

- 6 (a) Define *magnetic flux density*.

..... [1]

- (b) A long solenoid of diameter 4.0 cm has 520 turns of insulated copper wire. The diameter of the wire is 0.46 mm. The wire is wrapped in a single layer with no gaps between each of the turns. The copper wire has resistivity  $1.7 \times 10^{-8} \Omega \text{ m}$ .

Calculate the resistance  $R$  of the wire of the solenoid.

$R =$  .....  $\Omega$  [3]

- (c) The solenoid in (b) is connected to a 24 V supply.

Use information from (b) to calculate the magnetic flux density  $B$  along the axis of the solenoid, at its centre.

$B =$  ..... T [3]

- (d) A current-carrying wire is placed inside, and along the axis of the solenoid in (b). The solenoid remains connected to the 24 V supply.

State and explain the magnitude of the force, if any, experienced by the wire.

..... [1]

[Total: 8]

