

- 9 (a) State **two** situations in which a charged particle in a magnetic field does **not** experience a force.

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2.
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[2]

- (b) A loosely coiled metal spring is suspended from a fixed point, as shown in Fig. 9.1.

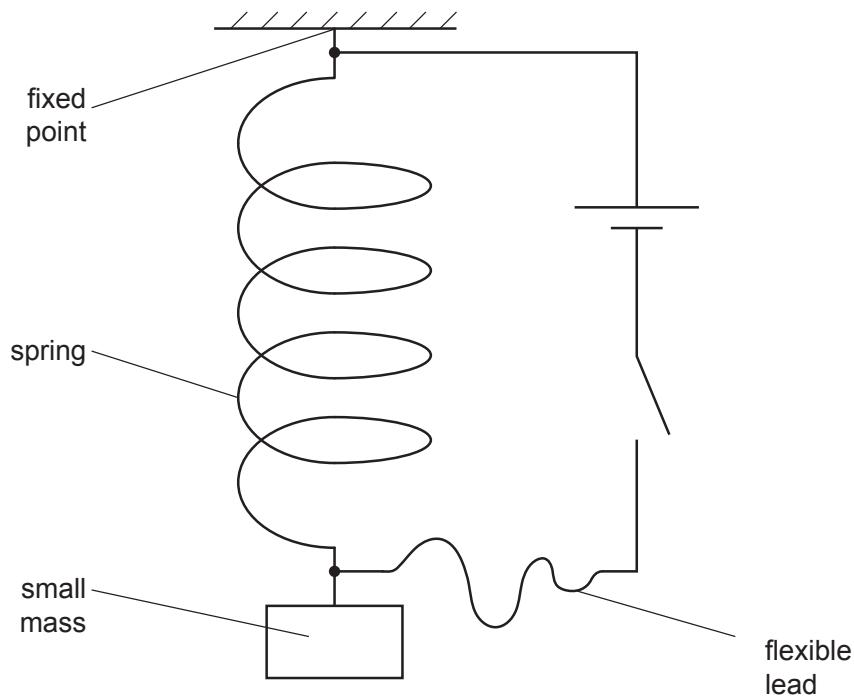


Fig. 9.1

Electrical connections are made to the ends of the spring by means of a flexible lead.

The length of the spring is measured before the switch is closed and then again after the switch is closed.

When the switch is closed, a magnetic field is set up around each coil of the spring.

By reference to these magnetic fields, explain why there is a change in length of the spring.
State whether the spring extends or contracts.

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[4]

- (c) With the switch in (b) closed, the small mass on the free end of the spring is now made to oscillate vertically.

Use the principles of electromagnetic induction to explain why small fluctuations in the current in the spring are found to occur.

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[3]