3 Block P of mass 2.0 kg is connected to a spring of spring constant 200 N m^{-1} that has one end fixed to the wall as shown in Fig. 3.1. Block P is in turn connected to block Q of mass 4.0 kg via an inextensible string.

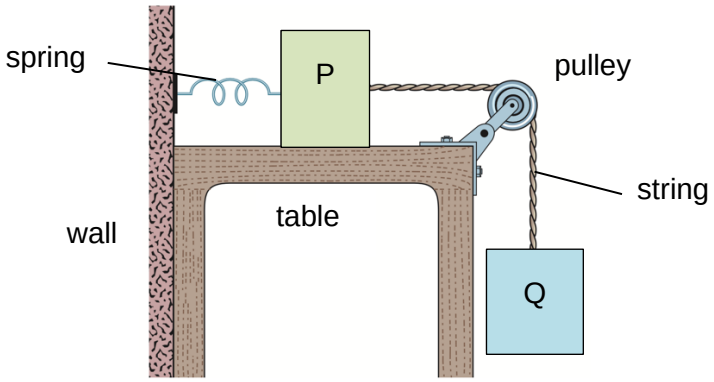

Fig. 3.1

The horizontal surfaces between block P and the table, and the pulley are frictionless. The pulley has negligible mass.

The blocks are released from rest with the spring being unstretched.

(a) Consider the spring, mass P and Q as a system.

State the energy conversion in the system just after block Q starts to move downwards.

.....

.....

..... [1]

(b) **(i)** Calculate the combined kinetic energy of the two blocks when block Q has fallen by 9.0 cm.

kinetic energy = …….. J [2]

(ii) Calculate the kinetic energy of the block Q after it has fallen by 9.0 cm.

kinetic energy = …….. J [2]

(c) Determine the distance that block Q has fallen before it first comes to rest.

distance = …….. cm [2]