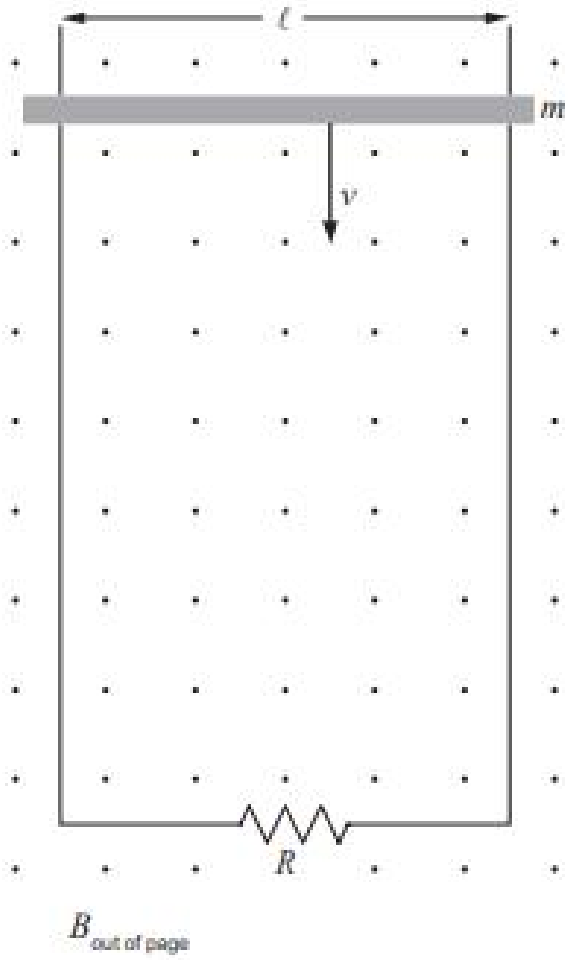
Question 12 **(6 marks)**

A metal bar of mass m is falling through a uniform horizontal magnetic field of strength B. The effective length of the bar in the field is ℓ. The bar, which maintains contact with the frictionless wire, completes an external circuit with a resistance of R. Derive an expression for the velocity of the bar in terms of m, g, R, B and ℓ given the velocity is constant.



Answer: v = _____