14 Some liquids conduct electricity. This property can be used to pump these liquids through pipes.
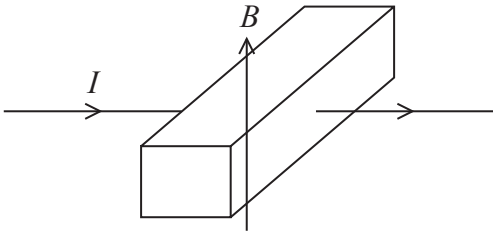
A short section of a rectangular pipe containing a liquid is shown in the diagram. The pipe is placed in a magnetic field of flux density B and a current I is passed through the liquid as shown.

(a) Add an arrow to the diagram above to show the direction in which the liquid will move.

(1)

(b) A practical demonstration of this principle used two rectangular electrodes, opposite each other on either side of the pipe, a distance of 0.60 mm apart. The dimensions of the electrodes are shown in the diagram.

The electrodes were connected to a 1.5 V cell. Salt water was pumped using a magnetic field of magnetic flux density 0.40 T.
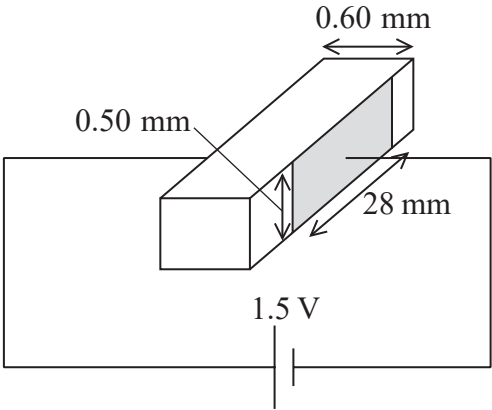
(i) Show that the current through the salt water is about 20 mA.

resistivity of salt water = 1.6 Ω m

(4)

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(ii) Hence calculate the force on the salt water.

(2)

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Force = ...

(Total for Question 14 = 7 marks)