 t + \frac{1}{2}at^2 \quad v^2 = v_0^2 + 2a(x - x_0)$

Vector **V**: $V = \sqrt{V_x^2 + V_y^2} \quad \theta = \tan^{-1}\left(\frac{V_y}{V_x}\right)$

REMEMBER TO SHOW YOUR WORK!