

tutorial #6 [electromagnetic induction] .quiz

1) Joseph Henry puts a sliding rod with length $L = 10$ cm and weight $mg = 1.0$ N on a circuit as shown in fig. 1 with resistance $R = 10 \Omega$. The rod is sliding down the tracks with no friction and the resistance of vertical tracks and rod is negligible. There is a uniform magnetic field, $B = 1.0$ T perpendicular to the plane as shown in the figure. Call the velocity of the rod, v , going down. In the first three parts find the answer in terms of v .

- a) Find the emf induced in the circuit.
- b) Find the current passing through the circuit. Draw the direction.
- c) What is the magnetic force on the rod?
- d) Now if v remains constant (zero acceleration), what is the value of $v = v_c$?
- e) Joseph stops the rod, and release it again (initial velocity = 0). So the rod starts accelerating. Would rod accelerate forever? Why?
- f) Joseph pushes the rod so initially it moves faster than the value you found in part 'd', $v(t = 0) > v_c$. Will the rod slow down? Why?

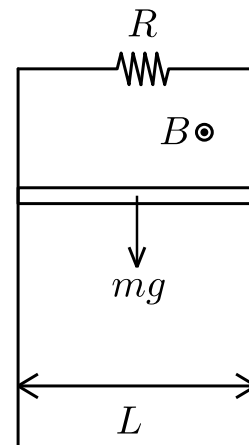


Figure 1: A rod sliding down in a magnetic field.