5 The poles of a horseshoe magnet measure 5.0 cm × 2.4 cm, as shown in Fig. 5.1.

For Examiner's Use

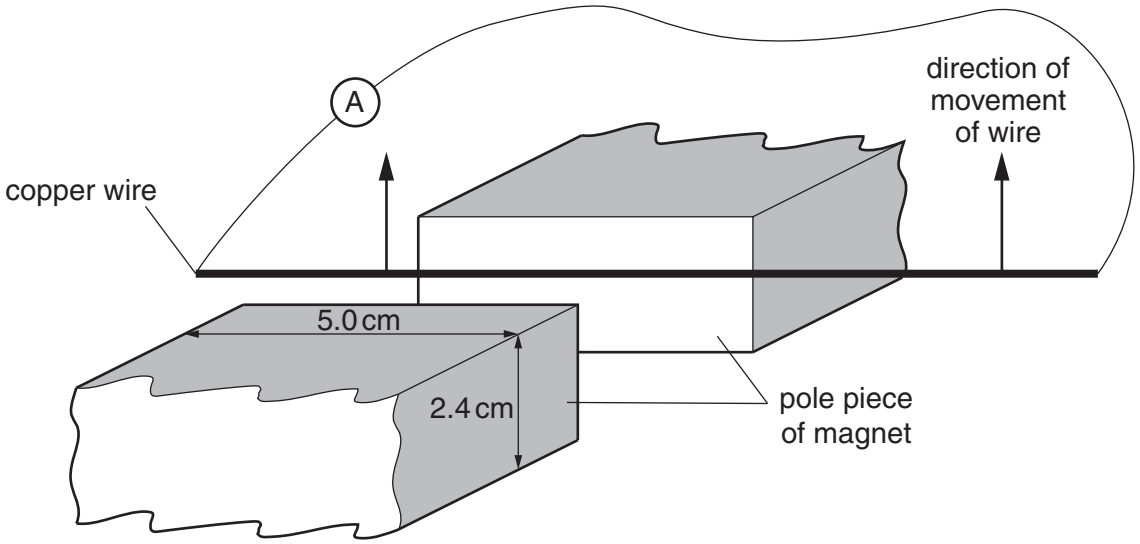

Fig. 5.1

The uniform magnetic flux density between the poles of the magnet is 89 mT. Outside the region of the poles, the magnetic flux density is zero.
A stiff copper wire is connected to a sensitive ammeter of resistance 0.12 Ω. A student moves the wire at a constant speed of 1.8 m s^{-1} between the poles in a direction parallel to the faces of the poles.

(a) Calculate the magnetic flux between the poles of the magnet.

magnetic flux = ... Wb [2]

(b) (i) Use your answer in **(a)** to determine, for the wire moving between the poles of the magnet, the e.m.f. induced in the wire.

e.m.f. = ... V [3]

(ii) Show that the reading on the ammeter is approximately 70 mA.

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[1]

(c) By reference to Lenz's law, a force acts on the wire to oppose the motion of the wire. The student who moved the wire between the poles of the magnet claims not to have felt this force.
Explain quantitatively a reason for this claim.

.....

..... [3]