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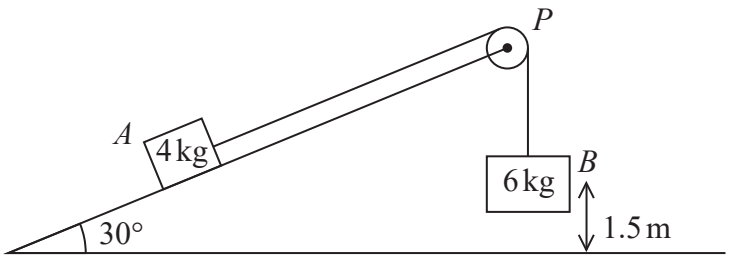


Figure 3

Two blocks, A and B, of masses 4 kg and 6 kg respectively, are connected by a light inextensible string. Block A is held at rest on a fixed rough ramp that is inclined at an angle of 30° to the horizontal. The string passes over a small smooth pulley, P, which is fixed at the top of the ramp. Block B hangs vertically below P, 1.5 m above the ground, as shown in Figure 3. Block A is more than 1.5 m from P. The blocks are released from rest with the string taut so that A moves up the ramp and the section of the string from A to P is parallel to a line of greatest slope of the ramp. The coefficient of friction between A and the ramp is $\frac{1}{\sqrt{3}}$

The blocks are modelled as particles and air resistance is ignored.

(a) Find the work done against friction as A moves 1.5 m up the ramp.

(4)

(b) Find the potential energy lost by the system as A moves 1.5 m up the ramp.

(3)

(c) Use the work-energy principle to find the speed of B at the instant immediately before it hits the ground.

(3)

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Q6