Quantity	Dimension	MKS unit
Angle	dimensionless[1]	Dimensionless = radian
Steradian	dimensionless	Dimensionless = radian^2
Area	L^2	m^2
Volume	L^3	m^3
Frequency	T^{-1}	s^{-1} = hertz = Hz
Velocity	$L \cdot T^{-1}$	$m \cdot s^{-1}$
Acceleration	$L \cdot T^{-2}$	$m \cdot s^{-2}$
Angular Velocity	T^{-1}	$rad \cdot s^{-1}$
Angular Acceleration	T^{-2}	$rad \cdot s^{-2}$
Density	$M \cdot L^{-3}$	$kg \cdot m^{-3}$
Momentum	$M \cdot L \cdot T^{-1}$	$kg \cdot m \cdot s^{-1}$
Angular Momentum	$M \cdot L^2 \cdot T^{-1}$	$kg \cdot m^2 \cdot s^{-1}$
Force	$M \cdot L \cdot T^{-2}$	$kg \cdot m \cdot s^{-2}$ = newton = N
Work, Energy	$M \cdot L^2 \cdot T^{-2}$	$kg \cdot m^2 \cdot s^{-2}$ = joule = J
Torque	$M \cdot L^2 \cdot T^{-2}$	$kg \cdot m^2 \cdot s^{-2}$
Power	$M \cdot L^2 \cdot T^{-3}$	$kg \cdot m^2 \cdot s^{-3}$ = watt = W
Pressure	$M \cdot L^{-1} \cdot T^{-2}$	$kg \cdot m^{-1} \cdot s^{-2}$ = pascal = Pa

Physics Test 1 Review
Week 3

Velocity = lenght / time = LT^{-1}

$F = MLT^{-2}$ ← just have to know what each thing's

Density ← know the units

ML^{-3}

$T = f(l, m, g)$

$l^x m^y g^z$

$T = L^x (LT^{-2})^z$

add exponents

$0 = 1x + 1z$ $\quad x = \frac{1}{2}$

$T \mid 1 = -2z$

$z = -\frac{1}{2}$

$L^{1/2} (LT^{-2})^{-1/2}$

$l^{1/2} m^{-1/2} g \quad \frac{\sqrt{l}}{\sqrt{g}}$

①

$$V = f(p\ \rho)$$

$$LT^{-1} = (MLT^{-1})^x (ML^{-1}T^{-2})^y$$

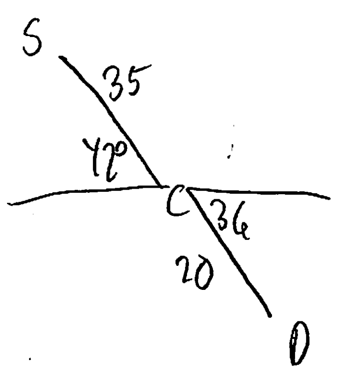
$L \mid 1 = 1x + -1y \quad x = \frac{1}{2} \quad y = -\frac{1}{2}$

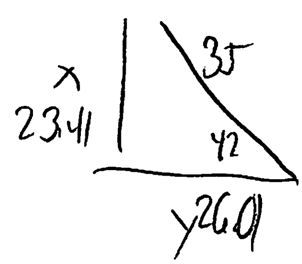
$T \mid -1 = -1x - 2y$

$M \mid 0 = 1x + 1y$

$p^{1/2} \quad \rho^{-1/2} \quad \frac{\sqrt{p}}{\sqrt{\rho}}$

②

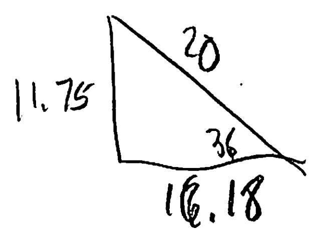




$\sin 42 = \frac{x}{35}$

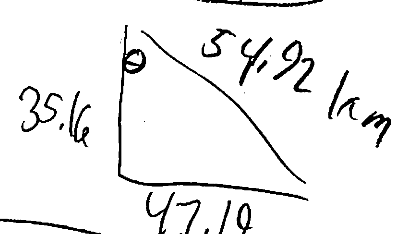
23.41

26.01



23.41 + 11.75

35.16



tan

50° east of sath

* Always draw

3. Did office hrs
   - set = for intercept
   - quadratic formula for roots $\frac{-b \pm \sqrt{4ac}}{2a}$

4. Did office hrs
   - really hard
   - TA confused + took a while

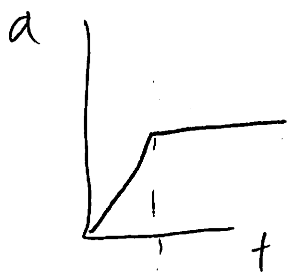
   * Integrate + find plots

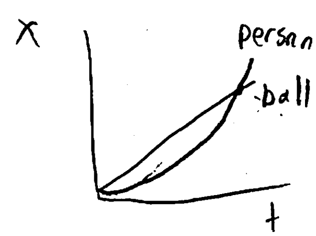
   Integration 101

   $$\int_a^b f(x)\,dx$$

   $3x^2$ ↗ raise by 1 $\frac{3x^3}{3}$) divide by → x^3

5. person





$= \frac{a}{(t_1 + t_2)}$

2 objects moving

don't forget about ball $x_b = x_p$

$x = V\cos t$? $t_1 + t_2$

Can find t_f by finding time in air

$t_f = \frac{2v\sin\theta}{g}$ can relate speed + angle

$V_1(t_1) = a\Delta t_1$

ball + person same position

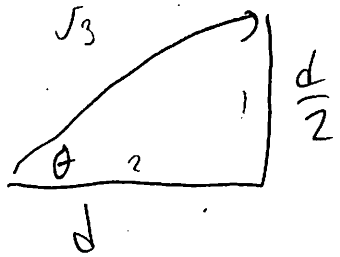
$$V_0 \cos\theta(\Delta t1 + t_2) = \underbrace{\tfrac{1}{2}a(\Delta t_1)^2}_{t_1} + \underbrace{a t_1 t_2}_{\substack{t_2 \\ \text{constant}}}$$

Sole for a

- could also solve for angle or speed

$$a = \frac{V_0 \cos\theta(\Delta t_1 + \Delta t_2)}{\frac{1}{2}(\Delta t_1)^2 + \Delta t_1 \Delta t_2}$$

6.



angle?
Magnitude?

for top to be here

~~tan 2θ~~ = ~~θ is 30~~ right? no g ↓

- can solve for initial x/y components of velocity in terms of t g

$y = v_y t - \frac{1}{2} g t^2$

differentate

$V_y = V_{oy} - gt$

at top $V_y = 0$

$0 = V_{oy} - gt$

$t_{top} = \frac{-V_y}{-g} = \frac{V_{oy}}{g}$

$y \text{ position} = V_{y_0}\left(\frac{V_{oy}}{g}\right) - \frac{1}{2} g \left(\frac{V_{oy}}{g}\right)^2$

$\frac{1}{2g} V_{y_0}^2$

$V_{y0} = \sqrt{gd}$

$t_{top} = \frac{V_{y0}}{g} \quad \frac{\sqrt{gd}}{g} \quad \sqrt{\frac{d}{g}}$

$1/\sqrt{g}$

$x = V_{ox} t$

$x = V_{ox} \sqrt{\frac{d}{g}}$

← must be easier than that
~ I followed it but could not create it

$$V_{0x} = \frac{d}{t} \quad \frac{d}{\sqrt{g/\cancel{d}}} = \sqrt{g\cancel{d}}$$

$$\tan\theta = \frac{V_{0y}}{V_{0x}}$$

$$V_0 = \frac{V_{0x}}{\cos\theta} = \frac{\sqrt{gd}}{\sqrt{2}/2} = \sqrt{2gd}$$

- yeah simple now that I think about it
Complex w/ variables

b. Horiz component acc

$? \, a_x$ ~~= 0 not acc~~

oh on the ledge

$$a = \frac{\Delta V}{t} \quad a \; \frac{V_x - 0}{t_f}$$

- acc will be -
- why set $t=0$ and new origin at start of ledge

$x_0 = 0$

$x(t = t_f) = s$

$V_x(t = t_f) = 0$

Remember $V_{x0} = \sqrt{gd}$

$$X(t) = V_{x_0} t + \frac{1}{2} a_x t^2$$

$$\sqrt{gd}\, t + \frac{1}{2} a_x t^2$$

$$V(t) = V_{x_0} + a_x t$$

$$\sqrt{gd} + a_x t$$

e solve for t $\quad t = \frac{-\sqrt{gd}}{a_x}$

$$s = \sqrt{gd}\left(-\frac{\sqrt{gd}}{a_x}\right) + \frac{1}{2} a_x \left(-\frac{\sqrt{gd}}{a_x}\right)^2$$

$$-\frac{gd}{2a_x}$$

$$a_x = \frac{-g^2}{2s}$$

So to review
- solve for t
- plug in to position

- thats all - almost thought of that

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7. Moving Cart + Hoop kinematics

$\xrightarrow{V_1}$ $\uparrow V_2$

- hard to do w/o all ~~#~~ variable,
- will land in hoop
  - frame of ref
  - remains in motion
  - even if on airplane

or say passed in same time
launch pt → hoop

↓

$$y_{hoop} = V_0 t + \frac{1}{2} g t^2$$

$$V = 0 = V_0 + g t$$

$$t = \frac{-V_0}{g}$$ ← oh that was ans
— that was easy

c) $h = y_{hoop} = V_0 \left(\frac{-V_0}{g}\right) + \frac{1}{2} g \left(\frac{-V_0}{g}\right)^2$

reduce

$$\frac{V_0^2}{g} - \frac{V_2^2}{2g} = \frac{V_2^2}{2g}$$

it seems to be same issues as TLS
- knowing what to do
- algebra
- reducing
- actually trying not just "reviewing"

d) distance traveled

$$X = V_{cart} \cdot 2t$$

$$V_{cart} \cdot 2\left(\frac{-V_0}{g}\right)$$

how they write

$$\boxed{2 V_1 \frac{V_2}{g}}$$