Model: Electric & Magnetic Field and Force

Act 9.3.4 Finish (~30 min)

Act 9.3.5 FNT Review (no Activity Sheet) (~30 min)

Learning Goals:

- Better understand magnetic forces and some of their uses

Act 9.3.6 Combining Electric & Magnetic Models (~30 min)

Learning Goals:

- Better understand magnetic forces and some of their uses.
- To understand that magnetic and electric fields are separate, but related, constructs.

Model: Electromagnetic Induction

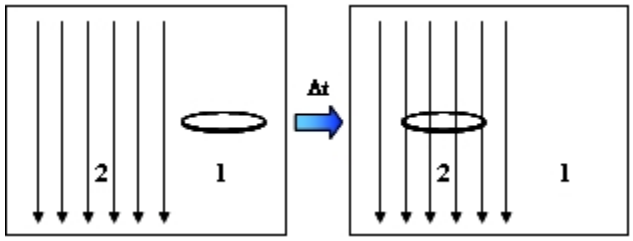
Act 9.4.1 Consequences of Changing Fields I (~45 min)

Learning Goals:

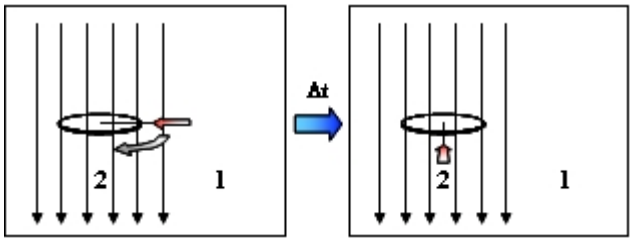
- understand that *magnetic flux,* Φ, is the amount of B field passing through a loop
- understand that *changing* the amount of B field passing through a coil causes an induced voltage in the coil; in terms of flux, this can be expressed as the induced emf is proportional to $d\Phi/dt$
- understand that the amount of B field passing through a coil can be changed by either changing the magnitude of B or by changing the orientation or shape of the coil.
- understand that the phenomena of creating a voltage by changing the amount of B can be understood by considering the forces produced on the charges in a conductor that moves relative to the magnetic field (RHR2)

9.4-1) (Solidification) A circular conductive loop is moved in the following five ways. For each case ***use a flux argument (dΦ/dt)*** to determine whether or not a current is induced in the loop.

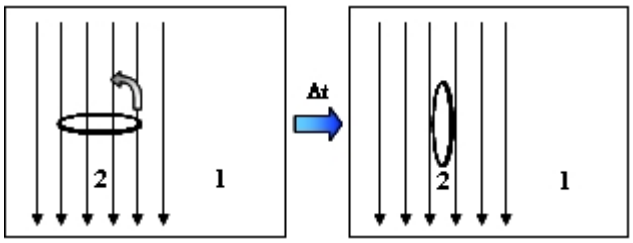
a) From location 1 to location 2, which lies inside a magnetic field, over a period of one second.



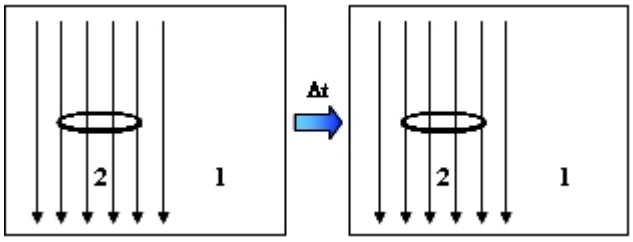
b) At location 2 within the magnetic field, twisted by 90° on its axis, over a period of one second.



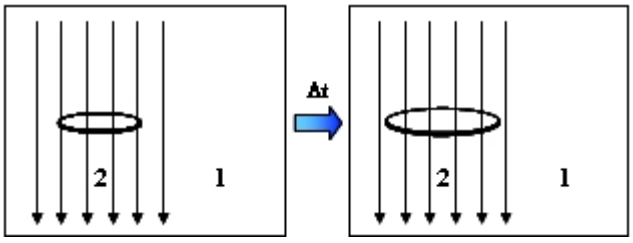
c) At location 2 within the magnetic field, rotated by 90° such that the plane of the coil is parallel to the field, over a period of one second.



d) At location 2 within the magnetic field, held motionless for a period of one second.



e) At location 2 within the magnetic field, stretched to a larger size over a period of one second.



e) Would anything about each situation change if change occurred in a time period of one-tenth second instead of one second?