**16**   A simple lifting mechanism comprises a light inextensible wire which is passed over a smooth fixed pulley.

One end of the wire is attached to a rigid triangular container of mass 2 kg, which rests on horizontal ground.

A load of m kg is placed in the container.

The other end of the wire is attached to a particle of mass 5 kg, which hangs vertically downwards.

The mechanism is initially held at rest as shown in the diagram below.
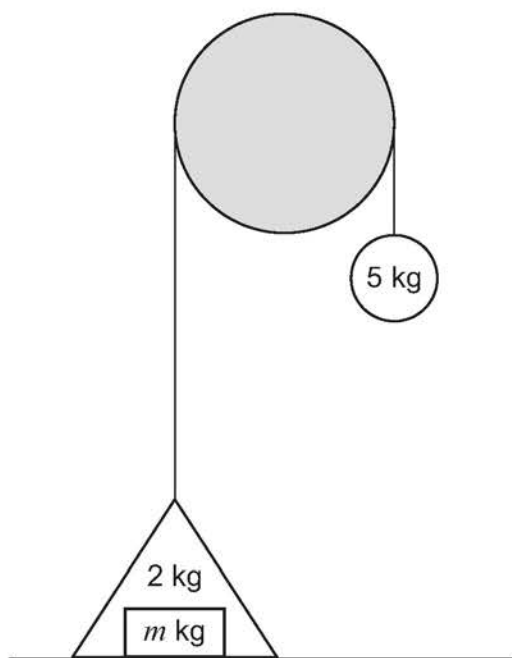
The mechanism is released from rest, and the container begins to move upwards with acceleration a m s^{-2}

The wire remains taut throughout the motion.

16 (a)   Show that

$$a = \left(\frac{3 - m}{m + 7}\right) g$$

[4 marks]

16 (b)   State the range of possible values of m.

[1 mark]

16 (c)   **In this question use $g = 9.8$ m s^{-2}**

The load reaches a height of 2 metres above the ground 1 second after it is released.

Find the mass of the load.

[4 marks]

16 (d)   Ignoring air resistance, describe **one** assumption you have made in your model.

[1 mark]