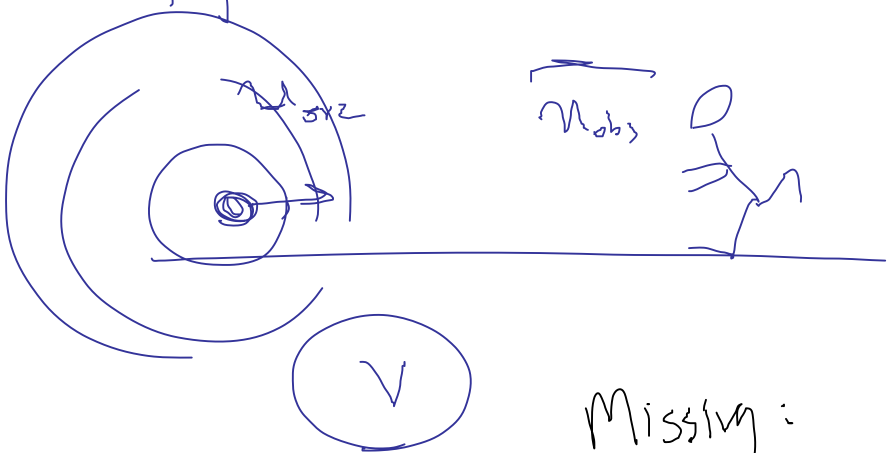
Phys 2110-4 5/3/13

Note Title 5/3/2013

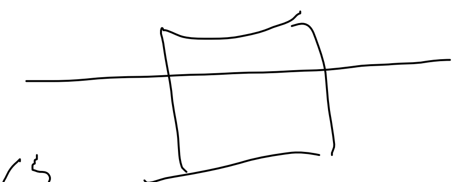
Doppler formula:



$$f' = f\left(\frac{1 \pm \frac{v_{obs}}{v}}{1 \mp \frac{v_{source}}{v}}\right)$$

Toward
away.

Missing: Gravity
Fluids
Statics
Thermal Physics
Thermo



2nd Semester

Electricity & Magnetism

Electric field

Potential, · —

Current

Magnetic field

Circuits

Wave Solutions w/ $\vec{E}$ & $\vec{B}$ fields

Light, Radio, μ-wave, γ-rays

Specialize to Light: Optics

3rd Semester

Relativity

Quantum Theory

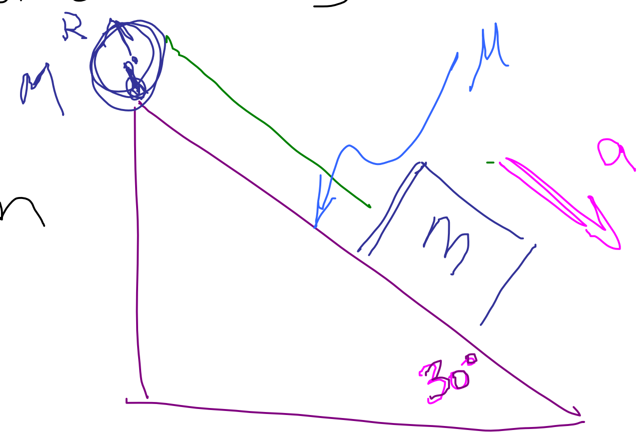
"Modern Physics"

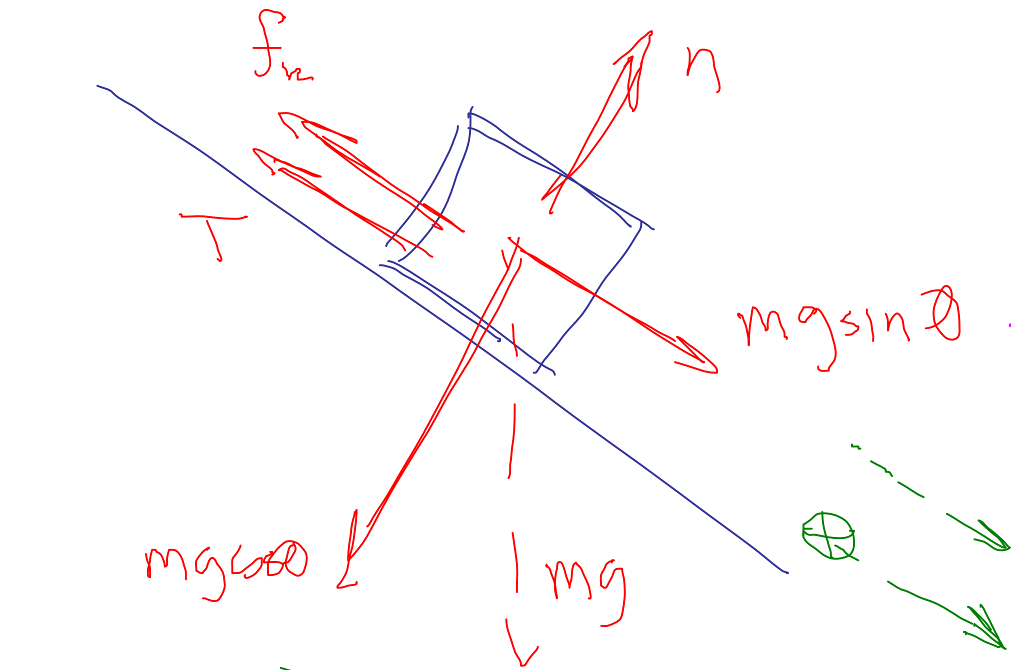
Summary: Wave
Oscill.
Rotation

New

10.57 2.4 kg block rests on slope attached by string to drum of mass 0.85 kg & r = 5.0 cm. Block acc's down slope at 1.6 $\frac{m}{s^2}$.

Find coeff of friction between block & slope.





$$n = mg\cos\theta$$

$$mg\sin\theta - f_k - T = ma$$

$$\boxed{mg\sin\theta - \mu_k mg\cos\theta - T = ma}$$

$$I = \tfrac{1}{2}MR^2$$

$$\tau = TR = I\alpha = \tfrac{1}{2}MR^2\alpha$$

$$= \tfrac{1}{2}MRa$$

$$a = R\alpha$$

$$\boxed{T = \tfrac{1}{2}Ma}$$

$$mg\sin\theta - \mu mg\cos\theta - \frac{1}{2}Ma = ma$$

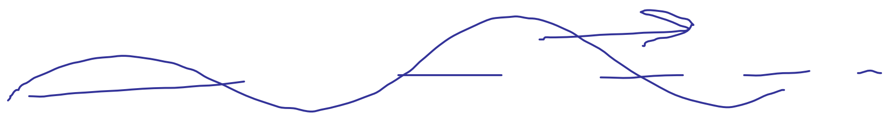
Solve for μ_k

$$\mu mg\cos\theta = mg\sin\theta - ma - \frac{1}{2}Ma$$

$$\mu = \frac{mg\sin\theta - ma - \frac{1}{2}Ma}{mg\cos\theta}$$

Plug in.

Waves



$k = \frac{2\pi}{\lambda}$

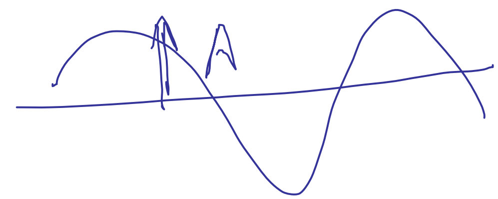
$\lambda f = v$ $\quad$ v = speed of wave

$$v_{str} = \sqrt{\frac{F}{\mu}}$$

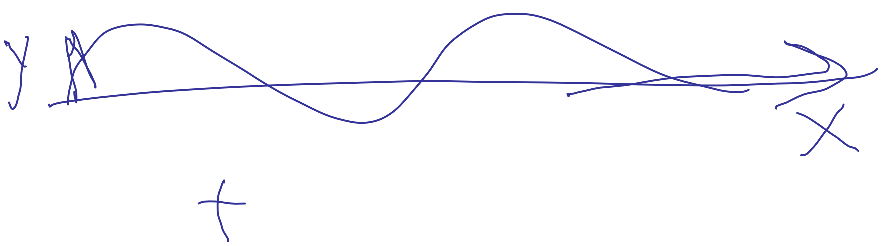
Harmonic waves

λ, $f = 1/T$, $\omega = 2\pi f$

A



Math. form



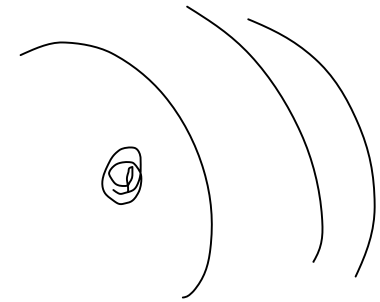
$$y(x,t) = A\cos(kx \mp \omega t + \phi)$$

$f(x \mp vt)$

Right

Left

$$I = \frac{\text{Energy}}{\text{Area} \cdot \text{Time}} \underset{\text{Isotropic source}}{=} \frac{P}{4\pi r^2}$$



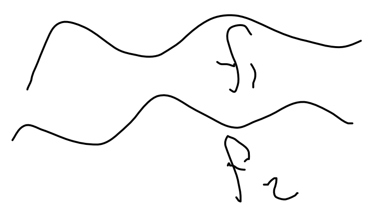
Sound:

Intensity level

$$\beta = 10 \log_{10}\left(\frac{I}{I_0}\right) \qquad I_0 = 10^{-12}\ \frac{W}{m^2}$$

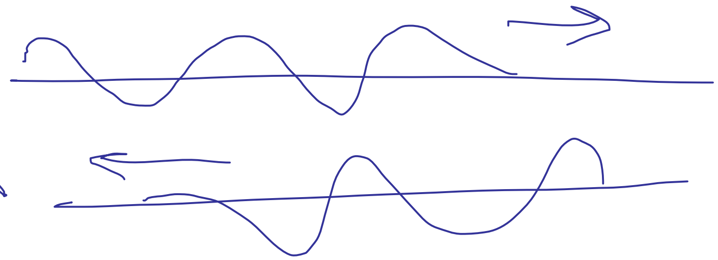
Interference:

Beats:



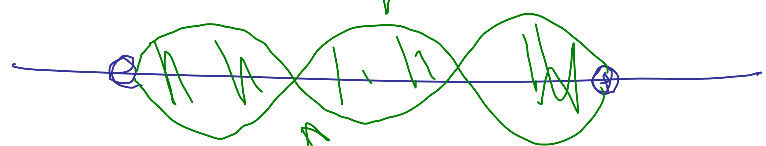
Pulse rate $= |f_1 - f_2|$

Standing waves



λ

f

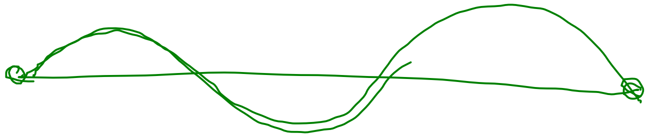


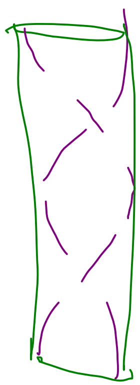
antinodes.

nodes

$$L = n\frac{\lambda}{2} \quad \text{etc.}$$

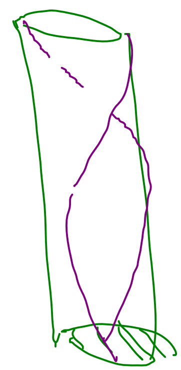
$$\lambda f = v$$





$$L = n\frac{\lambda}{2}$$

etc. v_{sound}



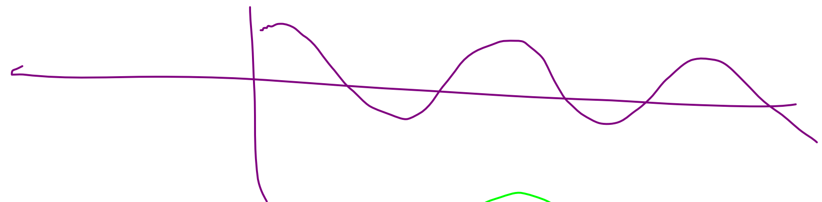
$$L = n\frac{\lambda}{4} \quad n = \text{odd } \#$$

etc.

Doppler effect

$$f' = f\left(\frac{1 \pm \frac{v_{obs}}{v}}{1 \mp \frac{v_{sour}}{v}}\right)$$

Oscillations:

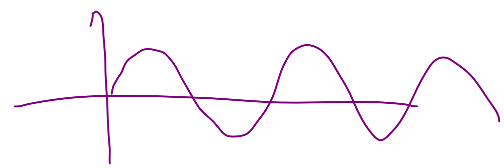


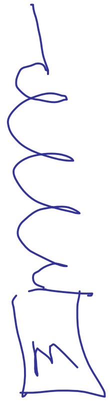
$$\frac{d^2x}{dt^2} = -\omega^2 x$$

k/m

$$\omega = \sqrt{k/m} \qquad f = \omega/2\pi \qquad T = 1/f \quad \text{etc.}$$

$$x = A\cos(\omega t + \phi)$$





$$\omega = \sqrt{k/m}$$

$$m \to m + \frac{m_{spr}}{3}$$

$$\frac{d^2\theta}{dt^2} = \cancel{-\omega^2\theta}$$

$$= -\omega^2 \sin\theta$$

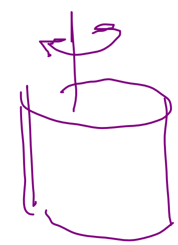
$$= -\omega^2\theta$$

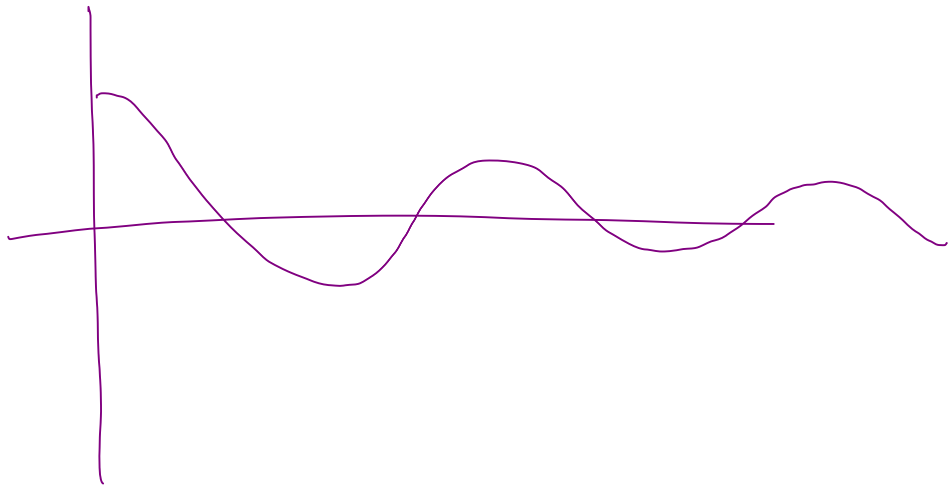
Simple pendulum

$$\omega = \sqrt{g/L} \quad \text{etc.}$$

$$\omega = \sqrt{\frac{mgL}{I}} \quad \text{etc.}$$

physical pendulum.





Damped,

Driven osc's.