2 **(a)** State the principle of moments.

……

……. [1]

(b) Fig. 2.1 shows a mass A of 0.50 kg resting on a 4.50 kg beam. Top end of the beam is hinged to the wall while the bottom of the beam is supported by a horizontal light spring located at a distance of 1.15 m from the hinge. A light stopper is placed beside mass A to prevent it from sliding.

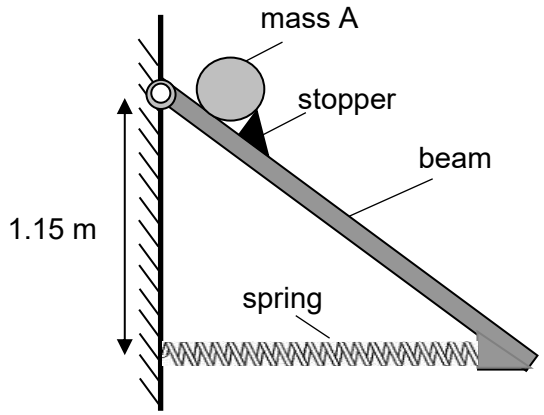

Fig. 2.1

(i) The combined weight *W* of mass A and beam acts at a horizontal distance of 0.80 m from the wall.

Show that the tension *T* in the spring is 34 N.

[1]

(ii) There is a force *R* exerted by the hinge on the beam.

Sketch a vector triangle to represent the three forces *R*, *T* and *W* in equilibrium.

[2]

(iii) Hence, or otherwise, determine the magnitude of R and its direction.

R = …… N

direction …….. [3]

(c) In Fig. 2.2, the bottom end of the beam is now rested on a smooth floor. The stopper is removed and the mass A slides down along the smooth beam and the smooth floor before colliding with a stationary mass B.

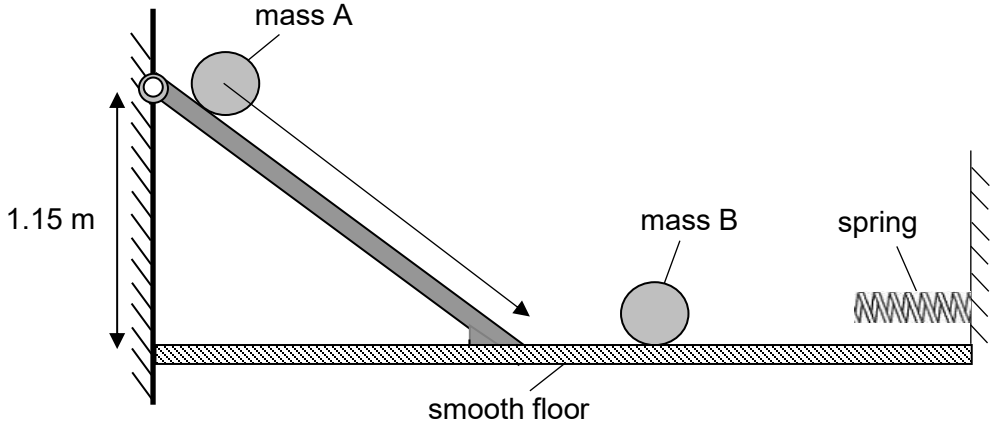

Fig. 2.2

Upon collision, masses A and B stick together. Subsequently, they collide with a horizontal spring and come to an instantaneous stop.

Describe the energy changes as mass A slides down the beam until the two masses come to their instantaneous stop.

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