4 **(a)** A sphere in a liquid accelerates vertically downwards from rest. the viscous force acting on the moving sphere, state:

(i) the direction

..... [1]

(ii) the variation, if any, in the magnitude.

..... [1]

(b) A man of weight 750 N stands a distance of 3.6 m from end D of a horizontal uniform beam AD, as shown in Fig. 4.1.

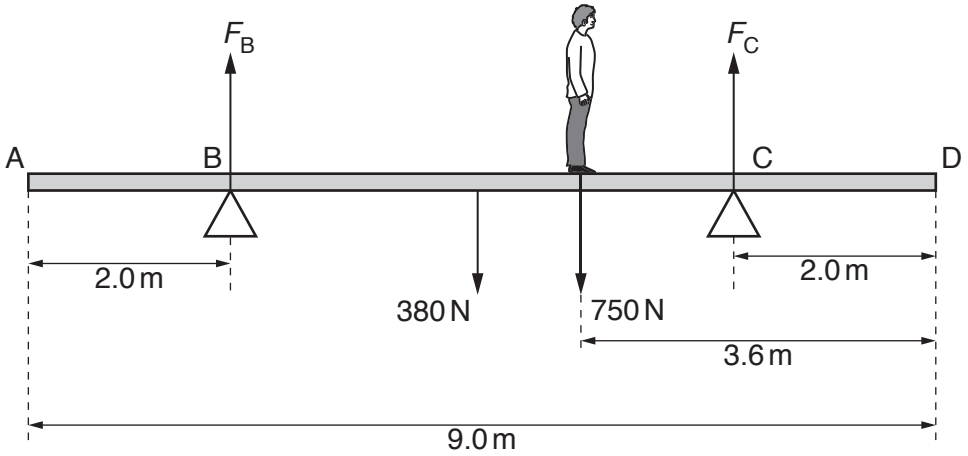

Fig. 4.1 (not to scale)

The beam has a weight of 380 N and a length of 9.0 m. The beam is supported by a vertical force F_B at pivot B and a vertical force F_C at pivot C. Pivot B is a distance of 2.0 m from end A and pivot C is a distance of 2.0 m from end D. The beam is in equilibrium.

(i) State the principle of moments.

.....

.....

..... [2]

(ii) By using moments about pivot C, calculate F_B.

F_B = ... N [2]

(iii) The man walks towards end D. The beam is about to tip when F_B becomes zero.

Determine the minimum distance x from end D that the man can stand without tipping the beam.

x = ... m [2]

[Total: 8]