1 **(a)** State the two conditions necessary for the equilibrium of a body acted upon by a number of forces.

1. ……………………………………………………………………………………………

……………………………………………………………………………………………………

2. ……………………………………………………………………………………………

…………………………………………………………………………………………… [2]

(b) A ***non-uniform*** beam of mass 20 kg and length 5.0 m is supported by a cable and hinged to the wall as shown in Fig. 1.1. The beam supports a mass of 5.0 kg at one end and is in equilibrium.

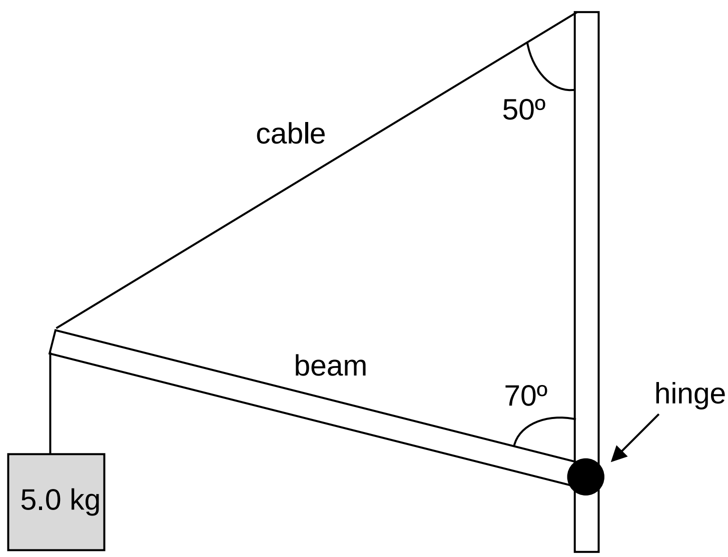

Fig. 1.1

(i) On Fig. 1.1, draw a free body diagram of the forces acting on the beam. [2]

(ii) If the tension in the cable is 120 N, calculate the position of the centre of gravity of the beam from the hinge.

centre of gravity = …… m [2]

(iii) Calculate the magnitude and direction of the force acting by the wall on the beam.

force = …….. N

direction = ……with the beam [4]

[Total: 10]