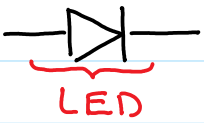
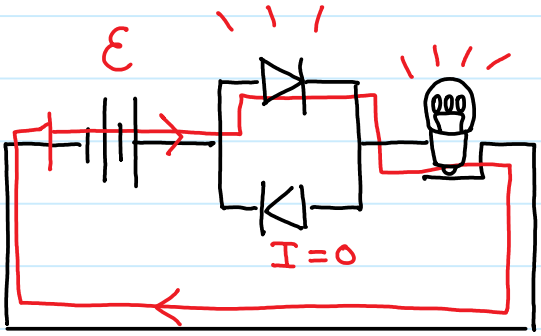
4) Faraday's Law

1) LIGHT EMITTING DIODE (VIDEO):

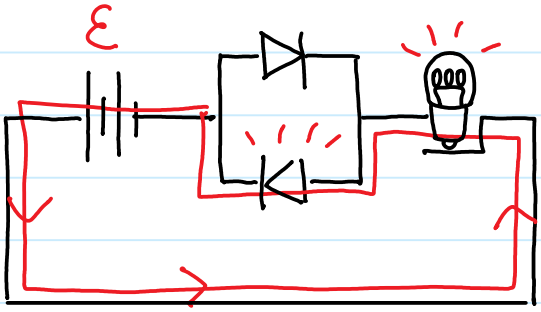


2) video: unlike a bulb, a light-emitting diode (LED) lets current flow just ... one way

3)
4)



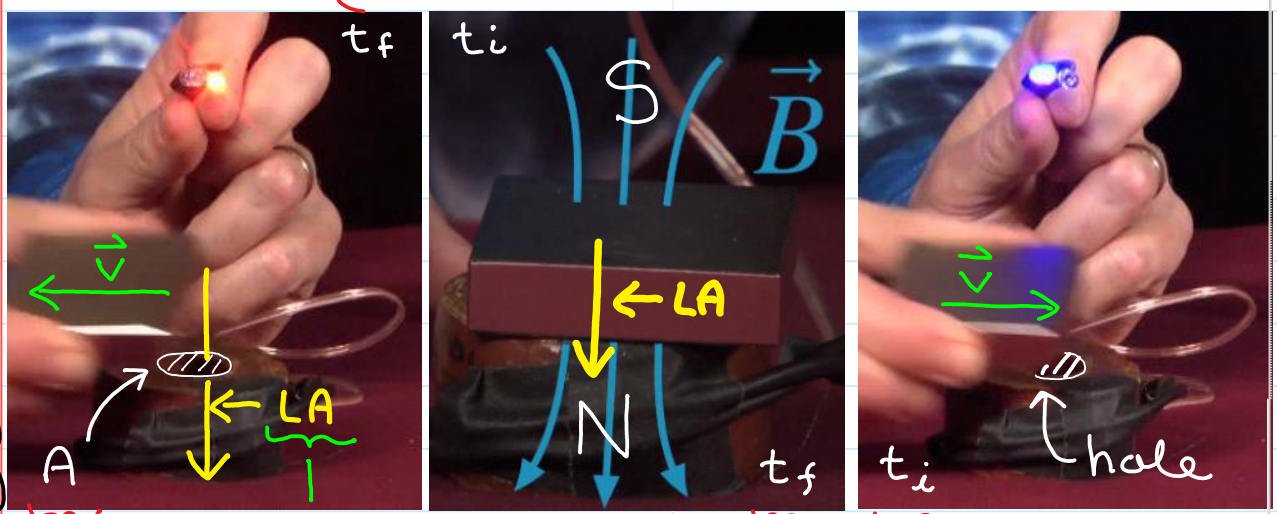
5)
6)



7) INDUCED EMF (VIDEO)

8) video: instead of a battery, and EMF can be "induced" by a ... changing magnetic flux

9)
10)
11)
12)
13)



area loop axis end start

14) review: the loop axis (LA) is perpendicular to the area (A) of a conducting loop (or a coil of N loops)

5) Flux

1) More Induced EMF

2) Faraday's Law: $\mathcal{E} = \left|\frac{\Delta\Phi}{\Delta t}\right| = \left|\frac{\Phi_f - \Phi_i}{t_f - t_i}\right|$

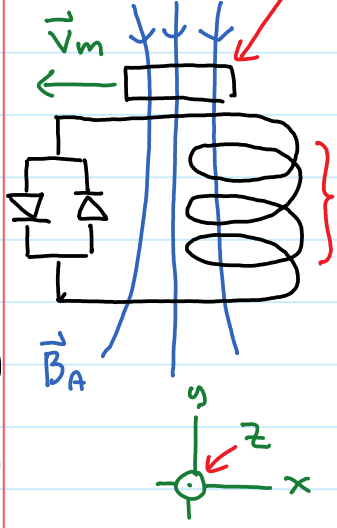
3) magnetic flux: $\Phi = AB\cos\theta$ where θ is the angle between the loop axis and... $\vec{B}$

4) learn: induced EMF drives induced current, with direction given by... Lenz's Law

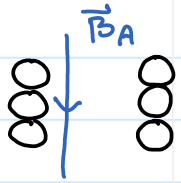
5) prepare (sketch, orange light)

6) 3D

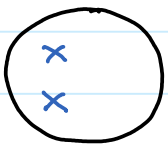
magnet (m)



2D (side)



2D (top)



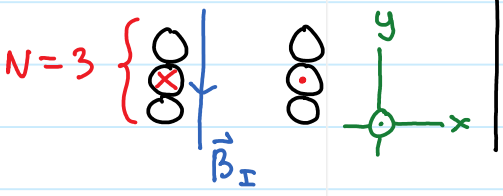
7) loop

8) applied (A)

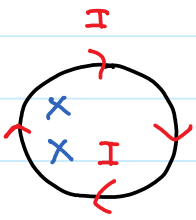
gain

induced (I)

10) N = 3



11)



12) solve (TB 25.1): (draw separate views for applied and induced $\vec{B}$ field ☐); note direction of $\vec{B}_A$ ☐; note change of $\vec{B}_A$ ☐; choose $\vec{B}_I$ to oppose change ☐; use right-hand to find induced current direction ☐