

7F Pulleys on Slopes

1. Two particles, P and Q, of masses 5kg and 10kg are connected by a light inextensible string. The string passes over a small smooth pulley which is fixed at the top of a plane inclined at an angle of 25° to the horizontal. P is resting on the plane and Q hangs freely with the string vertical and taut. The coefficient of friction between P and the plane is 0.2.
 - a) Find the acceleration of the system

b) Find the tension in the string

2. One end of a light inextensible string is attached to a block A of mass 2kg. The block A is held at rest on a smooth fixed plane which is inclined to the horizontal at an angle of 30° . The string lies along the line of greatest slope of the plane (ie – up the plane), and passes over a smooth light pulley which is fixed at the top of the plane. The other end of the string is attached to a block B of mass 5kg. The system is released from rest. By modelling the blocks as particles and ignoring air resistance:
- a) i) Show that the acceleration of block B is $\frac{4}{7}g$
- ii) Find the tension in the string

b) State how you have used the fact that the string is inextensible in your calculations

c) Calculate the magnitude of the force exerted on the pulley by the string