

3. (a) A uniform thin wire XY is suspended by two inelastic strings attached to its end. The wire has a mass of 20 g and its resistance is  $1.2 \, \Omega$ . The length of the wire is 50 cm. The wire and the supporting strings are placed in a region where there is a uniform magnetic field of magnitude 40 mT and direction perpendicular to the plane containing the strings and the wire, as shown in Fig. 3. What is the direction and magnitude of the potential difference that must be applied to the wire so that the tension in the strings becomes zero?

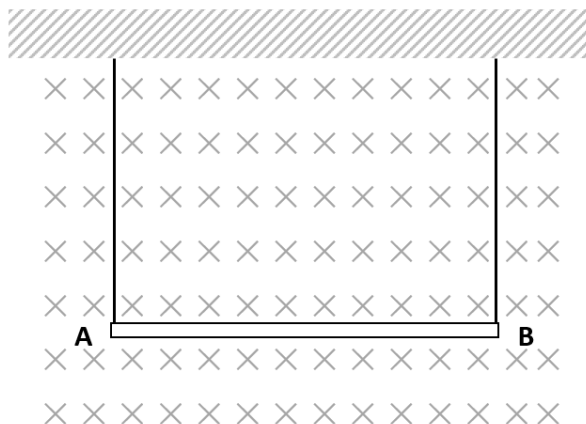


Fig. 3.

[From A to B, 11.77 V]

[4 marks]