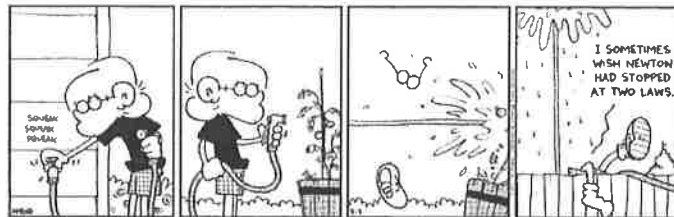**Newton's Third Law of Motion:**

When two bodies interact, the force that A exerts on B is equal and opposite to the force that B exerts on A.

If a heavier student pushes a lighter student, who exerts more force? Explain.

Exert the same force on each other, but the lighter student will have a greater acceleration.

$F_1 = F_2$ $Ma = mA$

Action-Reaction pairs: Equal and opposite forces acting upon (two) different objects.

Give some examples of "action-reaction pairs" of forces:

1) The force exerted

by _____ bat _____ on _____ ball _____

is equal and opposite to the force exerted

by _____ ball _____ on _____ bat _____.
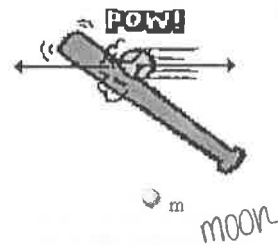
2) The force exerted

by _____ moon _____ on _____ Earth _____

is equal and opposite to the force exerted

by _____ Earth _____ on _____ moon _____.
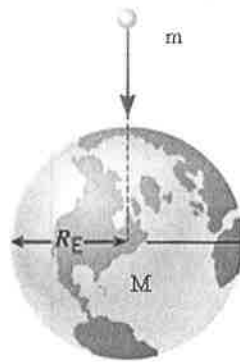
(net forces)

Newton's Second Law deals with... all the forces acting upon [one single] object.

Newton's Third Law deals with.... pairs of forces between [two objects]
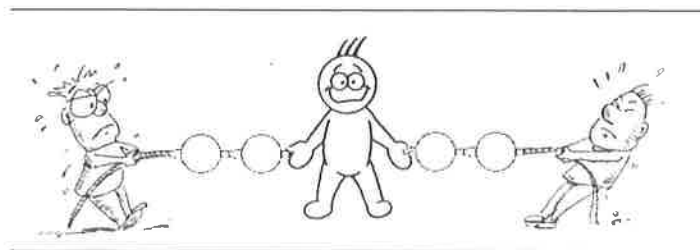
Net force on ~~ball.~~ moon

not zero
not in equilibrium

$$\Sigma F_{moon} = F_g = mg \uparrow_{moon}$$

m

R_E

M

Action-Reaction pairs:

$F_{Earth \ on \ moon} = F_{moon \ on \ Earth}$

$Ma = mA$

Net force on block:

$$\Sigma F = \emptyset N$$

$$\Sigma F = F_N + F_g = \emptyset N$$

in equilibrium

F_N
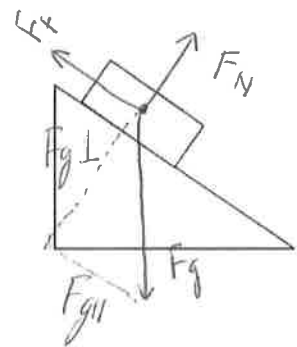
F_g
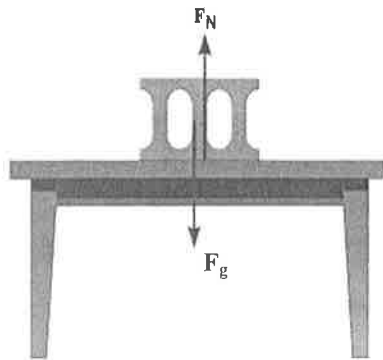
Action-Reaction pairs:

Block pushes on
table and
the table pushes
on the block
with equal force.

Equilibrium

What are some properties of an object in equilibrium?

no $\vec{a}$ object can be at rest

$\Sigma F = \emptyset N$ or in constant velocity motion

F_N

$F_{g\perp}$

$F_{g\parallel}$

F_g

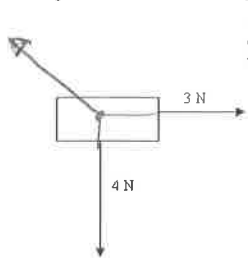Sketch a free-body diagram for this box at rest on a hill.

Then, find the resultant of the vectors you drew.

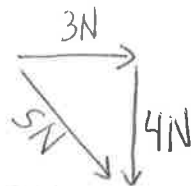Based on your drawings above, what is another
property of an object in equilibrium?

Is the system below in equilibrium?   Draw the resultant.

no

3 N

4 N

Now, draw a single vector that will put the system into equilibrium.

3N

5N

4N

5N

equal &
opposite

resultant force

Equilibrant: A single force
vector that puts the whole system in equilibrium.

What is the relationship between the resultant and the equilibrant?

equal and opposite forces