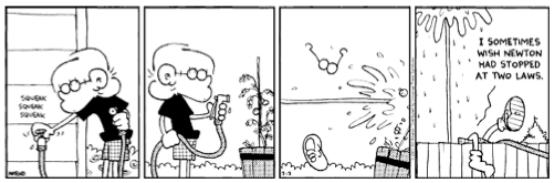
Newton's Third Law

IB 11

Newton's Third Law of Motion:

When two bodies A and B interact (push or pull), the force that A exerts on B is equal and opposite to the force that B exerts on A.



NOT: For every action, there is an equal and opposite reaction!

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

same force, different mass -> different accl

Action-Reaction pairs:

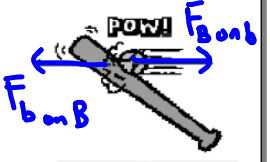
Give some examples of "action-reaction pairs" of forces:

1) The force exerted

by Bat on ball

is equal and opposite to the force exerted

by ball on Bat.

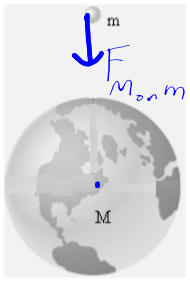


2) The force exerted

by M on m

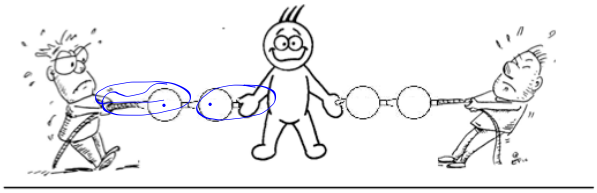
is equal and opposite to the force exerted

by m on M.



Newton's Second Law deals with . . . all the forces (the net force) acting on a single object.

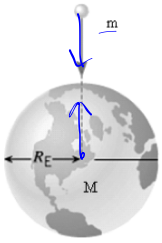
Newton's Third Law deals with . . .. pairs of forces (action-reaction pairs) between two objects.



Net force on ball:

not zero

will accl



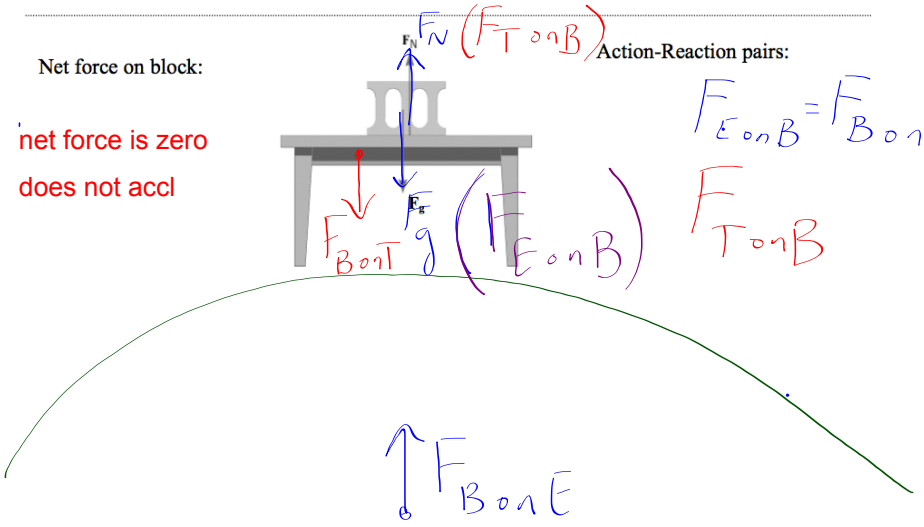
Action-Reaction pairs:

$F_{M\,on\,m} = F_{m\,on\,E}$

Net force on block:

net force is zero

does not accl



$F_N \; (F_{T\,on\,B})$

Action-Reaction pairs:

$F_{E\,on\,B} = F_{B\,on\,E}$

$F_{T\,on\,B}$

$F_{B\,on\,E}$

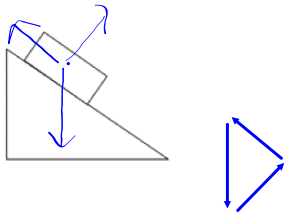
Equilibrium

What are some properties of an object in equilibrium?

accl = zero

vel is const (or zero)

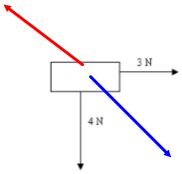
Sketch a free-body diagram for this box at rest on a hill.



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.

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

Equilibrant: A single force vector that puts system into equilibrium

What is the relationship between the resultant and the equilibrant?