Physics 201 3hr. (lab is separate)

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Course Web Page www.asg.sc.edu
look for Physics 201 tab

Labs + CAPA start next Mon
I cannot do over rides
I teach a CAPA Tues 9:30 - welcome
Find a good seat - make permanent next week

About me
Home of origin & now
Education
Interests + Research

About the course
The On Line Notes
(note math at end pages)

Aug 30, 2007 Physics 201

1. Units m, kg, s — how defined (see notes)
2. Powers of 10 & Prefixes
3. Greek alphabet
4. Numerical uncertainty rules
5. Unit conversion $12\text{ in} = 1\text{ ft} \Rightarrow \frac{1\text{ ft}}{12\text{ in}} = 1$

$2.54\text{ cm} = 1\text{ in}$, $2.2\text{ lbs} = 1\text{ kg}$

$1\text{ L water} = 1\text{ kg}$ $1\text{ m}^3 = 10^3\text{ kg} = 1\text{ Metric ton}$

$\text{Å} = 10^{-10}\text{ m}$

Vectors

Graphical

Component

$A = (2, 1, 0)$

$B = (1, 3, 6)$

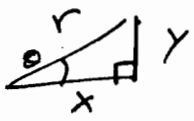
$A \pm B$

$A \cdot B$

$|A|$

$|B|$

Trig



$r^2 = x^2 + y^2$

$\theta = \tan^{-1}\frac{y}{x}$

$\cos\theta = \frac{x}{r}$

$\sin\theta = \frac{y}{r}$

$\tan\theta = y/x$

$\vec{A} = (2, 1, -2)$

$B = (0, 1, 3)$

$|A| = \sqrt{A \cdot A} = \sqrt{4 + 1 + 4}$

$= \sqrt{9} = 3$

$|B| = \sqrt{0 + 1 + 9} = \sqrt{10}$

$A \cdot B = A_x B_x + A_y B_y + A_z B_z = |A||B| \cos\theta$

$A \cdot B = 0 + 1 - 6 = -5 = 3\sqrt{10} \cos\theta.$

$\cos\theta = -\frac{5}{3\sqrt{10}}$

$a = g = 9.8 \frac{m}{s^2} = 10 \frac{m}{s^2}$ *

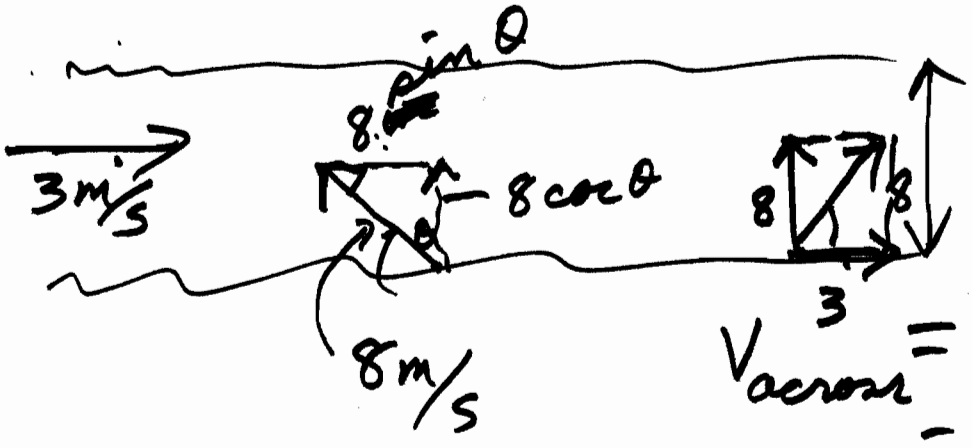
grav. $32 \frac{ft}{s^2}$ *

on test

$V_f = V_0 + a\,t$

$(32)(2)$

$96 = (32)(3)$



$V_{across} = 8\cos\theta$

$= 8\cos\left(\sin^{-1}\frac{3}{8}\right)$

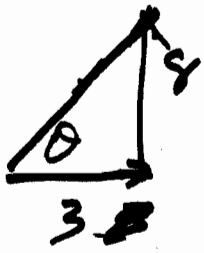
$3 = 8\sin\theta$

$\sin\theta = \frac{3}{8}$

$\theta = \sin^{-1}\frac{3}{8}$

$30\text{ m} = V_{across}\, t$

$V = \sqrt{8^2 + 3^2}$



$\tan\theta = \frac{8}{3}$

$a = \begin{cases} 10\ m/s^2 \\ 32\ ft/s^2 \end{cases} = a_{grav}$

$v = \frac{dx}{dt} = \boxed{\frac{\Delta x}{\Delta t}}$

$a = \frac{dv}{dt} = \frac{d^2x}{dt^2} = \boxed{\frac{\Delta v}{\Delta t}}$

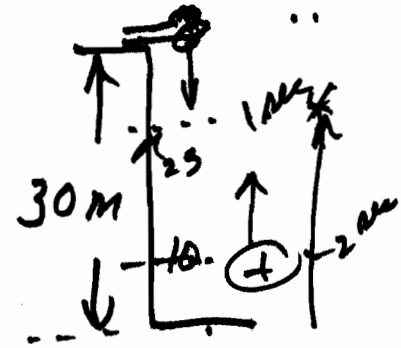
$= \frac{60\ m/h - 0\ m/h}{4\ sec}$

$a = \frac{60\ m/h - 30\ mi/h}{3\ hr}$

$x(t) = x_0 + v_0 t + \frac{1}{2} a t^2$ ← g

$v(t) = v_0 + at$

$v^2 - v_0^2 = 2as$ ← $x - x_0$



$X_0 = 30$
$X = 0$
$a = g = -10$
$V_0 \neq 0$
$t = ?$

$V = ?$

$t = 1 \quad x = 30\ m + a t + \frac{1}{2}(-10) t^2$ (1)

$= 30 - 5 = 25$

$t = 2 \quad x = 30 + 0(2) + \frac{1}{2}(-10)(2)^2$

$= 30 - 5 \cdot 4 = 10\ m$

$t = 1 \quad v = 0 + (-10)(1)$

$= -10$

$t = 2 \quad v = 0 + (-10)\,2$

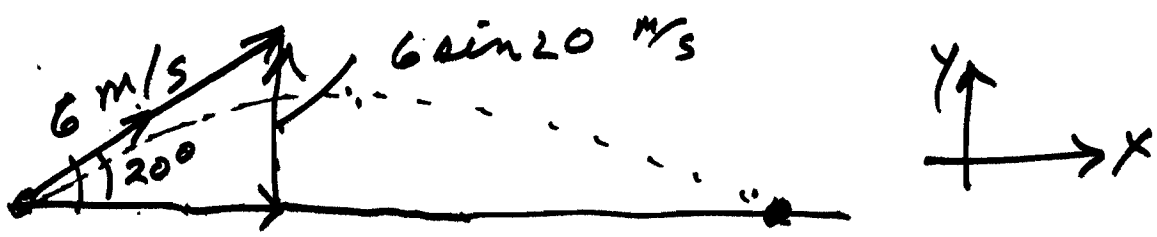
$= -20$

$0 = 30 + (0)t + \frac{1}{2}(-10)t^2$

$5t^2 = 30 \qquad t^2 = 6 \qquad t = \sqrt{6}$

$v^2 - 0^2 = 2(-10)(-30) \qquad v = \sqrt{600}$

$v^2 = 600 \qquad = 10\sqrt{6}\ m/s$



$6\cos 20$ m/s

$V_y = 6\sin 20$

$V_{y_{top}} = V_{y_0} + a t_{1/2}$

$0 = 6\sin 20 - 10 t_{1/2}$

$t_{1/2} = \frac{6\sin 20}{10}$

$= 0.6 \sin 20$

$y_0 = 0$ $\quad t =$

$y = 0$

$V_{y_0} = 6\sin 20$

$V_y = -6\sin 20$

$V_{y\,top} = 0$

$t_{\text{start to hit ground again}} = 1.2 \sin 20$

$X = (6\cos 20)(1.2)(\sin 20)$

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how high

$v^2 - v_0^2 = 2as$

$0 - (6\sin 20)^2 = 2(-10)h$

$\frac{(6\sin 20)^2}{20} = h$

1.st $F=0 \Leftrightarrow a=0$

2 $\frac{d\vec{p}}{dt} = \vec{F}$ $\quad p = mv$

$\frac{d\vec{p}}{dt} = m\frac{d\vec{v}}{dt}$

$m\vec{a} = F$ $\quad$ apor $= ma$

3. $\vec{F}_{1\to 2} = -\vec{F}_{2\to 1}$

$\Rightarrow$ α β γ

$\ni$ ϵ $\forall$

$\forall X \in \{G\} \ni X^2 = -4$

$F = ma$

$= kg\ m/s^2$

$= Nt$

$F_{gr} = \frac{100\,kg}{m} \frac{10}{} = 1000\,Nt = Weigh$

1000000000000000000000000000000000000000000000000000000

$F_{S\to J} = (4,7)\,Nt$

$F_{J\to S} = (-4,-7)$