

- 2 An object of mass m of 0.42 kg is attached to a spring S and the system is made to oscillate with simple harmonic motion on a horizontal, frictionless surface, as shown in Fig 2.1. The mass passes through the equilibrium position at P 200 times per minute.

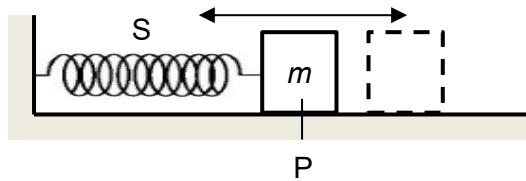


Fig 2.1

The kinetic energy of the mass as it passes through the equilibrium position is 500 mJ.

- (a) (i) Determine the period of the oscillation.

$$\text{period} = \dots \text{ s} \quad [1]$$

- (ii) Show that the amplitude of the oscillation is approximately 15 cm.

[3]

- (iii) Sketch in Fig 2.2 the variation with time of the velocity of the mass for 2 cycles. Label the axes with appropriate values.



Fig 2.2

[2]

- (b) Deduce the change, if any, to the frequency of the oscillation if the following modifications are made separately to the experiment:

- (i) the experiment is done on Mars instead of the Earth,

.....
..... [1]

- (ii) another spring identical to S is connected in parallel, as shown in Fig 2.3.

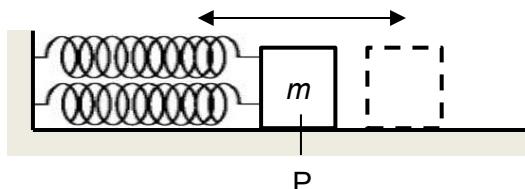


Fig 2.3

[1]