

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

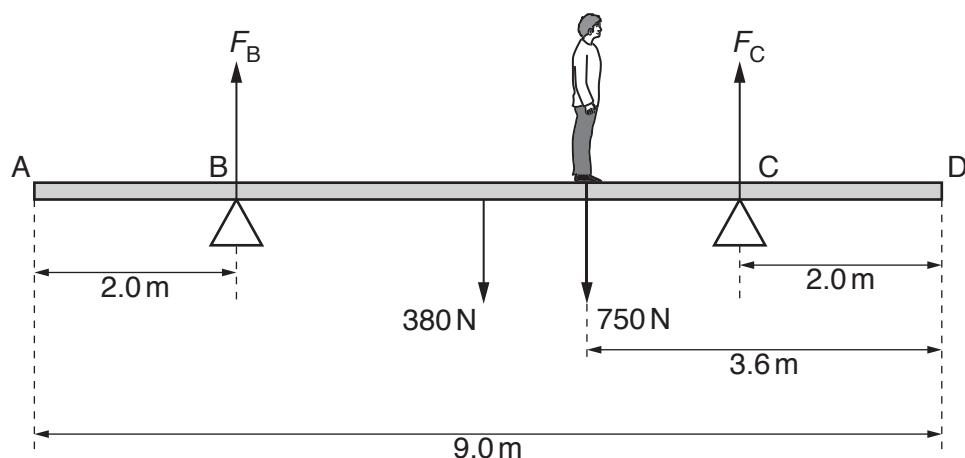
(i) the direction

..... [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  $F_B$ .

$$F_B = \dots\dots\dots\dots\dots N [2]$$

- (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.

$$x = \dots\dots\dots\dots\dots m [2]$$

[Total: 8]