2 A metal plate is made to vibrate vertically by means of an oscillator, as shown in Fig. 2.1.
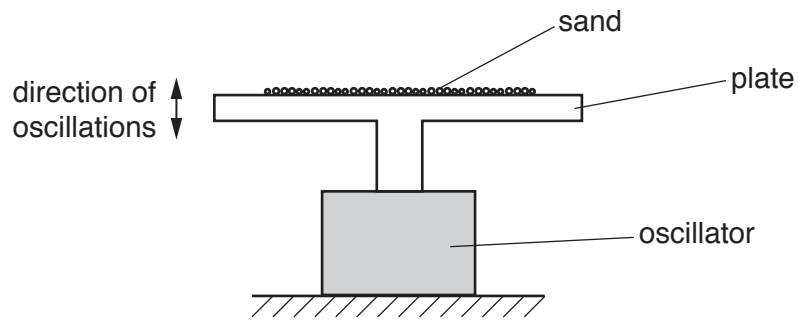

Fig. 2.1

Some sand is sprinkled on to the plate.

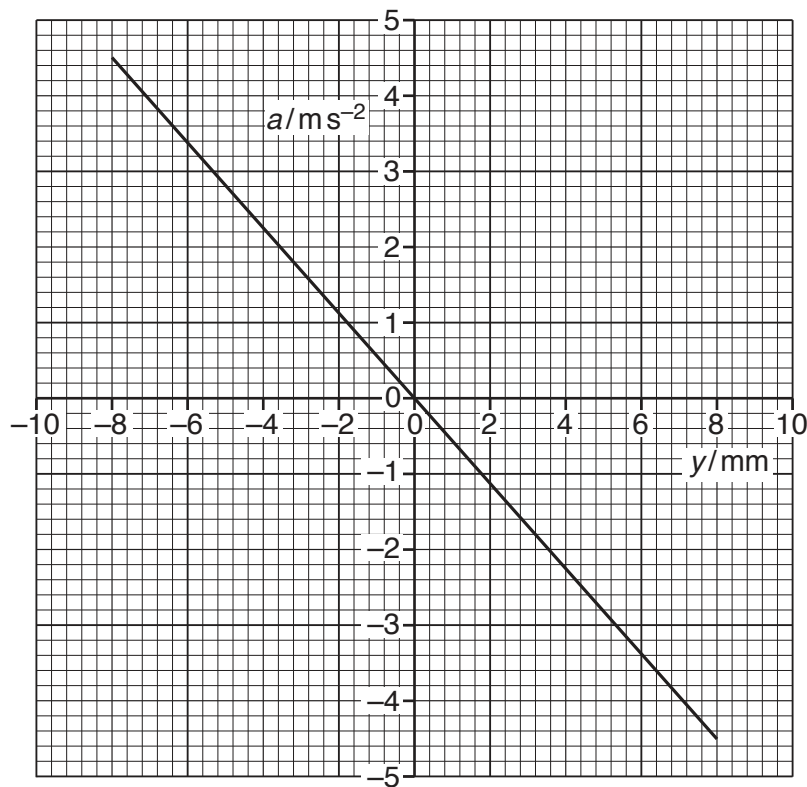The variation with displacement y of the acceleration a of the sand on the plate is shown in Fig. 2.2.

Fig. 2.2

(a) (i) Use Fig. 2.2 to show how it can be deduced that the sand is undergoing simple harmonic motion.

....

....

....

....[2]

(ii) Calculate the frequency of oscillation of the sand.

frequency = ... Hz [2]

(b) The amplitude of oscillation of the plate is gradually increased beyond 8 mm. The frequency is constant.

At one amplitude, the sand is seen to lose contact with the plate.

For the plate when the sand first loses contact with the plate,

(i) state the position of the plate,

....[1]

(ii) calculate the amplitude of oscillation.

amplitude = ... mm [3]

[Total: 8]

 [Turn over