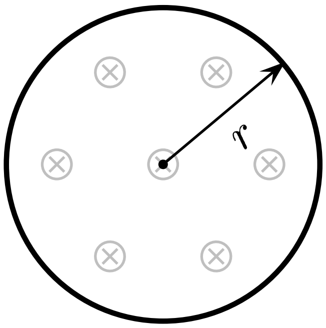
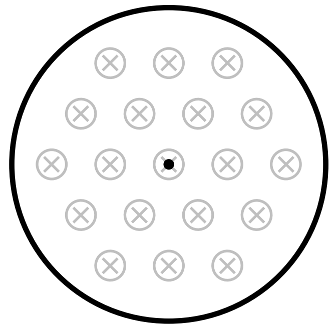
Given $r = 1\,\text{m}$.
At $t_1 = 0\,\text{sec},\ B_1 = 1\,\text{T}$.
At $t_2 = 2\,\text{sec},\ B_2 = 2\,\text{T}$.



B_1 at t_1



B_2 at t_2

Find the induced emf $\mathcal{E}_{\text{ind}}$, in volts.

A) $|\mathcal{E}_{\text{ind}}| = \pi$ and its direction is clockwise.

B) $|\mathcal{E}_{\text{ind}}| = \dfrac{\pi}{2}$ and its direction is clockwise.

C) $|\mathcal{E}_{\text{ind}}| = \pi$ and its direction is counterclockwise.

D) $|\mathcal{E}_{\text{ind}}| = \dfrac{\pi}{2}$ and its direction is counterclockwise.

Based on the formula $\epsilon_{\text{ind}} = \left|\frac{d\,\phi}{dt}\right| = \left|\frac{B_2\,A - B_1\,A}{t_2 - t_1}\right|$, the magnitude of induced emf $|\epsilon_{\text{ind}}| = \frac{(2-1)\,\pi}{2-0} = \frac{\pi}{2}$ volts.

Direction: B_{ind} opposes the increase of flux within the circular loop. So B_{ind} is out. RHR #3 implies that ϵ_{ind} is counterclockwise.

Answer **D**.

31.04-01˙Varying˙Flux˙and˙Induced˙Emf 2004-3-24