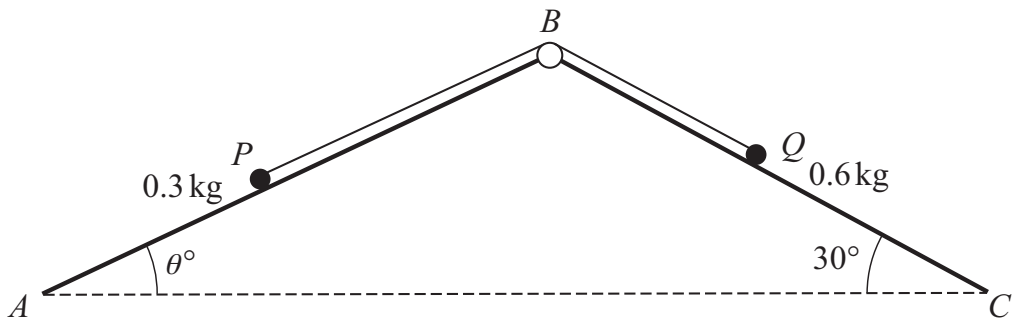
6



Two particles, P and Q, of masses 0.3 kg and 0.6 kg respectively, are attached to the ends of a light inextensible string. The string passes over a smooth pulley fixed at a point B where the inclined planes AB and BC meet. P lies on the smooth plane AB which is inclined at an angle $\theta°$ to the horizontal where $\sin\theta° = 0.4$. Q lies on the plane BC which is inclined at 30° to the horizontal. The string is taut and the particles can move on lines of greatest slope of the two planes (see diagram). The particles are released from rest.

(a) It is given that the plane BC is smooth.

Find the tension in the string and the acceleration of Q. [5]

(b) It is given instead that the plane BC is rough. The work done against the frictional force when Q moves 2 m down the plane is 1.8 J. You should assume that P does **not** reach the pulley and that Q does **not** reach C.

Use an energy method to find the speed of Q when it has moved 2 m down the plane. [4]