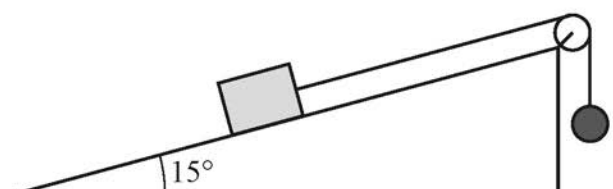
13 A block of mass 8 kg is placed on a rough plane inclined at 15° to the horizontal. The coefficient of friction between the block and the plane is 0.3.

One end of a light rope is attached to the block. The rope passes over a smooth pulley fixed at the top of the plane, and a sphere of mass 5 kg, attached to the other end of the rope, hangs vertically below the pulley. The part of the rope between the block and the pulley is parallel to the plane. The system is released from rest, and as the sphere falls the block moves directly up the plane with acceleration $a\,\mathrm{m\,s^{-2}}$.



(a) On the diagram in the Printed Answer Booklet, show all the forces acting on the block and on the sphere. **[4]**

(b) Write down the equation of motion for the sphere. **[2]**

(c) Determine the value of a. **[6]**