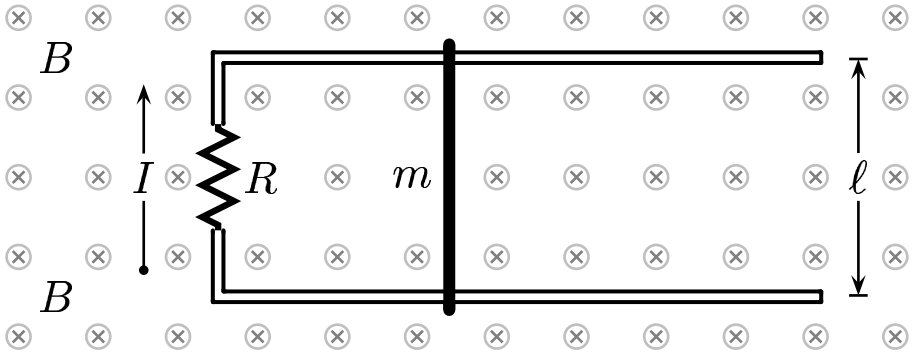
Given: A metal rod (with mass m) is sliding along two parallel metal rails, with a constant speed v. A resistor R is placed across the parallel tracks on the left. The magnetic field B is constant and into the page. The direction of induced current I is shown.



Determine the direction of the velocity v of metal rod.

A) $v = 0$

B) $\rightarrow$

C) $\leftarrow$

The current I creates a field in the direction which is into the page (the same direction as the external magnetic field shown in the figure).

Lenz's Law says the motion of the rod must oppose the change of the flux defined by the loop, in order to make the flux remain constant. Therefore the rectangular area defined by the left end, the two rails, and the metal rod is contracting; *e.g.*, to make up for the decrease in flux due to the external magnetic field.

Thus the rod slides to the left ($v \leftarrow$).

Answer **C**.

31.02-03˙Moving˙Rod˙and˙Force 2004-3-24