**6** A long vertical rectangular frame, of width of 2.0 m, consists of a 2.0 Ω resistor and conducting wires of negligible resistance. The frame is placed in a uniform magnetic field of flux density 0.35 T. The magnetic field is directed into the plane of the frame.

A horizontal metal rod of mass 0.15 kg and negligible resistance slides along the frame downwards, as shown in Fig. 6.1. The metal rod remains in electrical contact with the frame throughout its motion.
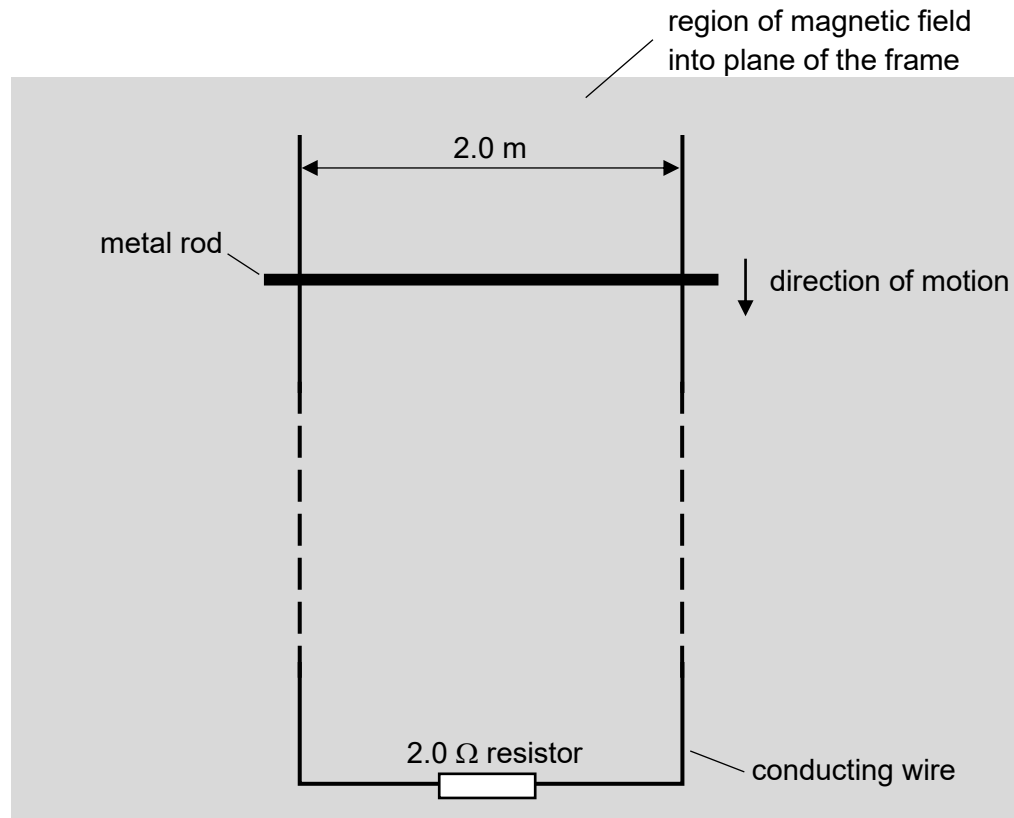


Fig. 6.1

**(a)** Explain why a magnetic force acts on the metal rod.

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**[3]**

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**(b)** State and explain the direction of the magnetic force.

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[2]

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**(c)** Determine the highest speed the metal rod can reach. Assume that friction and air resistance are negligible.

speed   =                                   m s$^{-1}$   [4]

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