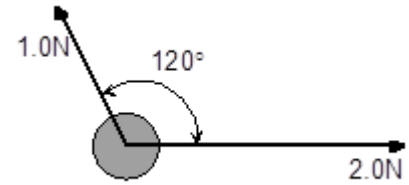

Newton's Second Law : Vector Analysis of Net Force

1. Forces of 100N[N] and 80N[W] act simultaneously on an object of mass 1.0kg. What is the acceleration of the object (remember acceleration is a vector)?

2. Forces of 2.0N and 1.0N act on an object of 5.0kg as shown in the diagram.

- Calculate the net force acting on the object.
- What is the acceleration of the object?



3. An empty railway flatcar of mass 15000kg is being pulled along a smooth, horizontal track by a tractor travelling on a road parallel to the track. The rope joining the tractor and the flatcar makes an angle of 25° with the track.

- If the acceleration of the flatcar is 0.80m/s^2 , what is the force exerted by the rope on the flatcar.
 - Why does the flatcar have no sideways acceleration, what is the sideways force exerted by the rope.
4. A block of mass 2.0 kg is placed on a smooth plane, inclined to the horizontal at an angle of 15°
- What is the acceleration of the block down the plane?
 - How far up the plane was the block released, if it took 1.5s to reach the bottom after it was released from rest?
5. A speedboat is pulling two waterskiers, using two ropes attached to the back of the boat. Each rope makes an angle of 30° on either side of the boat's axis. The force exerted by each rope is 400N. If the boat is moving in a straight line at a constant speed, what force must it be exerting to keep the pair of skiers moving?

Answers :

1. 130 m/s^2 [N39°W]

2. a. 1.7N [E30°N], b. 0.34 m/s^2 [E30°N]

3. a. $1.3 \times 10^4\text{N}$ [25° to the track], b. $5.6 \times 10^3\text{N}$

4. a. 2.5 m/s^2 , b. 2.9m

5. 693N
