1. An induced EMF is produced by a changing magnetic flux.

$$\mathcal{E} = \frac{\Delta \Phi}{\Delta t}$$

For a single straight wire

FIGURE 21-9   A conducting rod is moved to the right on a U-shaped conductor in a uniform magnetic field **B** that points out of the paper.
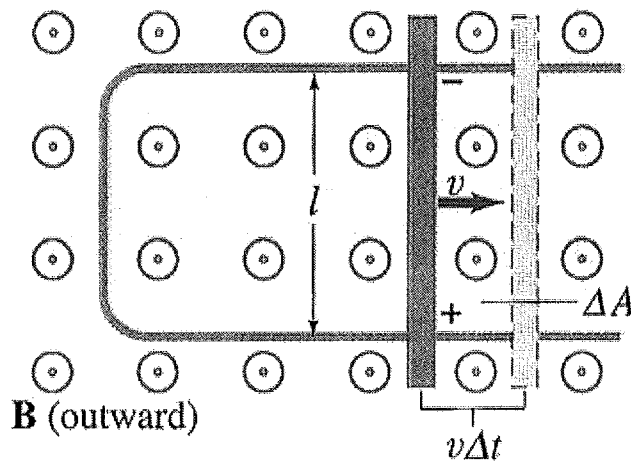
If the B is constant and A changes then

$$\mathcal{E} = \frac{B \Delta A}{\Delta t}$$

$$\mathcal{E} = \frac{B l v \Delta t}{\Delta t}$$

$$\mathcal{E} = B l v$$

Example: An airplane travels 100km/h in a region where the Earth's magnetic field is 5.0×10^{-5} T and is nearly vertical. What is the potential difference induced between the wing tips that are 70m apart?

$$\varepsilon = Blv$$

$$\varepsilon = 5.0 \times 10^{-5} \text{ T} \times 70\text{m} \times \frac{100\text{km/h}}{3.6}$$

$$1.0V$$