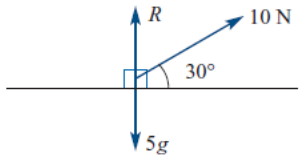
**Forces worksheet 2**

1. A particle slides down a smooth slope of 45°. What is its acceleration?

2. A 60 kg woman skis down a slope that makes an angle of 60° with the horizontal. The woman has an acceleration of 8 $m\ s^{-2}$. What is the magnitude of the resistive force?

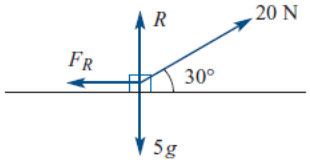
3. Find the acceleration of a 5 kg mass and normal reaction for each of the following situations.

a




smooth surface

b




$F_R = 5\ N$

4. particle of mass 3 kg is being accelerated up a rough inclined plane, with friction force 8 N by a force of 30 Newtons acting parallel to the plane. The plane is inclined at an angle of 30° to the horizontal. Find its acceleration.

5. A particle of mass 5 kg slides from rest down a rough plane inclined at 60° to the horizontal. Given that the of friction between the particle and the plane is 20 N, find the speed of the particle after it has travelled 5 m.

6. A body of mass 8 kg is projected up an incline of 20° with a velocity of 10 $m\ s^{-1}$. If the friction between the body and the plane is 15 N, find the distance it goes up the plane and the velocity with which it returns to its starting point.

7. A car of mass one tonne coasts down a slope inclined at the angle θ ($\sin\theta = 0.05$) at constant speed. The car can ascend the same slope with a maximum acceleration of 1 $m\ s^{-2}$. Find:
**a** the total resistance to the motion (assumed constant)

**b** the driving force exerted by the engine when the maximum acceleration is reached.

8. A particle of mass 5 kg is being pulled up a slope inclined at 30° to the horizontal. The pulling force, *F* Newtons, acts parallel to the slope, as does the resistance with a magnitude one-fifth of the magnitude of the normal reaction.
**a** Find the value of *F*, such that the acceleration is 1.5 $m\ s^{-2}$ up the slope.

**b** Also find the magnitude of the acceleration if this pulling force now acts at an angle of 20° to the slope (i.e. at 50° to the horizontal).