MCV 4U
4.3: FORCE AS A VECTOR

① Force $\vec{F}$:

- Amount of push or pull on an object.
- Measured in Newton (N).
- There are several different types of force:

type of force	symbol	description
applied force	$\overrightarrow{F_{app}}$	force acting on an object
frictional force	$\overrightarrow{F_f}$	exists between two surfaces in contact and act opposite to the direction of motion
force of gravity	$\overrightarrow{F_g}$	aka. the weight of an object, this force acts on all objects in earth's gravitational field and always points towards the centre of earth.
normal force	$\overrightarrow{F_N}$	a force that acts perpendicular to the common contact surface between two objects
tension	$\overrightarrow{F_T}$ or $\vec{T}$	force applied through a stretched string or cable
net force	$\overrightarrow{F_{net}}$	aka. resultant force, it is the vector sum of all the forces acting on an object.
equilibrant		a force equal in magnitude but opposite in direction to the resultant.

② VECTOR COMPONENT

- Like all other vectors, a force vector can be broken up (resolved) into horizontal and vertical components, $|\vec{\mathrm{h}}|$ and $|\vec{\mathrm{v}}|$ respectively. [See example 2, page 137]

③ STATE OF EQUILIBRIUM

- The state of an object in which the net force is zero. Objects in this state are either at rest or moving in uniform motion (constant speed in a straight line – also called constant velocity).

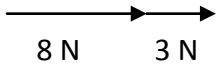
④ ACCELERATION ($\vec{a}$):

- Rate of change in velocity.
- Measured in m/s^2.

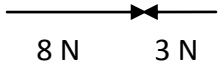
⑤ NEWTON'S FIRST LAW – read page 136

[SEE worked examples 1 to 9 on pages 136-141]

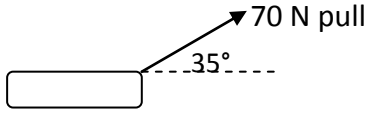
CONSIDER THE FOLLOWING EXAMPLES:

1. 

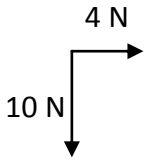
Determine the resultant force.

2. 

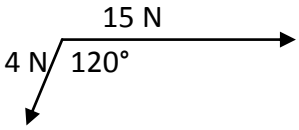
Determine the resultant force.

3. 

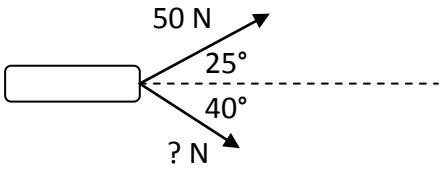
Determine the horizontal & vertical component forces. Describe the meaning of each force.

4. 

Determine the resultant force.

5. 

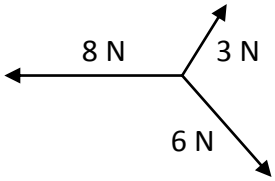
Determine the resultant force.

6. 

What force is required on the lower rope so that the object travels in a straight line? What is the magnitude of the resultant force?

7. 

A 75-kg man lies in a hammock. The ends make angles of 60° and 45° with the horizontal. What is the tension in each end of the hammock?

8. 

Three forces act on an object. If the object remains in a state of equilibrium, calculate the angle between the lines of action of the smaller forces.