3 **(a)** A body undergoes simple harmonic motion.

The variation with displacement x of its velocity v is shown in Fig. 3.1.

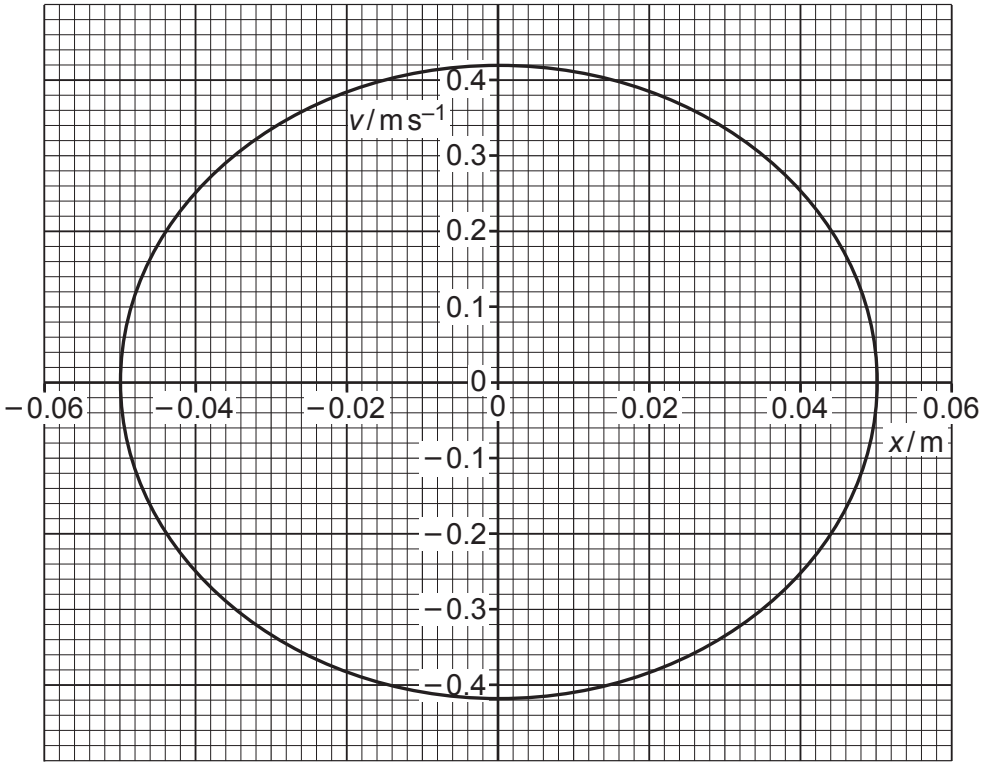

Fig. 3.1

(i) State the amplitude x_o of the oscillations.

x_o = ... m [1]

(ii) Calculate the period T of the oscillations.

T = ... s [3]

(iii) On Fig. 3.1, label with a P a point where the body has **maximum** potential energy. [1]

(b) A bar magnet is suspended from the free end of a spring, as shown in Fig. 3.2.

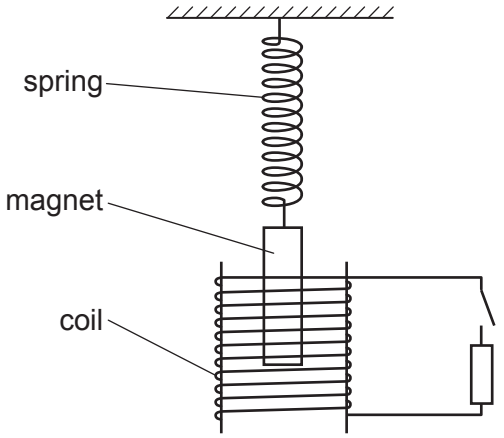

Fig. 3.2

One pole of the magnet is situated in a coil of wire. The coil is connected in series with a switch and a resistor. The switch is open.

The magnet is displaced vertically and then released. The magnet oscillates with simple harmonic motion.

(i) State Faraday's law of electromagnetic induction.

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..... [2]

(ii) The switch is now closed. Explain why the oscillations of the magnet are damped.

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..... [3]

[Total: 10]