Phys 2110-4   9/23/11
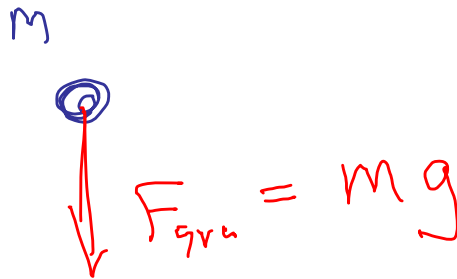
Chapter 4   Dynamics, Forces

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

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

Gravity

M

$$F_{grav} = mg$$

$F_{table} = \vec{n}$

$= m\vec{g}$

$\vec{n}$

mg

$F_{net} = 0$
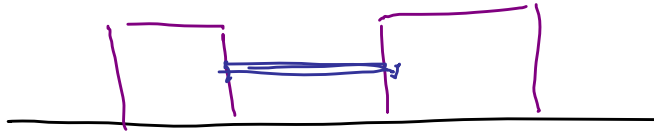
mg

F_{floor}
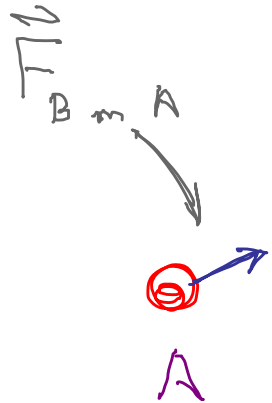
mg

Strings

T

mg

T

T
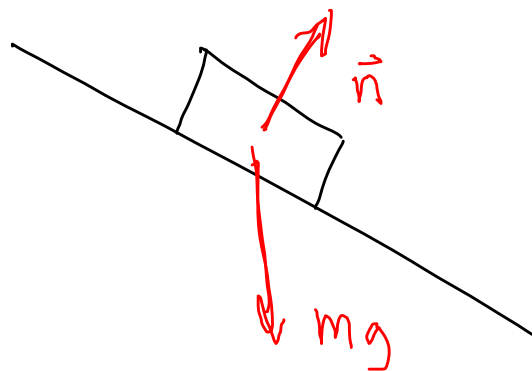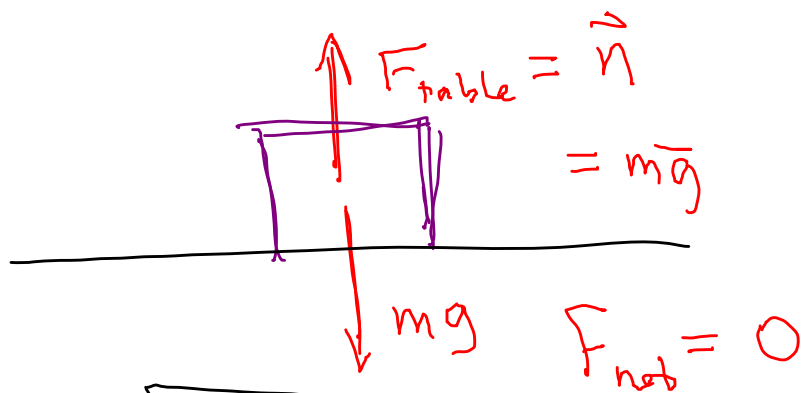
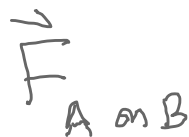String is under tension, has a tension T (units of force)
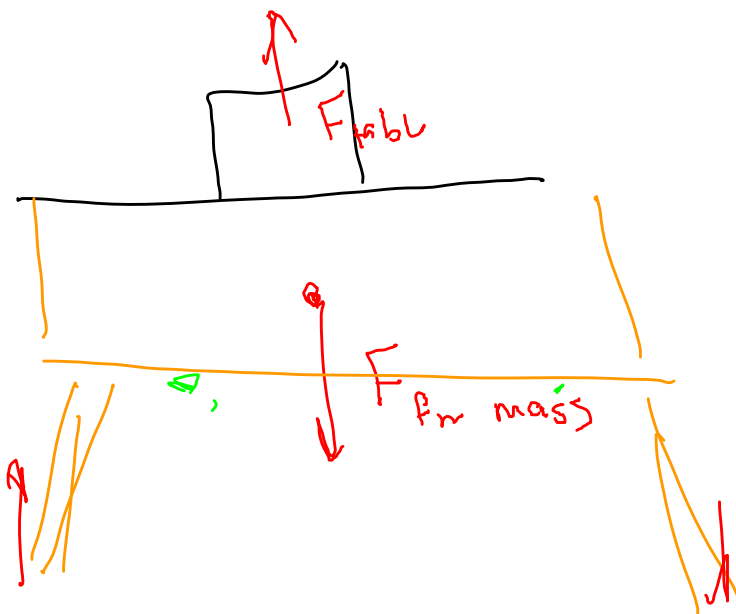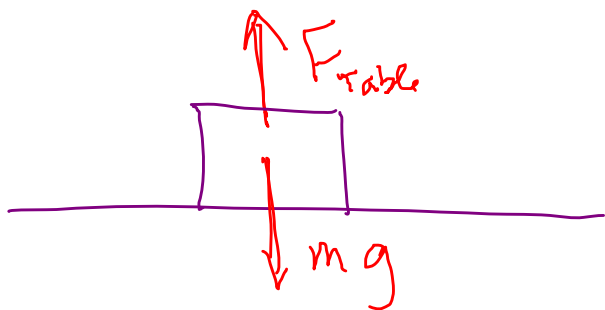
Rod: Has a tension, can
Push outward, or pull
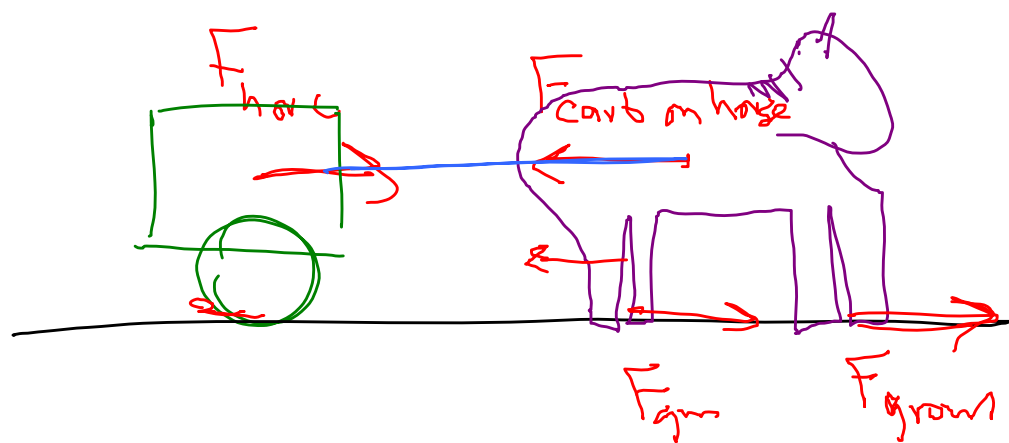inward

Newton's 3rd Law

Forces originate on objects.

If A exerts force $\vec{F}_{A \, on \, B}$ on
object B, then B exerts
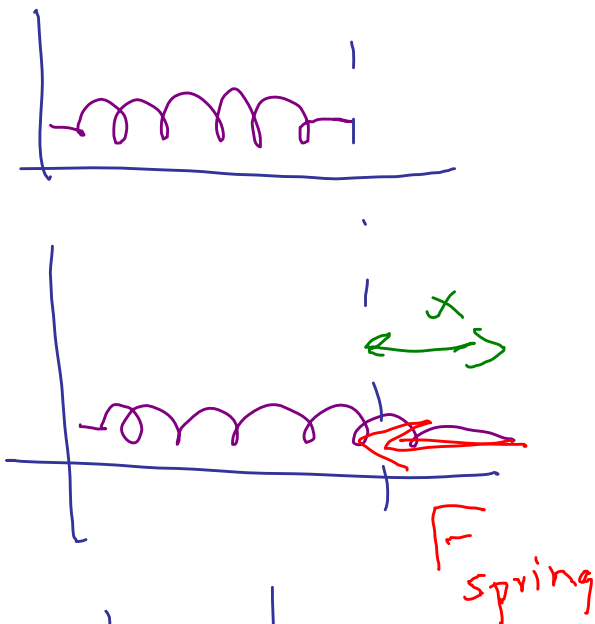a $\vec{F}_{B \, on \, A} = - \vec{F}_{A \, on \, B}$

$\vec{F}_{B \, on \, A}$

$\vec{F}_{A \, on \, B}$

A

B

F_{Table}

mg

F_{tabl}

$F_{fn\ mass}$

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

$\vec{F}_{net}$ means add forces on one objeT

p. 58

Spring (Ideal)

F_{horse}

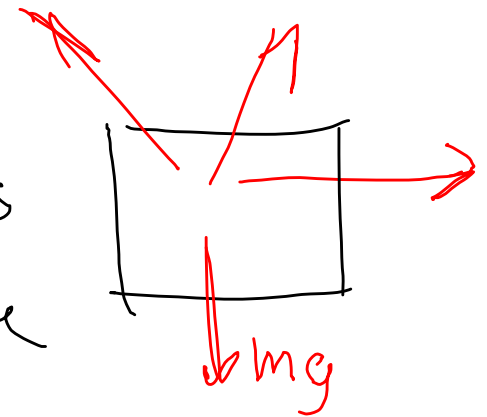$F_{cart\ on\ horse}$

F_{gnm} F_{ground}

x

F_{spring}

$k = $ spring constant

N/m

$$|F_{spring}| = |kx|$$

Work lotsa problems

Forces: Draw a picture showing the directions magnitudes (such as are known)
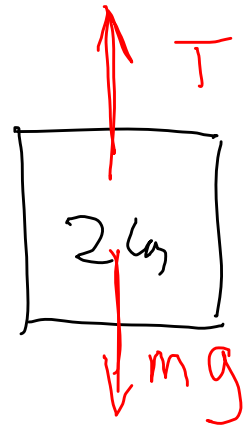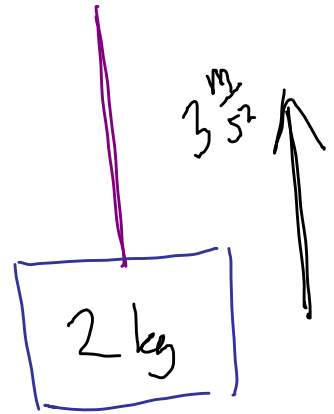
P.55

Free-Body Diagram
DDP!

Example

2kg mass pulled upward by string, so that it accels upward at $3 \frac{m}{s^2}$. Find tension in the string.

$$F_y = T - mg = ma_y$$
$$T = mg + ma_y$$

$$T = mg + ma_y$$
$$= m(g + a_y)$$
$$= (2 \, kg)\left(9.8 \, \frac{m}{s^2} + 3 \, \frac{m}{s^2}\right)$$
$$= (2 \, kg)\left(12.8 \, \frac{m}{s}\right)$$
$$= 25 \, N$$