

Electromagnetic Induction

Course:	Physics
Context (student grade level, ages, required prior knowledge, special needs, etc.):	Grade level: 12 Ages: 16-18 years Prior knowledge: Sources of electrical energy, types of Power stations, knowledge on magnetic fields. Special Needs: laptops, smartboard, Wi-Fi
PhET sim (name and link):	Faraday's Law sim Faraday's Law

Learning Goals

- Perform and describe an experiment which shows that changing magnetic field can induce an e.m.f. in a circuit.
- Interpret factors that affect the induced e.m.f./current.
- Determine what changes the direction of the induced e.m.f.

Pre-lab Activity[5 minutes]

Instructions: Individually answer the following questions.

1. Apart from batteries what else can be a source of electrical energy?

2. What is common between different forms of power stations? In each case what provides mechanical Energy

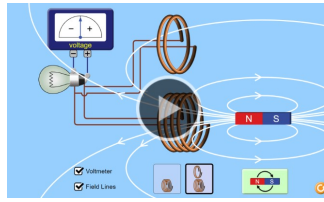
3. Section of bicycle shown below. Why does the brightness of bulbs change when speed of paddling Changes?



Open Play[5 minutes] -work in groups of 3

Play with the Faraday's Law sim

https://phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_all.html.



Describe three things you have observed:

(a) Observation 1:

(b) Observation 2:

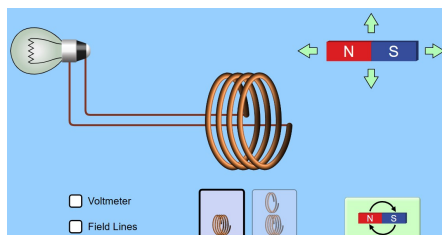
(c) Observation 3:

Share your observations with the class.

Main Activity[20 minutes]

Work in groups of 2 or 3

1. One of the objects should move.



(a) State what happens when that object moves.

(b) Explain why it happens.

2. In which situation will the bulb light? Check (✓) the right box.

Magnet moving below coil	
Magnet moving above coil	
Magnet kept stationary in the coil	
Magnet moving into the coil	
Magnet leaving the coil	

3. Explore other features of the sim.

What should be done to

(a) change the direction of the induced e.m.f./current change.

Actions to be done	(a)
	(b)

(b) change size of the induced e.m.f./current change.

Actions to be done	(a)
	(b)

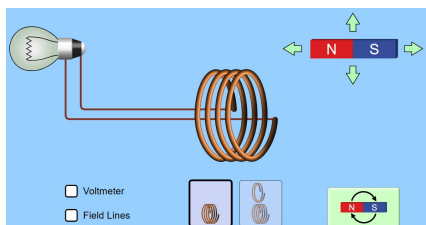
Class Discussions: Share what you discovered with class

Reflect on your pre-lab and share with class.

Post-lab Activity

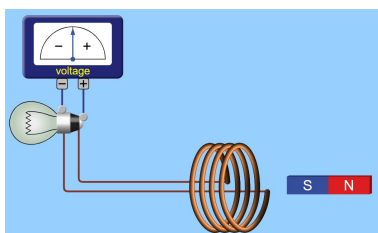
Individually answer the following questions and submit as you leave the room.

1. In the circuit below, the bulb was replaced by a motor. In which situation can the motor run faster?



- A. A magnet replaced by a weaker one moving at 1 m/s into a coil of 4 turns.
- B. A magnet replaced by a stronger one moving at 1 m/s into the coil of 4 turns.
- C. A magnet replaced by a stronger one held stationary inside a coil of 40 turns.

2. Predict what will happen if the magnet in the figure below was rotated next to the coil. Explain your answer.



Prediction:

Explanation:

3. Relate the induced e.m.f/current to the simple alternating current generator
