4 **(a)** State what is meant by simple harmonic motion.

.....

.....

..... [2]

(b) A small sphere is suspended from a fixed point P by a string of negligible mass, as shown in Fig. 4.1.

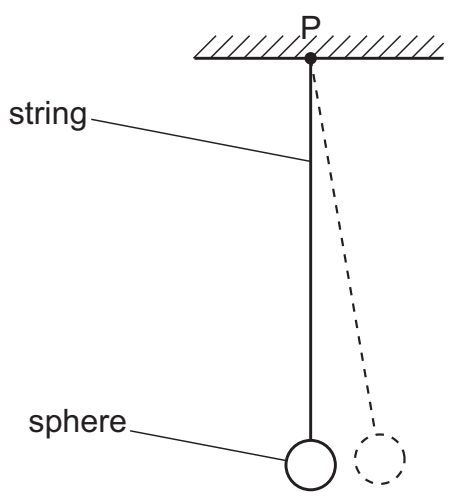

Fig. 4.1

The sphere is given a small horizontal displacement and is then released.

The variation with time of the horizontal velocity v of the sphere is shown in Fig. 4.2.

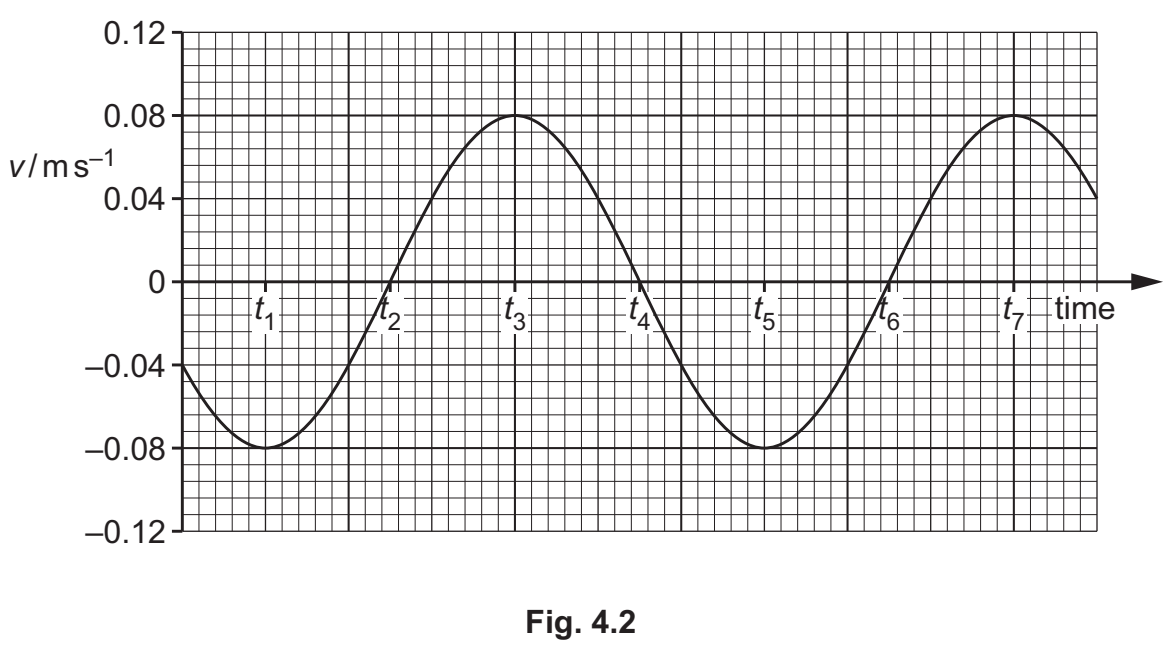

Fig. 4.2

(i) State two times at which the sphere is passing in the same direction through the equilibrium position.

time ..... and time ..... [1]

(ii) The time interval between t_1 and t_6 is 2.2 s.

Calculate the frequency of oscillation of the sphere.

frequency = ... Hz [2]

(c) The sphere in **(b)** is undergoing simple harmonic motion.

Use your answer in **(b)(ii)** and data from Fig. 4.2 to determine the maximum displacement of the sphere from its equilibrium position.

maximum displacement = ... m [3]

[Total: 8]