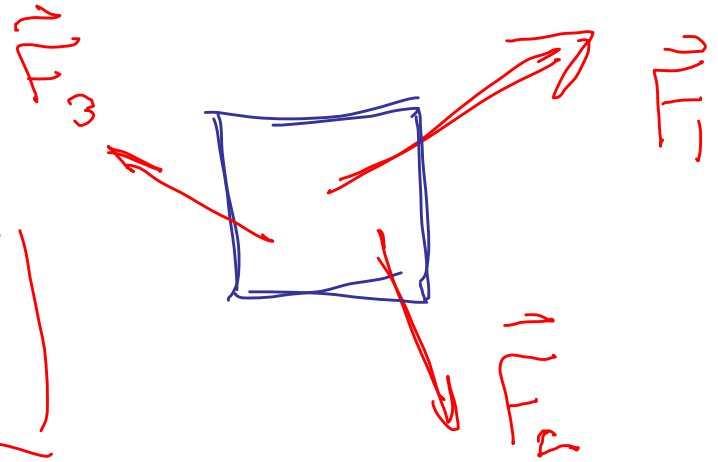
Phys 2110-4 2/11/13

Note Title 2/11/2013

Forces

N's 2nd Law



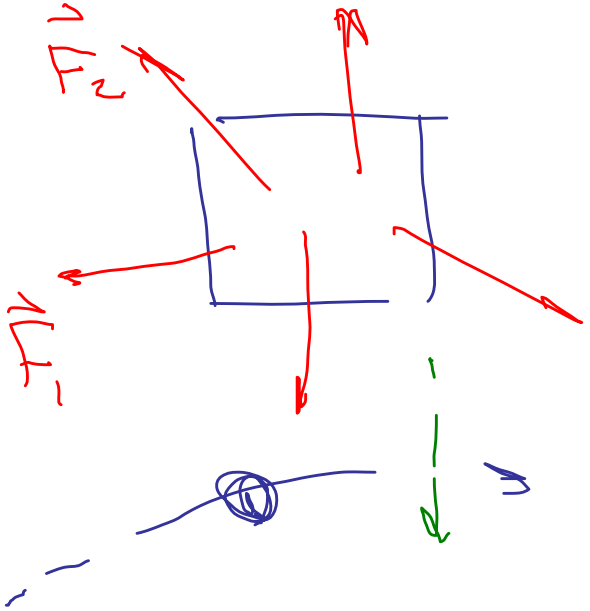
$$\vec{F}_{net} = m\vec{a}$$

$$\vec{a} = \frac{\vec{F}_{net}}{m}$$

$\vec{F}_{net}$ is vector sum of ind'v forces (N)

$\vec{a}$ is the acceleration (m/s^2)

M is the mass (kg)



Force diagram

Free-body diagram

Draw Damn Picture

$\vec{a} = -g\hat{j}$ p. 55

$F_{grav} = m\vec{a} = -mg\hat{j}$

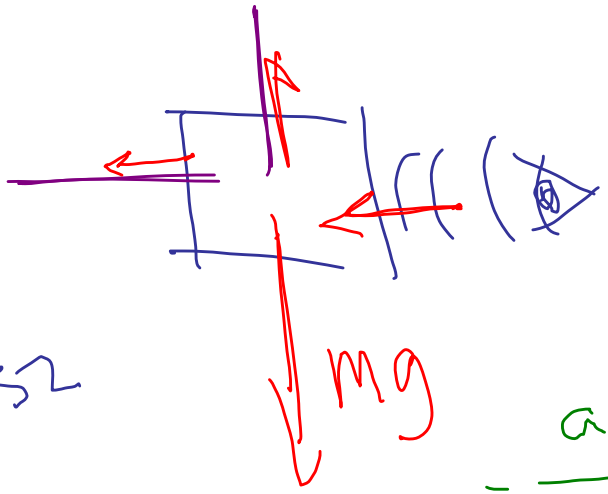
always there

m = mass does not change.

mg = force = weight

mg = weight

Prob set: 10



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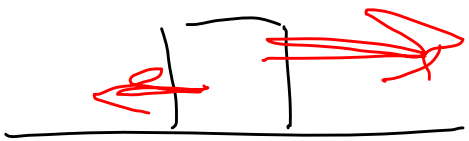
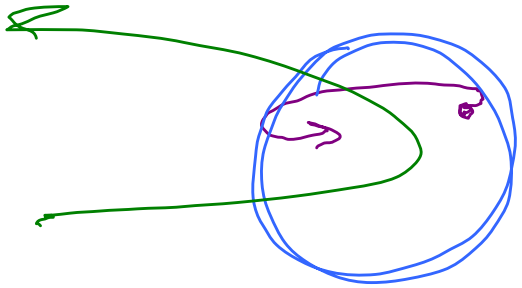
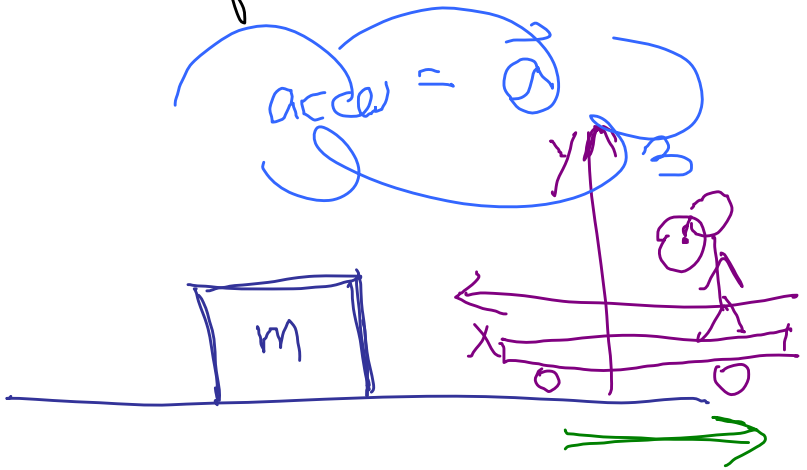
$$\vec{F} = m\vec{a}$$

Inertial Ref frames







Have to use a proper ref frame inertial.

Forces in nature

Quantum physics

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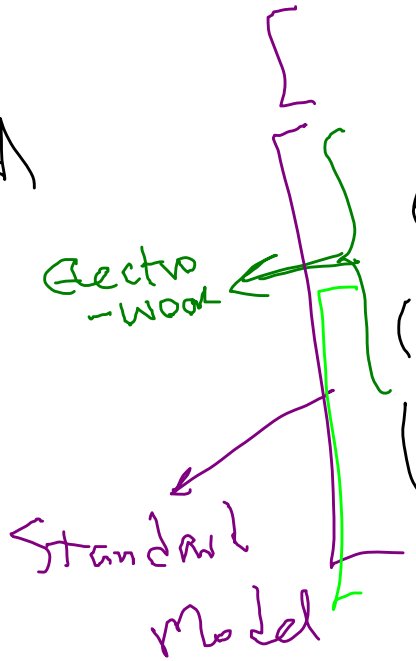
4 fundamental forces



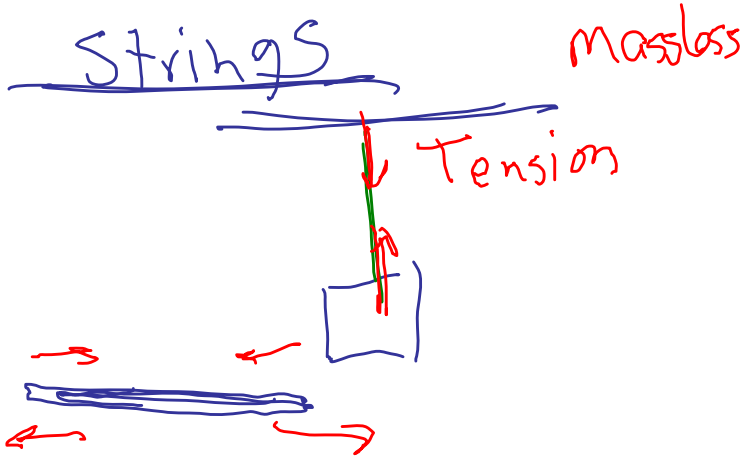
Gravity

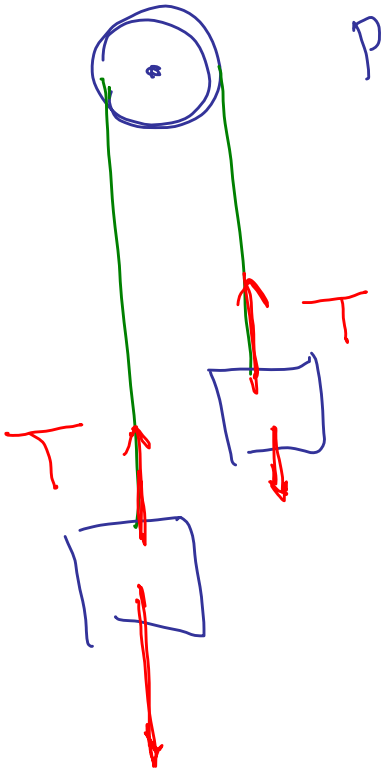
Electro Magnetic

(Nuclear) Weak Force

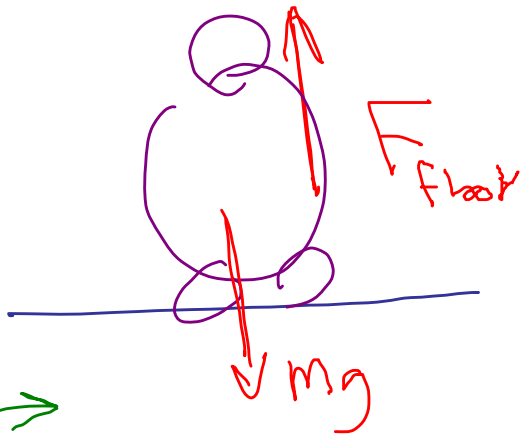
(Nuclear) Strong force

In our probs



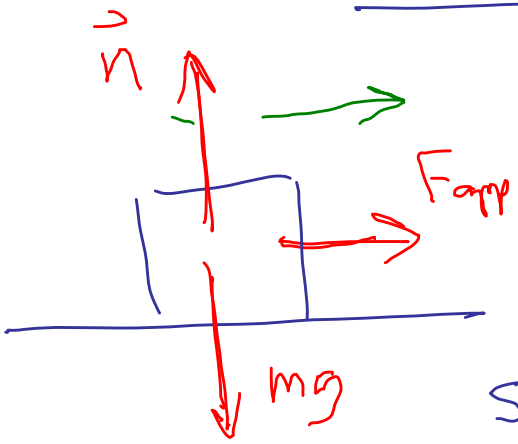


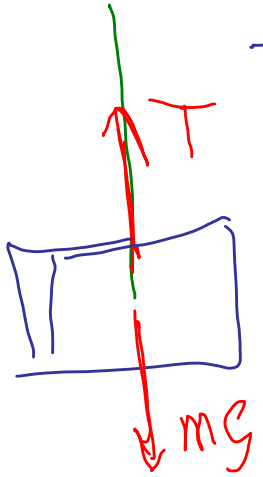
Pulley (massless)



No motion

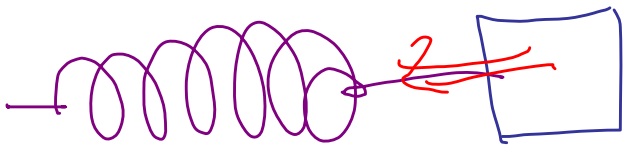
$F_{Flr}' = mg$





Smooth surface

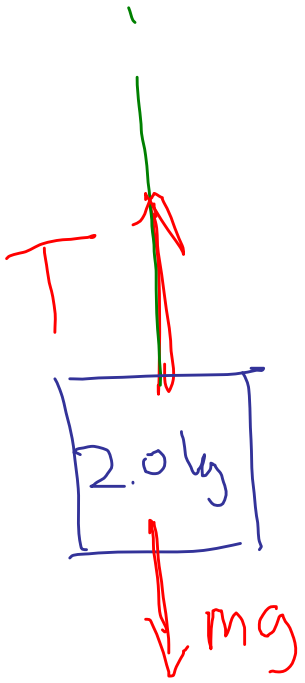
Force is perp to surface



Later.

Examples

A string is attached to 2.0 kg mass & mass is pulled upward so that its accel. is $3.0\ m/s^2$ upward. Find tension in string

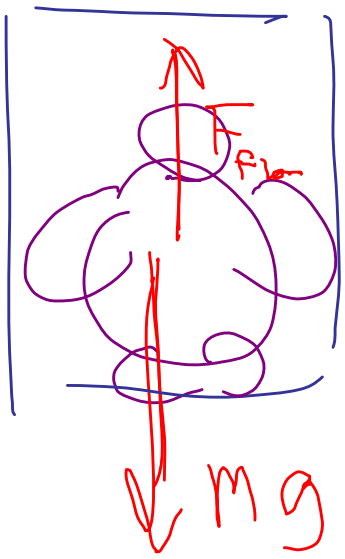


$$F_{net,y} = T - mg$$
$$= ma_y = m\,(3.0\ m/s^2)$$

$$T = mg + ma_y$$
$$= m(g + a_y) = (2.0\ kg)(9.8\ m/s^2 + 3.0\ m/s^2)$$
$$= 26\ N$$

4.29 An elevator accelerates downward at $2.4\ m/s^2$. What force does the floor exert on a 52 kg passenger?

$m = 52\ kg$



$$F_{floor} - mg = ma_y$$

$$= m(-2.4\ m/s^2)$$

$$F_{floor} = mg + m(-2.4\ m/s^2)$$

$$= m(g - 2.4\ m/s^2)$$