3 A 2.0 kg block on a track is released at A, 1.0 m above the ground as shown in Fig. 3.1. The track is frictionless except for the rough surface between B and C, which has a length of 2.0 m. The block travels down the track, hits the spring of force constant k = 225 N m^{-1} at D and compresses the spring by 0.20 m from its equilibrium position before coming to rest momentarily.

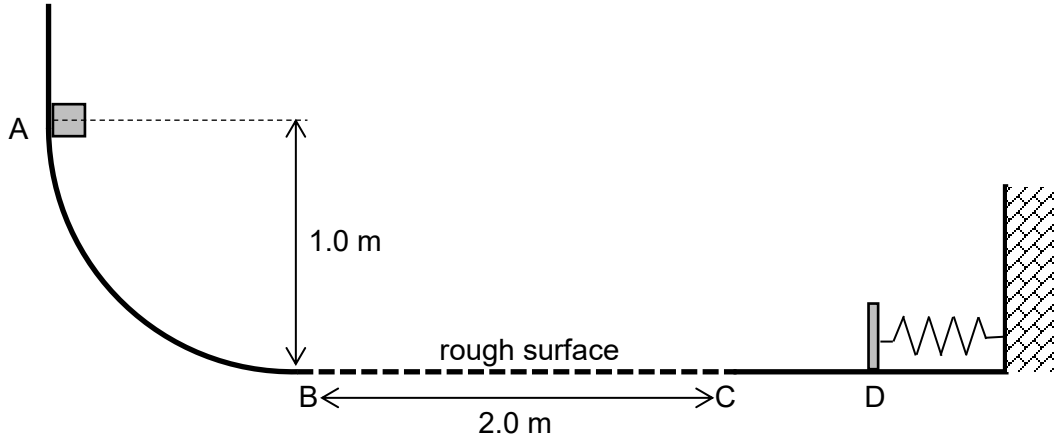

Fig. 3.1

(a) (i) Determine the speed of the block at B.

speed at B = ... m s^{-1} [2]

(ii) Calculate the maximum elastic potential energy stored in the spring.

elastic potential energy = ... J [1]

(iii) Using your answers to **(a)(i)** and **(ii)**, determine the work done against friction when the block travels from B to C.

work done against friction = ... J [2]

(b) The block subsequently rebounds and moves towards B after the spring un-compresses itself. Determine the distance along the track from C where the block finally stops.

distance from C = ... m [3]

[Total: 8]