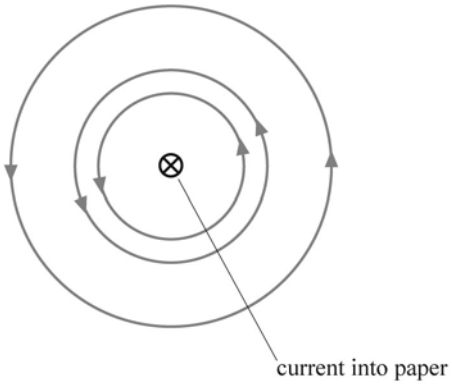
9 End-of-chapter test 1

Answer all questions.

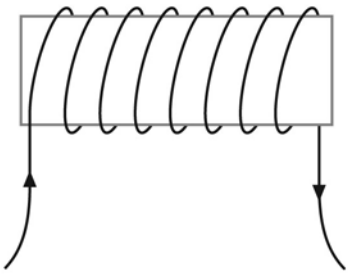
1 The diagram shows the magnetic field pattern for a current-carrying straight wire drawn by a student in her notes.



List two errors made by the student. [2]

2 Define magnetic flux density. [2]

3 **a** Copy and complete the diagram below to show the magnetic field pattern for a long solenoid. [2]



b Describe how the field pattern in **a** would change when the current in the solenoid is reversed and the current is increased. [2]

4 You can predict the direction of the force experienced by a current-carrying conductor placed at right angles to an external magnetic field using Fleming's left-hand rule.
Describe Fleming's left-hand rule. [1]

5 The horizontal component of the Earth's magnetic field has a flux density of 2.0×10^{-5} T.
A cable of length 1.2 m and carrying a current 15 A hangs vertically.
Calculate the force experienced by this cable. [3]

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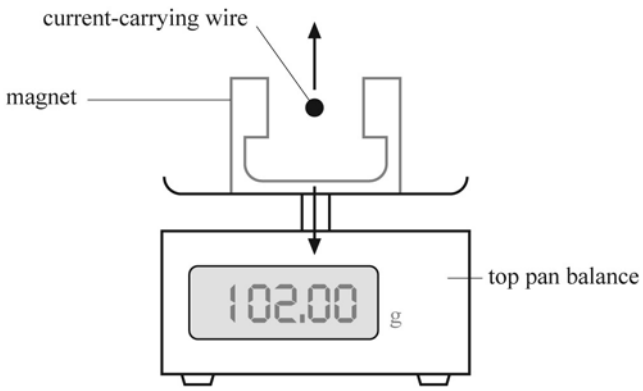
6 The diagram shows an arrangement that is used to determine the magnetic flux density between the poles of a magnet.



The magnet is placed on a sensitive top pan balance. A current-carrying wire is placed at right angles to the magnetic field between the poles of the magnet. The force experienced by the current-carrying wire is equal but opposite to the force experienced by the magnet.
The magnet is pushed downward when the wire experiences an upward force.

The length of the wire in the magnetic field is 5.0 cm. The balance reading is 102.00 g when there is no current in the wire. The balance reading increases to 103.14 g when the current in the wire is 8.2 A.

a Show that the force experienced by the wire is equal to 1.1×10^{-2} N. [1]

b Calculate the magnetic flux density of the magnetic field between the poles of the magnet. [3]

Total: _____ Score: %
16

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