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

.....

.....

..... [2]

(b) A block is suspended from a spring, as shown in Fig. 4.1.

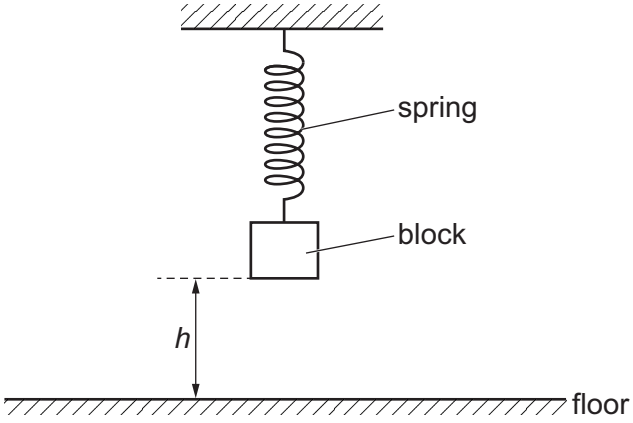

Fig. 4.1

The block is pulled down and released at time $t = 0$. It then oscillates vertically with simple harmonic motion.

Fig. 4.2 shows the variation of the velocity v of the block with height h of the base of the block above the floor.

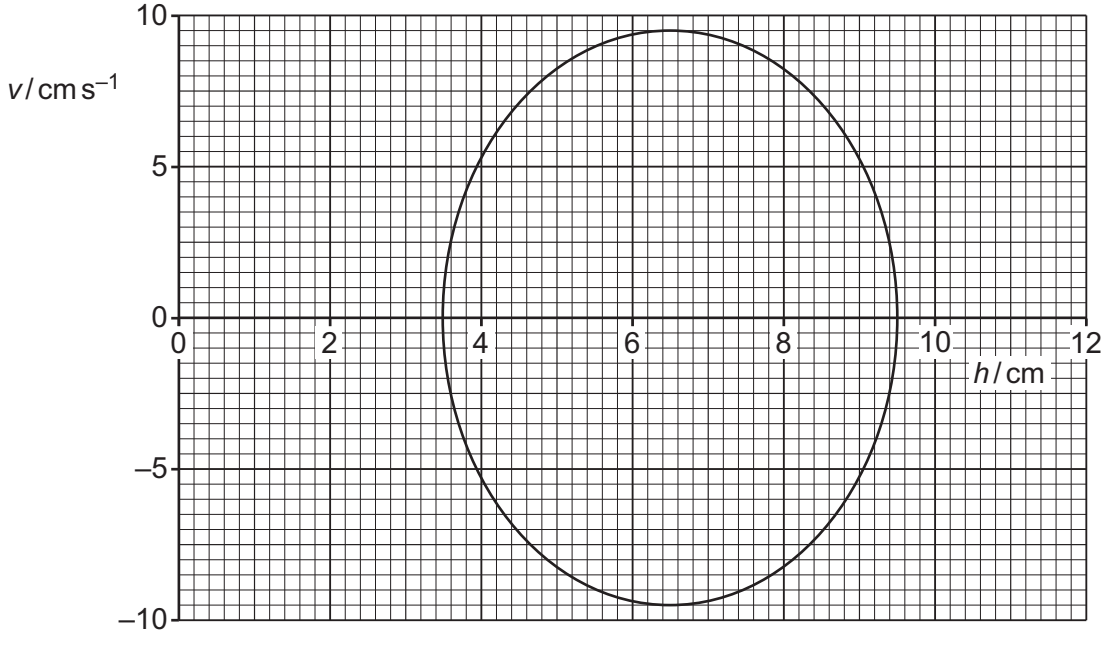

Fig. 4.2

(i) Determine the amplitude, in cm, of the oscillations.

amplitude = ... cm [1]

(ii) Show that the angular frequency of the oscillations is $3.2\,\text{rad}\,\text{s}^{-1}$.

[2]

(iii) Calculate the period T of the oscillations.

T = ... s [2]

(iv) On Fig. 4.3, sketch the variation of h with time t from $t = 0$ to $t = 6.0\,\text{s}$.

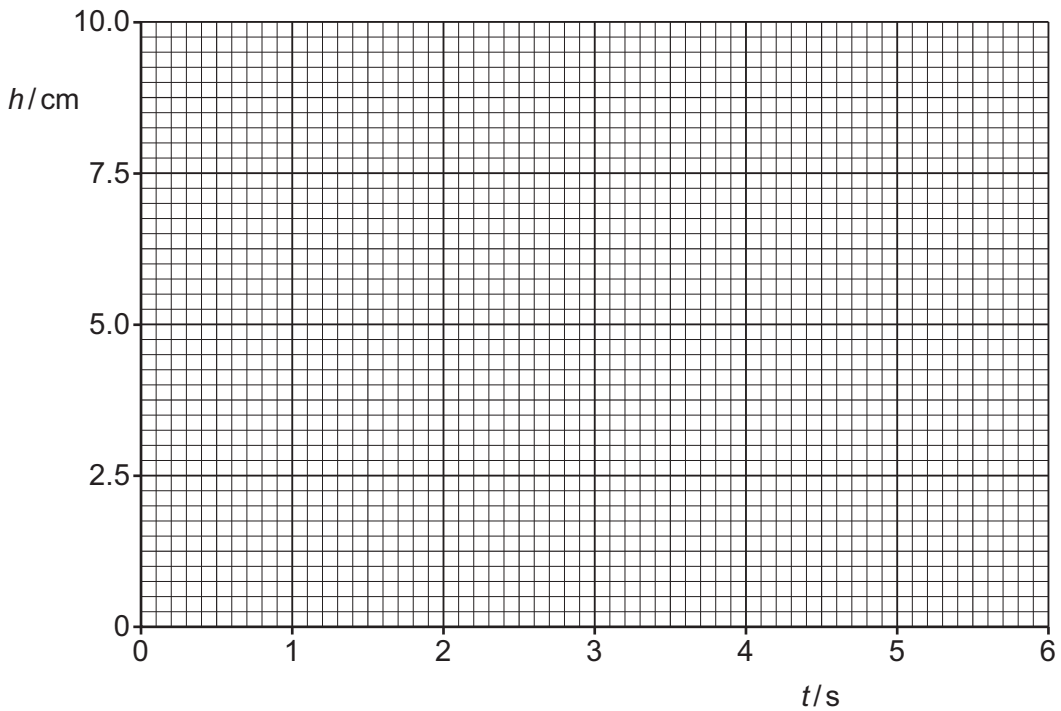

Fig. 4.3

[4]

[Total: 11]