1 **(a)** A wooden block placed on a weighing scale on a table registers 1.6 kg.

The same block and the weighing scale are now placed on a rough slope as shown in Fig. 1.1.

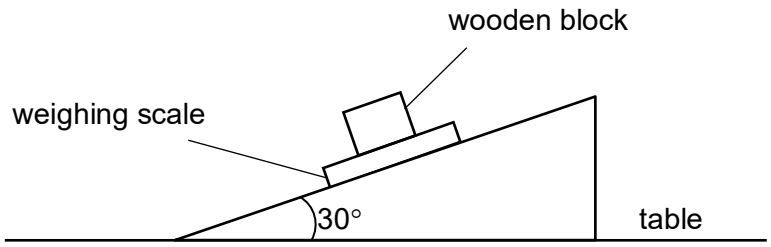

Fig. 1.1

The slope is at an angle of 30° to the horizontal.

Determine the new reading on the weighing scale. Show your working clearly.

new reading on the weighing scale = ... kg [3]

(b) The same block is now suspended from the ceiling by a cord of length 1.3 m.

A tennis ball of mass 58 g is shot from a launcher and strikes the block horizontally.

The ball is in contact with the block for a time of 0.20 s during which it reverses its direction and moves off with a speed of 19 m s^{-1}. After the collision, the block swings to a maximum angle of 37° from its initial vertical position.

Assume that during the collision, vertical motions are negligible.

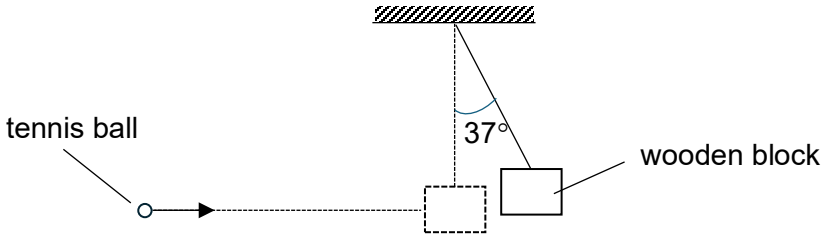

Fig. 1.2

(i) Show that the speed of the block immediately after the collision is 2.3 m s^{-1}.

[2]

(ii) Calculate the average force *F* between the ball and the block during the collision.

F = ... N [2]

(iii) Determine the horizontal speed of the ball before the collision.

initial speed of the ball = ... m s^{-1} [2]

(c) Using your answers in **(b)**, deduce whether the collision is elastic.

.....

.....[2]

[Total: 11]