**2** **(a)** Define the moment of a force about a pivot.

.....

..... [1]

**(b)** Three objects A, B and C are placed on a horizontal beam. The beam is in equilibrium, as shown in Fig. 2.1.

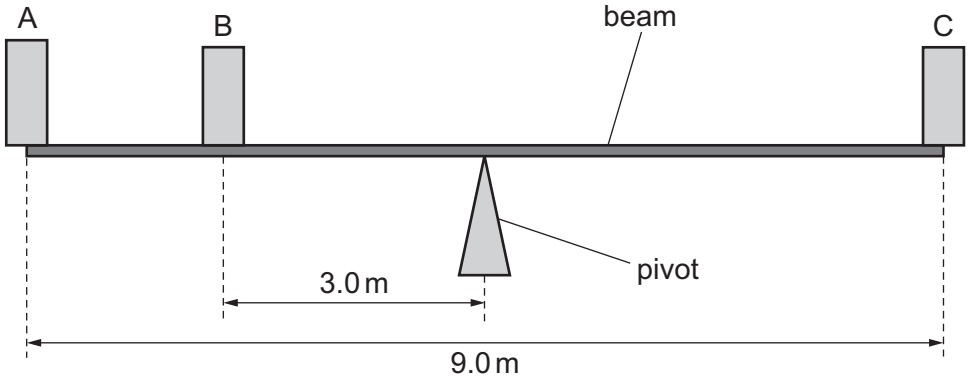


**Fig. 2.1** (not to scale)

The beam is uniform and has length 9.0 m.
A pivot is at the midpoint of the beam.
Object A has mass 90 kg and is at one end of the beam.
Object B has mass *m* and is a distance of 3.0 m from the pivot.
Object C has mass 150 kg and is at the other end of the beam.

**(i)** Calculate *m*.

*m* = ..... kg [3]

**(ii)** Object A is removed and replaced by a wire fixed to the end of the beam and to the ground, as shown in Fig. 2.2.

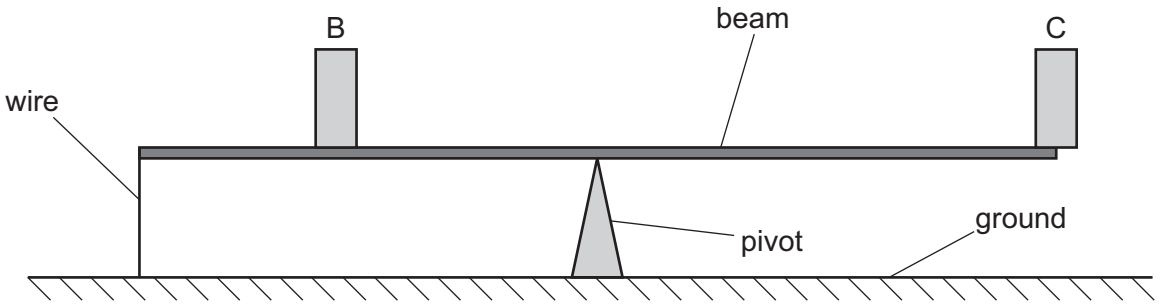


**Fig. 2.2**

After the change, the beam is again horizontal and in equilibrium. The positions of B and C are unchanged.

The wire has a diameter of $1.8 \times 10^{-3}$ m and has a strain of $1.2 \times 10^{-3}$.
The wire is not extended beyond its limit of proportionality.

Calculate the Young modulus of the wire.

Young modulus = ..... Pa [3]

**(iii)** Object B is now moved to a new position closer to the pivot without passing it. The beam is again horizontal and in equilibrium.

State and explain the effect, if any, that this has on the strain in the wire.

.....

.....

..... [2]

[Total: 9]