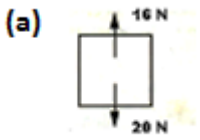
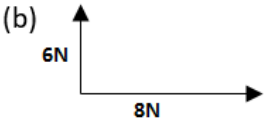
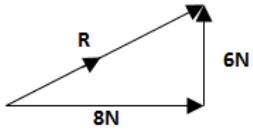
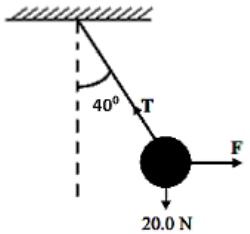
SUVA SANGAM COLLEGE

YEAR 12

PHYSICS

WORKSHEET-6

STRAND 1 MECHANICS

NO.	**CONCEPT IN BRIEF: FORCES** **FORCE** ➢ Is a vector quantity ➢ Unit is Newton (N) **RESULTANT FORCE** Single force upon adding forces on the same object considering their direction. Example (a)  $F_r = \uparrow 16N + \downarrow 20N = \downarrow 4N$ (b)   Newton's 2nd Law ❖ Relationship between F_r and the mass is $F = ma, \quad i.e. \uparrow F \; results \; in \; an \uparrow a, \; (F \alpha a)$ **Equilibrium in 2 dimensions** When 2 or more forces are acting on the same object at the same time, their sum is zero. $\varepsilon F_x = 0, \varepsilon F_y = 0$
1	A pendulum which weighs 20.0 N is attached to a string. It is held aside by a horizontal force F to make an angle of 40° to the vertical as shown in the diagram.  Calculate: (i) The magnitude of the tension T in the string (ii) The force F.

CONCEPT IN BRIEF: FORCES

Applications of Newton's Law

Objectives:

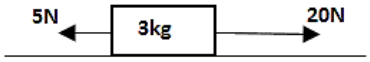
Solve application questions using Newton's Law (2nd Law)

Accelerating Objects

The acceleration of any object can be found by first finding the net force acting on the object. The net/resultant force is the vector sum of all the forces acting on the object.

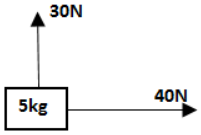
2

(i) Two forces act on a 3ks mass as shown below



Find the acceleration of the mass.

(ii) Two forces act on an object as shown:



Calculate:

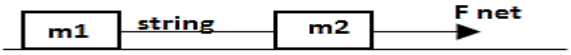
(a) The net force acting on the object.

(b) The acceleration of the object.

CONCEPT IN BRIEF: FORCES

Couples Masses

Case 1a: Masse pulled by strings



Acceleration

Using Newton's 2nd Law:

$$F = ma, \quad a = \frac{F}{m} = \frac{F}{m_1 + m_2}$$

Masses are added since they are connected to each other.

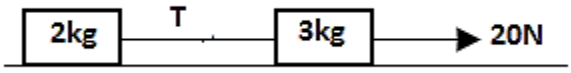
Tension in the string

If the surface is frictionless then the tension in the string connecting the masses is given by:

$$Tension = mass\ being\ pulled \times acceleration$$

3

2 masses are connected by a light inextensible string on a frictionless horizontal surface as shown below.



Calculate:

(i) The acceleration of the system

(ii) The tension in the string connecting the 2 masses.