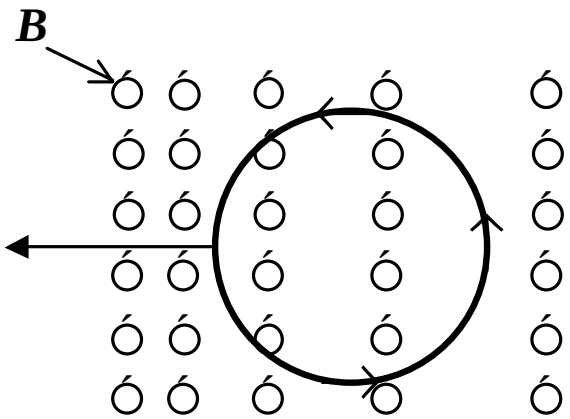
Quiz #3 Solution: Pratt's lecture, Feb. 20, 2002

A conducting ring of radius r = 0.25 m and resistance R = 1.2 Ω is moving in a non uniform magnetic field, as shown.

1. The induced current in the ring flows
   (a) clockwise
   (b) anticlockwise



To oppose the increase in magnetic flux, a magnetic field must be induced that points **out of the page**. The induced current must then be anticlockwise by the right-hand rule.

2. Suppose that the average field through the ring as it moves increases linearly with time so that

$$\frac{\Delta B}{\Delta t} = 3.0 \text{ T/s}.$$

Now $A = \pi r^2 = 0.196$ m^2 and $|e| = \frac{\Delta \Phi}{\Delta t} = A\frac{\Delta B}{\Delta t}$

Finally, $I = \frac{e}{R} = \frac{A}{R}\frac{\Delta B}{\Delta t} = \frac{0.196}{1.2}3.0 = 0.49$ Amp

The induced current in the ring is

(a) 0.25 A
(b) 0.37 A
(c) 0.49 A
(d) 0.61 A
(e) 0.73 A