Science Education

E-MODULE 5
(PHYSICS 10)

iLab

An e-module based on Deped CARAGA LEAST LEARNED COMPETENCIES with Internet-Based Laboratory Activities

Arranged by :

Elaikah Keith G. Dato-on

MAED Physics

$d = V_0 t + \frac{1}{2} a t^2$ $v = \frac{d}{t}$ $F = m \cdot a$ $KE = \frac{1}{2} m v^2$ $\rho = \frac{M}{V}$ $W = mg$ $E = m \cdot c^2$

Welcome to the Future of Learning Physics! Explore, Experiment, and Discover the Wonders of the Physical World!

To the Facilitator

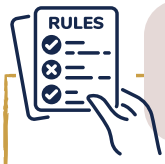
Welcome to this e-module with an Internet-Based Laboratory Activities in Physics 10, an interactive and comprehensive learning resource designed to enhance your understanding of the fundamental concepts in physics.

- As a facilitator, you are expected to orient the learners on how to use this e-module. You also need to keep track of the learners' progress while allowing them to manage their own learning at home. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the e-module.

Thank you for choosing this iLab as your learning resource. We hope your journey through this e-module is both delightful and richly rewarding.

To the Learner

Welcome to the exciting world of digital learning! As a learner, you must learn to become responsible of your own learning. We hope that this e-module will serve as a valuable tool in your learning journey, providing you with the knowledge and skills you need to excel in your studies. We encourage you to take full advantage of this resource, explore all its features, and actively participate in the interactive activities.



iLab Policies

As you go through the different activities of this e-module be reminded of the following:

Remember, the goal is not just to complete the module, but to truly understand and absorb the information it provides. Always bear in mind that you are not alone. We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. Happy learning!

Rule 1:
Active Participation: Engage actively with all the materials and activities. The more you interact, the more you learn.

Rule 2:
Pace Yourself: Don't rush through the content. Take your time to understand each concept before moving on to the next.

Rule 3:
Note-Taking: Keep a notebook handy for jotting down important points or questions that arise during your learning.

Rule 4:
Utilize Resources: Make full use of additional resources provided in this module. It is there to enhance your understanding.

Rule 5:
Reflect: After completing each section, take a moment to reflect on what you've learned and how you can apply it.

How to use these e-modules?

The e-module is compose of the following parts.

01

OVERVIEW

This provides you with the general information about the e-module.

02

PRE-TEST

This determines your background knowledge of the lesson.

03

MOTIVATIONAL ACTIVITY

This is an activity before proceeding to the lesson proper.

04

LESSON PROPER

This is the part where you can find the basic concepts about the lessons discussed

05

ILAB

These are the internet-based laboratory activities to be performed by you which will enrich your understanding of the lessons or concepts.

06

POST-TEST

This is the part that intends to determine how much you have learned from the lesson.

07

ANSWER KEY

This is the part that presents the answers to the activities included in the module.

Overview

Understanding the operation of a simple electric motor and generator.

Learning Competency:
explain the operation of a simple electric motor and generator. **(S10FE-IIj-54)**

Electric motors and generators are the backbone of countless machines we use daily, from the appliances in our homes to the power plants fueling entire cities. They represent the magic of converting energy—whether it's turning electricity into motion or motion into electricity. By understanding how these devices work, we gain insight into the fascinating principles of electromagnetism and their real-world applications. This module will unravel the science behind these incredible inventions and explore how they power the world around us

Expected Outcomes:
After reading this e-module and performing the activities you should be able to:

- Define the magnetic field, magnetic force, electric field, and electric force;
- Differentiate an electric motor from an electric generator;
- Explain the working principles of a simple electric motor and generator.

Pre-Test

Before we delve into our upcoming lesson, it's crucial to establish a foundational understanding of the topic at hand. This not only primes your mind for new information but also allows you to connect new knowledge with what you already know.

To facilitate this, we have prepared a set of questions designed to gauge your existing knowledge on the subject matter. These questions are not a test, but a tool to help you and us understand your current familiarity with the topic.

We encourage you to answer these questions thoughtfully and honestly. There's no need to rush - take your time to reflect on each question. Remember, the goal here is not to get all the answers right, but to provide an accurate snapshot of your current understanding.

So, let's embark on this journey of discovery together. Your responses will guide us in tailoring the upcoming lessons to your learning needs, ensuring a more effective and enjoyable learning experience.

Ready? Let's begin!

Directions: Read and understand each question carefully and encircle the letter of the best answer.

1. What is a magnetic field?
A) The area around a charged particle where it exerts force.
B) The region around a magnet where magnetic forces are exerted.
C) A field created by an electric current that generates heat.
D) A field that opposes electrical conductance.

2. Which of the following best describes a magnetic force?
A) The force that causes electric charges to move in a wire.
B) The force that attracts or repels magnetic materials or charged particles.
C) The force that causes mechanical work in a generator.
D) The force between two electric charges of opposite polarity.

3. What is an electric field?
A) The space where gravitational forces are exerted.
B) A region around a magnet where magnetic forces are exerted.
C) A region where electric charges exert forces on other charges.
D) A space where electrical energy is stored.

4. Which of the following defines an electric force?
A) The force exerted by electric charges on each other.
B) The force that opposes the movement of charges in a conductor.
C) The force produced by a moving magnetic field.
D) The force that accelerates electrons in a circuit.

5. Which of the following best differentiates an electric motor from an electric generator?
A) A motor converts electrical energy into mechanical energy, while a generator converts mechanical energy into electrical energy.
B) A motor works only with AC, while a generator works only with DC.
C) A motor uses a magnetic field, while a generator does not.
D) A motor generates power, while a generator does not.

6. In a simple electric motor, what role does the magnetic field play?
A) It induces current in the coil of wire.
B) It causes the motion of the coil by exerting a force on the current-carrying wire.
C) It stores electrical energy for later use.
D) It prevents the coil from overheating.

7. Which of the following describes how a simple electric motor works?
A) It uses a moving magnet to induce a current in a coil.
B) It converts electrical energy into mechanical motion by using a rotating armature and a magnetic field.
C) It generates electricity by rotating a coil within a stationary magnetic field.
D) It uses electrical energy to rotate a magnet within a coil.

8. What is the primary function of a simple generator?
A) To convert mechanical energy into electrical energy.
B) To convert electrical energy into mechanical energy.
C) To increase the power output of an electrical circuit.
D) To store energy in the form of a magnetic field.

9. How does mechanical energy get converted into electrical energy in a simple generator?
A) By rotating a magnet around a stationary coil of wire.
B) By increasing the voltage across the generator's circuit.
C) By using a magnetic field to accelerate electrons in a conductor.
D) By generating a static charge in the coil of wire.

10. What is the key difference between the operation of an electric motor and an electric generator?
A) A motor works by magnetic induction, while a generator works by electrostatic induction.
B) A motor converts electrical energy into motion, while a generator converts mechanical motion into electrical energy.
C) A motor requires an external power supply, while a generator can operate without one.
D) A motor can only run on DC, while a generator runs on AC.

Motivational Activity

Magnetic and Electric Word Search

Directions: Find the following words in the grid below to reinforce understanding of key terms related to electric motors, generators, magnetic fields, and electric forces.

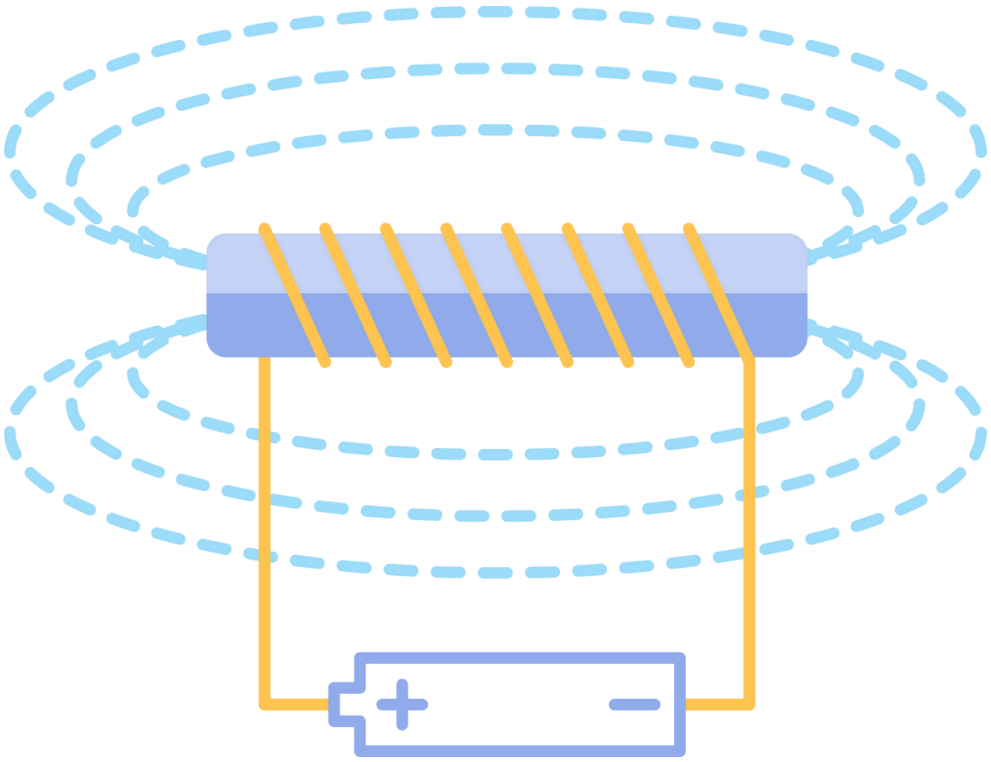
https://thewordsearch.com/puzzle/8224533/magnetic-and-electric-word-search/

1. Magnetic Field
2. Motor
3. Generator
4. Electric Force
5. Magnetic Force
6. Battery
7. Coil
8. Magnet
9. Current
10. Power

P	E	L	E	C	T	R	I	C	F	O	R	C	E
M	A	G	N	E	T	I	C	F	I	E	L	D	Z
D	M	A	G	N	E	T	I	C	F	O	R	C	E
I	G	E	N	E	R	A	T	O	R	Z	S	P	S
F	Q	N	X	T	F	B	F	E	O	S	P	E	M
S	K	M	Z	Q	C	A	B	I	B	P	L	P	U
U	K	U	O	Y	C	T	J	S	C	O	X	I	R
C	J	M	Y	T	I	T	I	Q	U	W	G	B	O
L	D	E	K	C	O	E	K	K	R	E	I	I	I
G	Y	A	F	O	F	R	B	A	R	R	L	U	D
V	V	D	C	I	E	Y	N	N	E	W	I	R	E
R	P	T	X	L	V	E	U	X	N	Y	G	R	J
X	Y	H	V	I	C	R	P	X	T	C	D	Z	K

Lesson Proper

Understanding the operation of a simple electric motor and generator.



Electric motors and generators operate based on fundamental principles of electromagnetism, converting energy between electrical and mechanical forms. The key characteristics of their operation—whether they produce motion or electricity, their efficiency, and their applications—are all determined by the interaction of magnetic fields and electric currents. These devices are essential in everyday life, from powering household appliances to generating electricity in power plants.

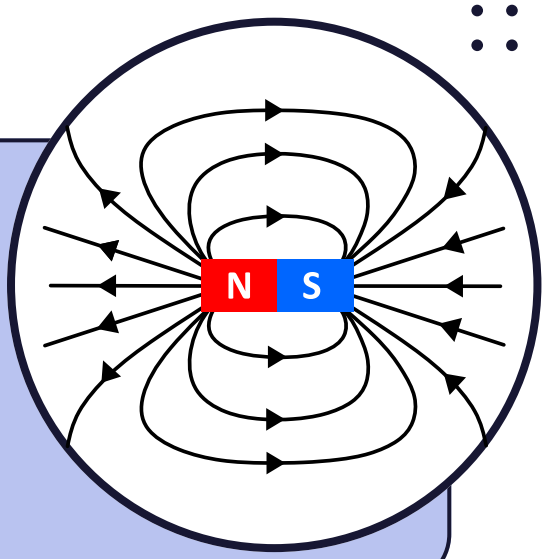
Understanding the principles behind motors and generators is crucial in developing efficient energy systems, designing modern technology, and exploring advancements in electromechanical engineering.

CORE CONCEPTS AND DEFINITIONS

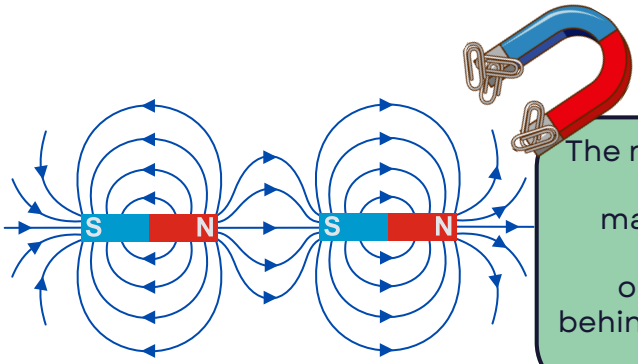
To lay the foundation for our lesson on electric motors and generators, let's begin by understanding a few key concepts that are essential to grasp how these devices function.

MAGNETIC FIELD

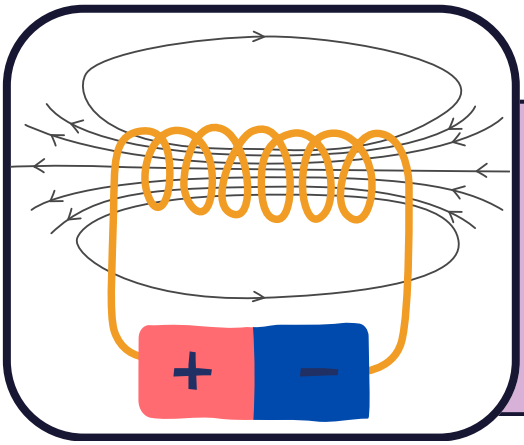
A magnetic field is the region around a magnet where magnetic forces can be detected. It is represented by field lines, which show the direction and strength of the magnetic force. Magnetic field lines help visualize the field's direction and intensity. These lines flow from the magnet's north pole to its south pole outside the magnet and the opposite direction inside. Magnetic fields play a critical role in both motors and generators, as they enable the interaction of forces to convert energy.



MAGNETIC FORCE



The magnetic force is the force exerted by a magnet on objects like iron or other magnets. It arises from the interaction of magnetic fields. For instance, when two magnets are brought near each other, they attract or repel depending on the orientation of their poles. Magnetic force is the driving force behind the movement in an electric motor, as it acts on current-carrying wires placed in a magnetic field.

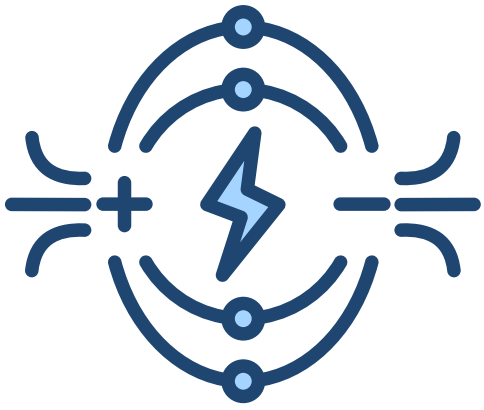


ELECTRIC FIELD

An electric field is the region around a charged particle or object where electric forces can be exerted on other charges. The strength of the electric field is determined by the amount of charge and the distance from the source. These fields are essential in the operation of certain components of electric motors and generators, especially in devices where charges or electric currents are manipulated.

ELECTRIC FORCE

Electric force is the attraction or repulsion between charged particles, it follows Coulomb's law, where the force increases as charges get closer or as their magnitudes grow. This concept is foundational for understanding how charges interact in electric circuits connected to motors and generators.



ELECTRIC MOTOR

An electric motor is a device that converts electrical energy into mechanical energy using the principles of electromagnetism. It works based on the interaction between magnetic fields and electric currents.

COMPONENTS OF AN ELECTRIC MOTOR

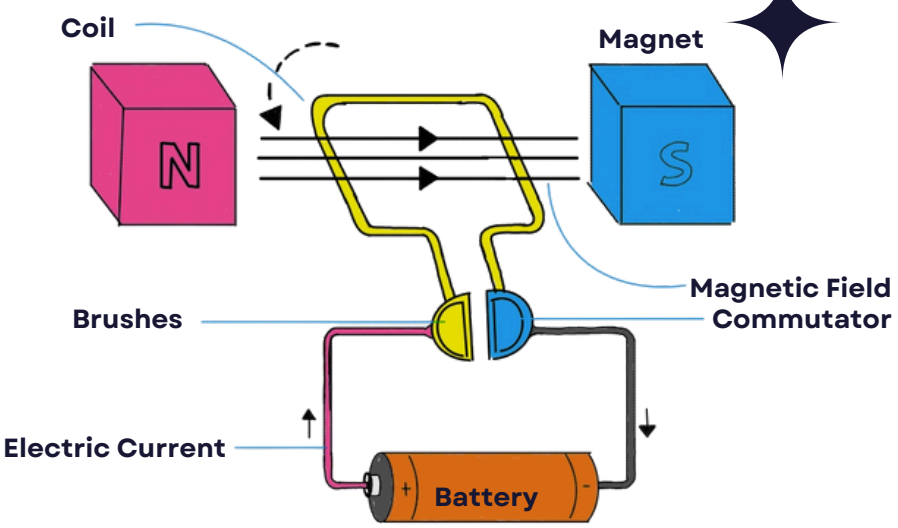
1. Magnet: A magnet provides a static magnetic field. The motor's coil is placed in this field.

2. Coil (Armature): A loop of wire that carries electric current. It is placed in the magnetic field, and when the current flows through it, it experiences a force.

3. Battery: Provides electrical energy to the motor.

4. Commutator: A switch that reverses the direction of current every half turn, ensuring continuous rotation of the coil.

5. Brushes: These maintain contact between the commutator and the external circuit, allowing current to flow into the coil.



Uses of an Electric Motor

- Drills
- Water Pumps
- Hard Disc Drives
- Washing Machines
- Industrial Equipment

WORKING PRINCIPLE OF AN ELECTRIC MOTOR

1. Electric Current Flows Through a Coil:
When electricity flows from the battery, it travels through a wire and into a coil (a loop of wire).

2. Magnetic Field Interaction:
The coil is placed in a magnetic field created by a magnet. The magnetic field interacts with the electric current flowing through the coil.

3. Force on the Coil:
The magnetic field exerts a force on the coil. This force causes the coil to rotate. The force is created because the electric current and the magnetic field are working together. This is called electromagnetic force.

4. Continuous Rotation:
To keep the coil spinning continuously, the current direction is reversed every half turn by a part called the commutator. This ensures the coil always keeps rotating in the same direction.

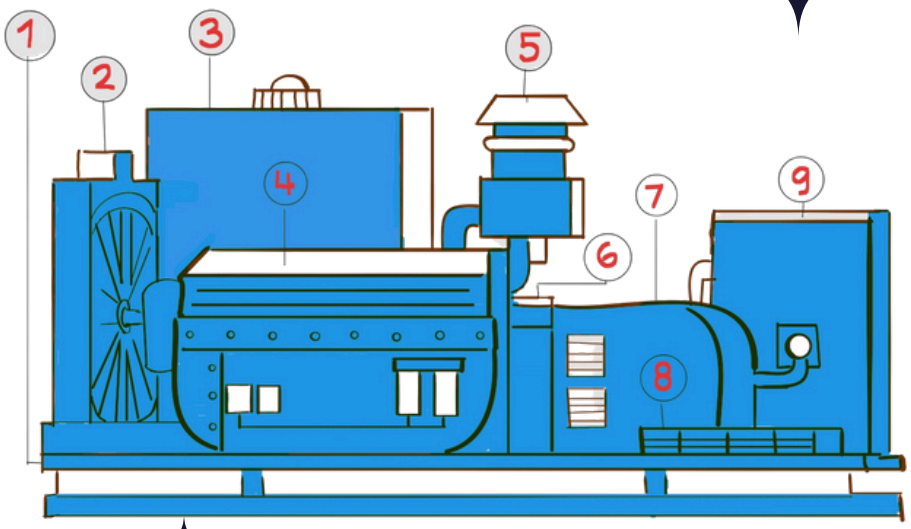
5. Mechanical Energy:
As the coil rotates, it creates motion–this is the mechanical energy that powers devices like fans, drills, and washing machines.

ELECTRIC GENERATOR

Electric generators, also known as dynamos is an electric machine that converts mechanical energy into electrical energy. The electric generator's mechanical energy is usually provided by steam turbines, gas turbines, and wind turbines.

COMPONENTS OF AN ELECTRIC GENERATOR

1. The Frame – the structure
2. A Cooling System – to regulate heat levels that build up in the system
3. A Fuel System – to keep the generator operational
4. An Engine – the source of mechanical energy
5. An Exhaust System – to dispose of the waste exhaust gases produced in the process
6. A Voltage Regulator – to regulate the voltage output
7. The Alternator – produces an electrical output from the mechanical input
8. A Battery Charger – to keep the battery of the generator charged
9. Control panel – the control panel controlling generator interface



TYPES OF GENERATORS

The classification of electric generators depends on the type of electrical energy that is produced, which is either direct current or alternating current.

- **AC generators**: AC generators are known as single-phase generators and are limited to 25 kW.
- **DC generators**: These generators are divided into three categories, and they are shunt, series, and compound-wound. Shunt generators are used in battery chargers. Series generators are used in street lights. While most of the DC generators are compound-wound.

Uses of an Electric Generator

1. **Power Plants**:
Large generators in power plants produce electricity for homes and businesses.

2. **Backup Power**:
Generators provide backup electricity during power outages to keep important things running, like hospitals or homes.

3. **Renewable Energy**:
Generators are used in wind turbines and solar farms to create electricity from natural energy sources.

4. **Portable Power**:
Small, portable generators give power in places without electricity, like during camping or at construction sites.

5. **Ships and Airplanes**:
Generators provide electricity for lights, communication, and navigation on ships and planes.

WORKING PRINCIPLE OF AN ELECTRIC GENERATOR

Generators convert mechanical energy into electrical energy using the principle of electromagnetic induction. The basic working principle involves moving a coil of wire within a magnetic field.

1. **Magnetic Field:** Generators have a stationary component called the stator that produces a magnetic field. This can be achieved using permanent magnets or electromagnets.
2. **Coil of Wire (Armature)**: Inside the generator, there is a coil of wire called the armature. The armature is usually made up of multiple loops of wire.
3. **Relative Motion:** The armature is connected to a mechanical source, such as a turbine driven by steam, water, or wind. When the mechanical source rotates the armature, it starts moving relative to the magnetic field produced by the stator.
4. **Electromagnetic Induction**: As the armature moves, it cuts through the lines of magnetic flux in the magnetic field. According to Faraday's law of electromagnetic induction, this changing magnetic field induces an electromotive force (EMF) or voltage across the ends of the coil.
5. **Current Generation**: The induced voltage causes an electric current to flow through the coil. This current is typically alternating current (AC) in an AC generator or direct current (DC) in a DC generator, depending on the type of generator.
6. **External Circuit**: The generated current is transferred from the generator to an external circuit through connection points called slip rings (in AC generators) or brushes and a split-ring commutator (in DC generators). The external circuit can then utilize the generated electrical energy to power various devices.
7. **Regulation and Control**: Generators can be regulated and controlled to maintain a constant voltage or frequency. This is achieved through mechanisms like voltage regulators or governors, which adjust the speed of the mechanical source or control the strength of the magnetic field.

DIFFERENTIATING ELECTRIC MOTORS AND GENERATORS

Electric motors are designed to convert electrical energy into mechanical energy. This transformation happens when electric current passes through a coil placed in a magnetic field, causing it to rotate due to the magnetic force acting on the current.
Electric Generators perform the opposite task: they transform mechanical energy into electrical energy. This occurs when a coil is moved (rotated or vibrated) within a magnetic field, inducing an electric current in the wire due to electromagnetic induction.
Key Differences:

- Motors are powered by electricity to produce motion, while generators rely on motion to produce electricity.
- Motors consume energy, while generators supply energy.

iLab (Internet-Based Laboratory Activity)

Understanding the operation of a Simple Electric Motor

Objective:

1. To understand how electric motors work, the interaction of electrical energy with magnetic fields, and how these concepts are applied in real-world devices.

Materials Needed:

- A computer or tablet with internet access.
- Access to the ck12 Interactive Simulation:

https://interactives.ck12.org/simulations/physics/electric-motor/app/index.html?hash=288a1282c8d83388e1509855053b90c6&source=ck12&artifactID=1916720&referrer=recommended_modalities/

Activity Instructions:

1. Access the Simulation:

Familiarize yourself with the virtual motor setup. The motor setup consists of a coil of wire (armature), magnetic field, and a power supply.
Observe how the motor begins to rotate when the current is applied

2. Set Up the Experiment:

1. Start the Motor: Click the "Start" button and observe the coil's rotation. Record the direction of rotation.
2. Change the Variables:

- Current Strength: Adjust the current supplied to the motor. Observe how the motor's speed and torque change.
- Magnetic Field Strength: Adjust the strength of the magnetic field. Observe how the interaction between the magnetic fields influences motor performance.
- Number of Coils: Experiment with the number of coils in the armature. Record the changes in the motor's speed and torque when you add more coils.

3. Record Your Observations and answer the following questions:

1. What happens to the speed of the motor when you increase the current?
2. How does the motor's performance change when the magnetic field strength is altered?
3. How does adding more coils affect the torque and speed?

Post-Test

As we conclude our lesson, it's important to assess your understanding of the topic we've just explored. This step not only helps reinforce your new knowledge but also enables you to connect the concepts you've learned with your existing understanding.

To assist in this, we've prepared a set of questions designed to gauge how well you've grasped the key points of the lesson. These questions are not a test, but a valuable tool to help both you and us assess your progress.

Take your time to reflect on each question and answer thoughtfully. There's no rush – the goal here is not to get every answer right, but to give an honest and accurate snapshot of your current understanding.

This process will guide us in refining future lessons to better meet your learning needs, ensuring a more effective and enjoyable experience moving forward.

So, let's continue on this journey of discovery! Ready? Let's begin!

Directions: Read and understand each question carefully and encircle the letter of the best answer.

1. What is the definition of a magnetic field?
A) The area around a charged object where it exerts electric force.
B) The region around a magnet where magnetic forces can be detected.
C) A field created by an electric charge moving through a conductor.
D) A space where electrical energy is stored.

2. Which of the following best describes the magnetic force?
A) The force that causes a charged particle to accelerate in an electric field.
B) The force between magnetic poles or moving charges.
C) The force that is exerted by a magnetic field on a conductor.
D) The force that opposes the flow of current in a conductor.

3. What does an electric field do?
A) Creates a region where magnetic forces are exerted on other magnets.
B) Creates a region where electric charges experience a force.
C) Allows magnetic materials to be attracted to a magnet.
D) Stores electrical energy in a magnetic field.

4. What is meant by an electric force?
A) The force between two magnetic poles.
B) The force exerted by a magnet on a charged object.
C) The force that acts between two electric charges, either attracting or repelling them.
D) The force that induces an electric current through a coil of wire.

5. Which statement best distinguishes an electric motor from an electric generator?
A) A motor converts electrical energy into mechanical energy, and a generator converts mechanical energy into electrical energy.
B) A motor is used to produce electrical power, while a generator uses power.
C) A motor operates on AC only, while a generator operates on DC.
D) A motor uses only mechanical components, while a generator uses only electrical components.

6. In a simple electric motor, what causes the rotation of the armature?
A) The force exerted by the electric current on the magnetic field.
B) The interaction between a magnetic field and a current-carrying conductor.
C) The motion of the coil inside the magnetic field.
D) The change in voltage applied to the motor.

7. Which of the following describes how a simple electric motor functions?
A) It converts mechanical energy into electrical energy by rotating a coil in a magnetic field.
B) It generates electrical energy by rotating a magnet around a coil.
C) It uses a magnetic field to convert electrical energy into mechanical motion.
D) It produces electricity by using an electric field to move charges.

8. What is the primary purpose of a simple generator?
A) To convert electrical energy into mechanical motion.
B) To convert mechanical energy into electrical energy.
C) To store electrical energy for future use.
D) To convert energy from one type of wave to another.

9. How is mechanical energy converted into electrical energy in a simple generator?
A) By rotating a coil of wire within a magnetic field.
B) By increasing the voltage across the generator's circuit.
C) By creating a static charge within a magnetic field.
D) By moving a magnet along the coil.

10. What distinguishes the operation of an electric motor from an electric generator?
A) A motor produces electricity by rotating a coil in a magnetic field, while a generator uses electrical energy to produce mechanical motion.
B) A motor converts electrical energy into mechanical energy, while a generator converts mechanical energy into electrical energy.
C) A motor relies on a stationary magnetic field, while a generator uses a moving magnetic field.
D) A motor operates using DC only, while a generator operates with AC only.

Compare your answers with the pre-test to see how much you've learned and retained.

1. What is a magnetic field?
A) The area around a charged particle where it exerts force.
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B) A motor works only with AC, while a generator works only with DC.
C) A motor uses a magnetic field, while a generator does not.
D) A motor generates power, while a generator does not.

Pre-test

Answer Key

6. In a simple electric motor, what role does the magnetic field play?
A) It induces current in the coil of wire.
B) It causes the motion of the coil by exerting a force on the current-carrying wire.
C) It stores electrical energy for later use.
D) It prevents the coil from overheating.

7. Which of the following describes how a simple electric motor works?
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10. What is the key difference between the operation of an electric motor and an electric generator?
A) A motor works by magnetic induction, while a generator works by electrostatic induction.
B) A motor converts electrical energy into motion, while a generator converts mechanical motion into electrical energy.
C) A motor requires an external power supply, while a generator can operate without one.
D) A motor can only run on DC, while a generator runs on AC.

Motivational Activity

Magnetic and Electric Word Search

Directions: Find the following words in the grid below to reinforce understanding of key terms related to electric motors, generators, magnetic fields, and electric forces.

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X	Y	H	V	I	C	R	P	X	T	C	D	Z	K
R	P	T	X	L	V	E	U	X	N	Y	G	R	J
V	V	D	C	I	E	Y	N	N	E	W	I	R	E
G	Y	A	F	O	F	R	B	A	R	R	L	U	D
L	D	E	K	C	O	E	K	K	R	E	I	I	I
C	J	M	Y	T	I	T	I	Q	U	W	G	B	O
U	K	U	O	Y	C	T	J	S	C	O	X	I	R
S	K	M	Z	Q	C	A	B	I	B	P	L	P	U
F	Q	N	X	T	F	B	F	E	O	S	P	E	M
I	G	E	N	E	R	A	T	O	R	Z	S	P	S
D	M	A	G	N	E	T	I	C	F	O	R	C	E
M	A	G	N	E	T	I	C	F	I	E	L	D	Z
P	E	L	E	C	T	R	I	C	F	O	R	C	E

1. What is the definition of a magnetic field?
A) The area around a charged object where it exerts electric force.
B) The region around a magnet where magnetic forces can be detected.
C) A field created by an electric charge moving through a conductor.
D) A space where electrical energy is stored.

2. Which of the following best describes the magnetic force?
A) The force that causes a charged particle to accelerate in an electric field.
B) The force between magnetic poles or moving charges.
C) The force that is exerted by a magnetic field on a conductor.
D) The force that opposes the flow of current in a conductor.

3. What does an electric field do?
A) Creates a region where magnetic forces are exerted on other magnets.
B) Creates a region where electric charges experience a force.
C) Allows magnetic materials to be attracted to a magnet.
D) Stores electrical energy in a magnetic field.

4. What is meant by an electric force?
A) The force between two magnetic poles.
B) The force exerted by a magnet on a charged object.
C) The force that acts between two electric charges, either attracting or repelling them.
D) The force that induces an electric current through a coil of wire.

5. Which statement best distinguishes an electric motor from an electric generator?
A) A motor converts electrical energy into mechanical energy, and a generator converts mechanical energy into electrical energy.
B) A motor is used to produce electrical power, while a generator uses power.
C) A motor operates on AC only, while a generator operates on DC.
D) A motor uses only mechanical components, while a generator uses only electrical components.

Post-test

Answer Key

Compare your answers with the pre-test to see how much you've learned and retained.

6. In a simple electric motor, what causes the rotation of the armature?
A) The force exerted by the electric current on the magnetic field.
B) The interaction between a magnetic field and a current-carrying conductor.
C) The motion of the coil inside the magnetic field.
D) The change in voltage applied to the motor.

7. Which of the following describes how a simple electric motor functions?
A) It converts mechanical energy into electrical energy by rotating a coil in a magnetic field.
B) It generates electrical energy by rotating a magnet around a coil.
C) It uses a magnetic field to convert electrical energy into mechanical motion.
D) It produces electricity by using an electric field to move charges.

8. What is the primary purpose of a simple generator?
A) To convert electrical energy into mechanical motion.
B) To convert mechanical energy into electrical energy.
C) To store electrical energy for future use.
D) To convert energy from one type of wave to another.

9. How is mechanical energy converted into electrical energy in a simple generator?
A) By rotating a coil of wire within a magnetic field.
B) By increasing the voltage across the generator's circuit.
C) By creating a static charge within a magnetic field.
D) By moving a magnet along the coil.

10. What distinguishes the operation of an electric motor from an electric generator?
A) A motor produces electricity by rotating a coil in a magnetic field, while a generator uses electrical energy to produce mechanical motion.
B) A motor converts electrical energy into mechanical energy, while a generator converts mechanical energy into electrical energy.
C) A motor relies on a stationary magnetic field, while a generator uses a moving magnetic field.
D) A motor operates using DC only, while a generator operates with AC only.

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