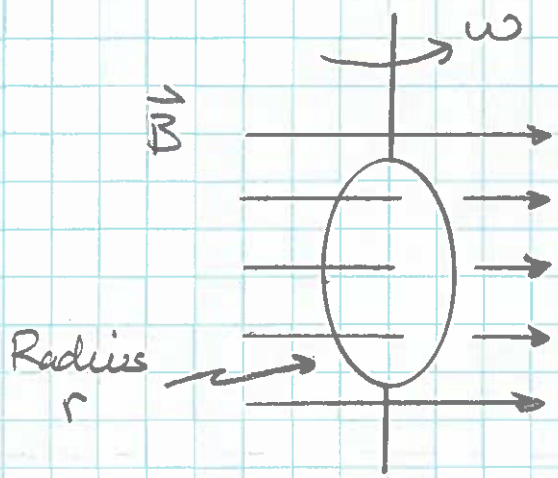
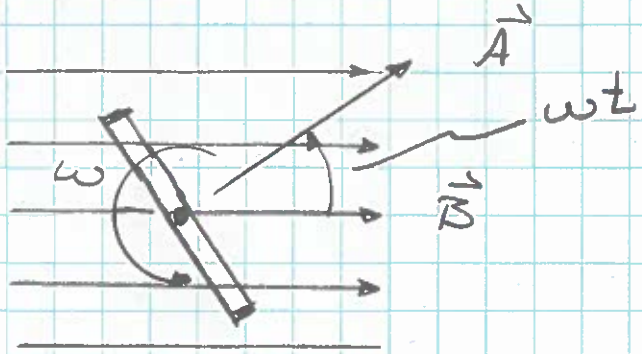


Looking Down



Induced EMF: $\mathcal{E} = \left| \frac{d\Phi_m}{dt} \right|$

$$= \left| \frac{d}{dt} (\vec{A} \cdot \vec{B}) \right|$$

$$= \left| \frac{d}{dt} (AB \cos \omega t) \right|$$

$$= |AB\omega \sin \omega t|$$

So, induced current:

$$I_{in} = \frac{\mathcal{E}}{R} = \frac{\pi r^2 B \omega |\sin \omega t|}{R}$$

This is an AC current that changes direction with frequency ω.

e.g. see the generator on the Faraday's Lab PhET.