3 **(a)** Define *simple harmonic motion*.

.....

.....

..... [2]

(b) A horizontal plate is vibrating vertically, as shown in Fig. 3.1.

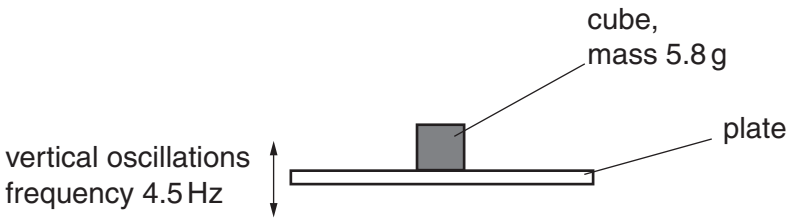

Fig. 3.1

The plate undergoes simple harmonic motion with a frequency of 4.5 Hz and amplitude 3.0 mm.
A metal cube of mass 5.8 g rests on the plate.

Calculate, for the cube, the energy of oscillation.

energy = ... J [3]

(c) The amplitude of oscillation of the plate in **(b)** is gradually increased. The frequency remains constant.
At one particular amplitude, the cube just loses contact momentarily with the plate.

(i) State the position of the plate in its oscillation at the point when the cube loses contact.

.....

.....

..... [2]

(ii) Calculate this amplitude of oscillation.

For Examiner's Use

amplitude = ... m [2]