

Weds: Read 4.4-4.5

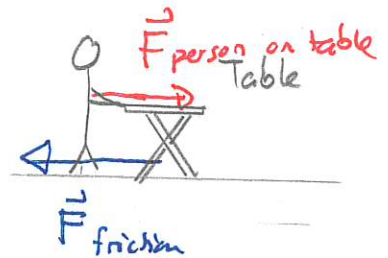
Fri: ~~HW~~ by 5pm

Thurs: Seminar

Mon: HW by 5pm

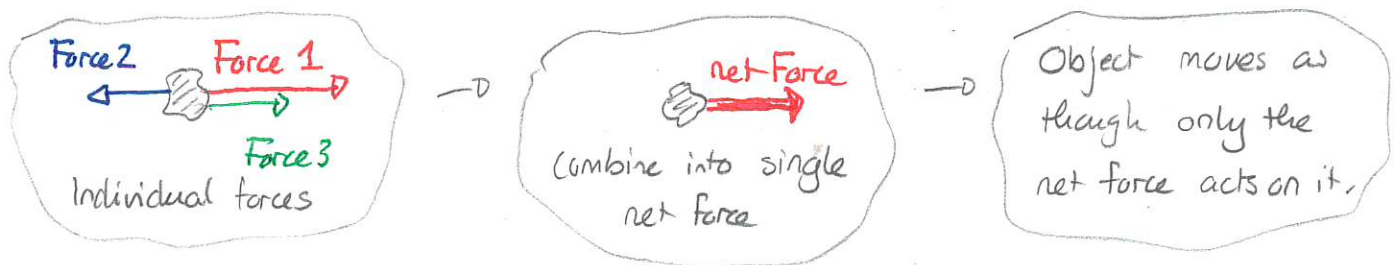
Multiple forces

If there is only one force acting on an object then the object will accelerate and its velocity will change as time passes. However, there are clearly cases where a force acts on an object but there is no acceleration. For example consider a person pushing horizontally on a picnic table which remains stationary. There must be another force.

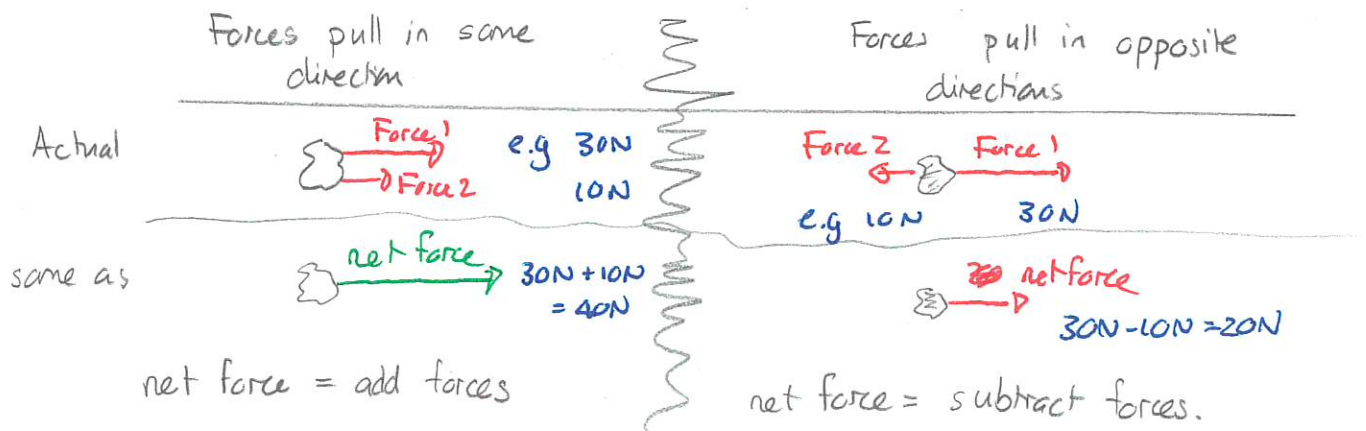


In this case it is a friction force which pushes in the opposite direction. These forces somehow cancel each other. Thus we need to find ways to account for multiple forces.

Observations and experiments reveal that the following works



For forces pointing along the same line, the rule for forming the net force is



Newton's First Law

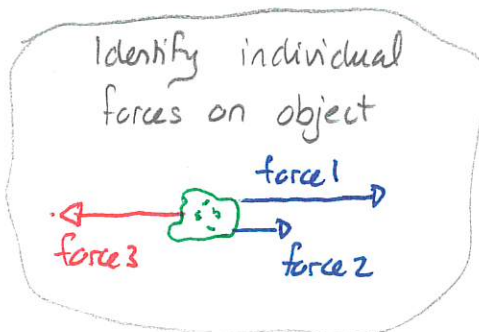
The Law of Inertia can now be stated correctly (and is known as Newton's First Law).

The net force on an object is zero \Leftrightarrow The acceleration of the object is zero \Leftrightarrow The object moves with constant velocity

Quiz 1 30% - 80%

Newton's Second Law

The most interesting situations arise when the net force is non-zero. Then the scheme is:



Combine the forces to get the net force



The acceleration of the object is determined by

$$\text{acceleration} = \frac{\text{net force}}{\text{mass of object}}$$

in m/s^2 → Newtons → kg

NEWTON'S SECOND LAW
 $a = F/m$



Alternatively

$$\text{net force} = \text{mass} \times \text{acceleration}$$
$$F = m \times a$$

Note that again

Net force determines how the velocity of an object changes with time.

Quiz 2 60% - 80%

Quiz 3 90%