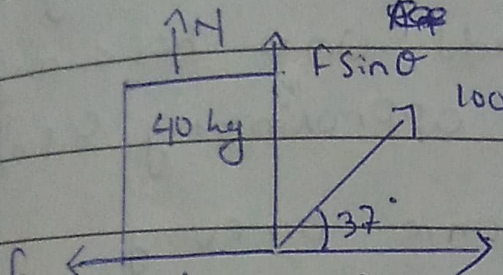
1) A Student pulls a box of book on a smooth horizontal floor with a force 100N in direction of 37° above the horizontal surface. If the mass of the box & book is 40kg, what is the acceleration of the box & normal force on the box by the floor?



:) Height of block - 40kg

Force of pull - 100N in 37° direction above horizontal surface

At equilibrium

Normal force acting on the body - 40N

Acceleration - $f\cos\theta = F$

$f\cos a = ma$

$100 \cos 37^\circ = 40a$

$100 \times \frac{3}{5} = 40a$

$a = \frac{20 \times 3}{40} = \frac{3}{2}$ or $1.5\ m/s^2$

2) In Physics, the concept force is used to desribe how the acceleration of a particle is affected by its interactions with other objects. According to its definition the force "F" exerted on a particle, by one or more other objects is a quantity which depends on the properties of all the interacting objects. This related to the acceleration "a" of the particle so that F=ma. Force is very important concept in Physics and has a meaning somewhat different from that associated with that word in everyday life. Every particle near the surface of the earth interacts with the earth. If this is the only interaction affecting the particle, the resultant acceleration of any such particle is directed downwards and has a magnitude g= approximately 9.8 m/s^2

a) Does the earth exert a force on every particle near to its surface?
yes the earth exert its gravatational force on every particle near to its surface.

b) is this a long-range force or contact force?
it is a long range force & non contact force

c) what is the magnitude of this force on a particle of mass m? what is the direction of this force

Magnitude of the force on a particle of mass m is $F = mg$ (g - acceleration due to gravity)
Direction of this force is towards the centre of the earth.

d) Two object A & B having respective masses of 2kg & 10kg, are both dropped from a tower & fall while interacting solely with earth (since air resistance is negligible.

i) What is the gravitational force acting on A & B?

The gravitational force for acting on A & B by earth is $g = 9.8 m/s^2$ or almost $10 m/s^2$

ii) What is the acceleration of falling object A & B?

Acceleration of falling object A & B is acceleration due to gravity $g = 9.8 m/s^2$ or almost $10 m/s^2$