Physics 2135   **Special Homework Assignment #7**

Consider a 1.5 V battery with a 0.3 Ω resistor attached to two conducting, frictionless rails 0.200 m apart. The entire apparatus is in a uniform magnetic field **B** directed out of the page and of magnitude 0.400 T perpendicular to the rails. A conducting bar can slide over the rails perpendicular to them as well as to the field. All other resistances in the problem are negligible compared to the 0.3 Ω resistor. The bar is placed on the rails, starts from rest, and is observed to accelerate.

1.5 V

⊙ *B*   0.2 m

0.3 Ω

x
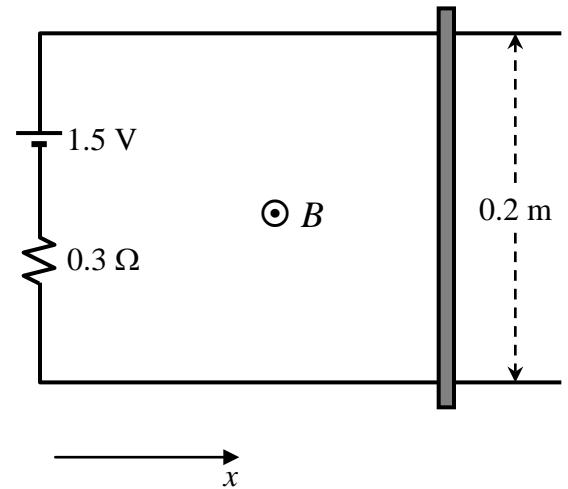
(a) What is the direction of the bar's acceleration?

(b) What is the direction of the emf induced in the bar?

(c) Use Faraday's Law to calculate the magnitude of the **induced** emf when the bar reaches a speed of 12.0 m/s.

(d) Calculate the current in the bar when its speed is 12.0 m/s.