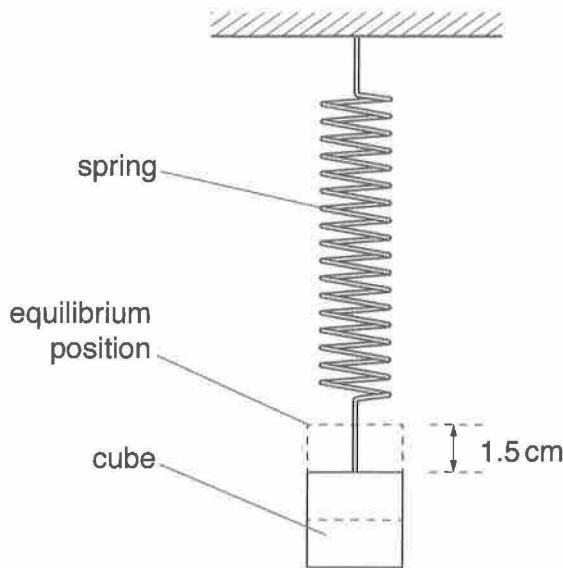


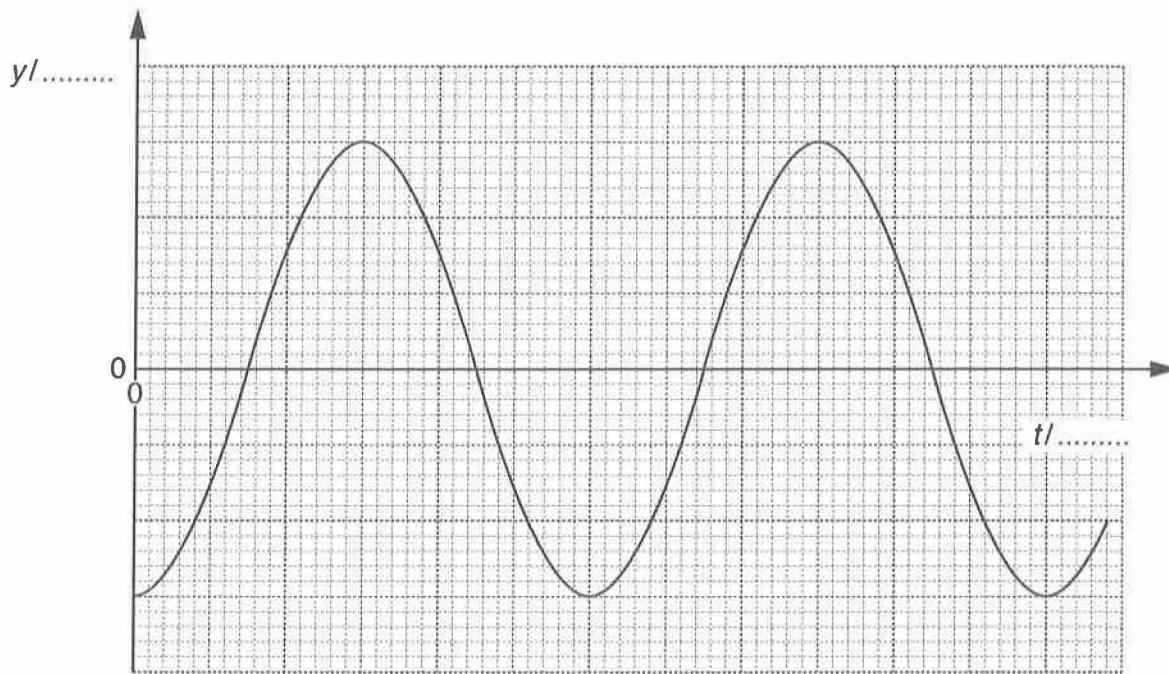
- 4 A student times the vertical oscillations of a metal cube suspended from a fixed point by means of a light spring, as shown in Fig. 4.1.



**Fig. 4.1**

The cube is displaced downwards by 1.5 cm from its equilibrium position and then released at time  $t = 0$ . The cube completes 20 oscillations in a time of 12.0 s.

- (a) Complete the axes of Fig. 4.2 to show the variation with time  $t$  of the displacement  $y$  of the cube.



**Fig. 4.2**

[2]



- (b) (i) Calculate the minimum time taken for the cube to travel from a displacement of + 2.0 mm to a displacement of – 2.0 mm.

time = ..... s [3]

- (ii) Use Fig. 4.2 to estimate the minimum time taken for the cube to travel from a displacement of –1.3 cm as the cube moves downwards to a displacement of –1.3 cm as the cube moves upwards.

time = ..... s [1]

- (c) Use your answers in (b) to suggest and explain whether timing of the period of oscillation of the cube should be made from the position where the displacement is zero or where it is a maximum.

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[2]

