Forces and friction
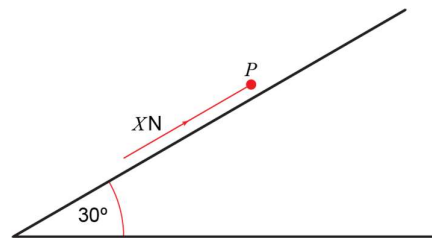
A girl is pulling a sledge of mass 7 kg in a straight line at a constant speed across rough horizontal ground by means of a rope. The rope is inclined at 20° to the ground. The coefficient of friction between the sledge and the ground is $\dfrac{1}{6}$. By modelling the sledge as a particle and the rope as a light inextensible string, find the tension in the rope.

Silver

A particle P of mass 5 kg rests in equilibrium on a rough plane under the action of a force of magnitude X Newtons acting parallel to the plane as shown above. The plane is inclined at 30° to the horizontal. The coefficient of friction between P and the plane is 0.6. The particle is in limiting equilibrium and is on the point of moving up the plane. Calculate:

  a The normal reaction of the plane on P.
  b The value of X.
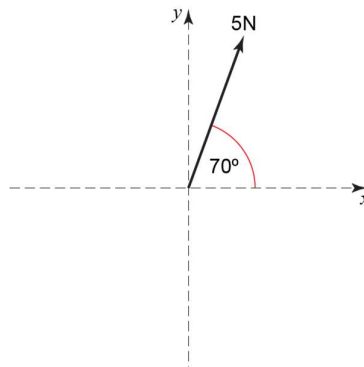
Find the component of the force in the *x*-direction and *y*-direction. Hence write the force in the form *p***i** + *q***j** where **i** and **j** are the unit vectors in the *x*- and *y*-directions respectively.