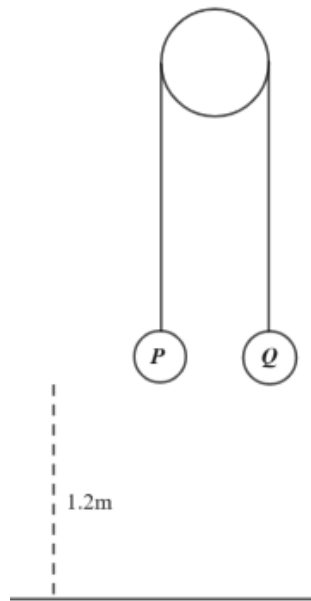


(1) Two particles, P of mass 4kg and Q of mass 5kg are connected by a light inextensible string which is taught over a smooth fixed pulley. The particles are HELD at rest 1.2 metres above the ground as shown below.



The particles are released from rest.

(a) Find the tension in the string.

(b) Find the acceleration of the particles.

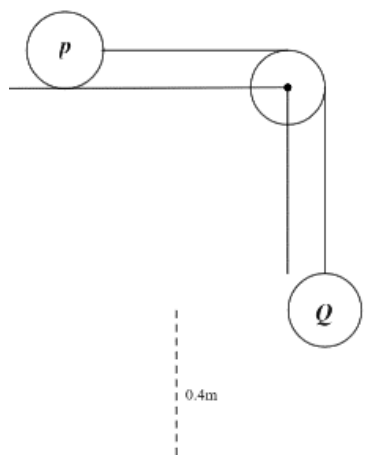
Particle Q hits the floor and doesn't rebound.

(c) Find the maximum height above the ground P reaches. You can assume that P doesn't hit the pulley.

(d) State the modelling assumptions you have made.

(2) A particle P of mass 2kg sits on a rough horizontal table and is connected to a particle Q of mass 3kg by a light inextensible string over a smooth fixed pulley on the edge of the table. The string is taught.

The particles are held at rest with particle Q a distance of 0.4m above the ground. A horizontal force of 14.4N acts against the motion of P on the table. A diagram shows P and Q below.



The particles are released from rest.

(a) Find the tension in the string.

(b) Find the acceleration of the particles.

(c) Find the magnitude and direction the of the force exerted on the pulley.

(d) After release Q hits the ground and doesn't rebound. Find the time taken for P to come to rest. You may assume P doesn't hit the pulley.

(e) State the modelling assumptions you have made.