

Electricity & Magnetism (p. 231 – 237)I. Electric Current & Magnetism

1. In 1820, Hans Oersted discovered a connection between electricity and

magnetism.

2. Moving charges in an electric current produce magnetic fields.

Circle One : True False

3. How does the magnetic field direction around a wire change as the current reverses?

The magnetic field direction reverses.

4. Increasing the current in a wire
- increases
- the strength of the magnetic field.

II. Electromagnets

1. Define the term electromagnet.

Electromagnet – temporary magnet made by wrapping a wire coil, carrying a current, around an iron core

2. Magnetic fields in looped wires are stronger than magnetic fields in straight wires.

Circle One : True False

3. Define the term solenoid.

Solenoid – a wire wrapped into a cylindrical coil

4. A solenoid wrapped around a iron core
- ^{increases}
- reduces the strength of its magnetic field.

Circle One : True False

5. What are three ways to increase the strength of an electromagnet? (Not all in book.)

1. ↑ # of turns in solenoid coil
2. ↑ current in the solenoid
3. Use "soft" iron (ferromagnetic material)

6. An electromagnet can control the direction of a magnetic field.

Circle One : True False

- Iron
- Nickel
- Cobalt

7. A magnetic field
- ~~cannot~~
- be turned on and off with an electromagnet.

Circle One : True False

8. Complete the flowchart showing how electromagnets are used in stereo speakers.

A CD player produces a voltage change due to information on the CD.

Voltage causes a varying electric current in electromagnet on speaker cone.

Amount and direction of electric current change.

Strength and direction of the magnetic field change in the electromagnet.

Permanent, fixed magnet attracts or repels electromagnet that's changing directions.

Electromagnet moves back-&-forth, causing the speaker cone to vibrate.

9. When causes an electromagnet to rotate & stop between two permanent magnets?

Rotate = Like poles of electromagnet are repelled

Stop = Unlike poles of electromagnet align with permanent magnet

10. Define the term galvanometer.

Galvanometer - device that uses an electromagnet to measure electric current

11. List two examples of galvanometers.

- Fuel Gauges
- Temperature Gauges

12. In a galvanometer, the electromagnet is connected to a small spring, which rotates until the spring force is balanced by the forces of the electromagnet.

13. Complete the flowchart showing how galvanometers are used in car fuel gauges.

A float in the fuel tank has a sensor that sends a current to the gauge.

As the float level changes, the current sent by the sensor changes.

Changing current in the galvanometer causes needle to rotate.

Gauge calibrated so when tank is full the needle rotates to the full mark.

III. Electric Motors**1. Define the term electric motor.**

Electric Motor - device that converts electrical energy to mechanical energy by using the magnetic forces between an electromagnet and permanent magnet to make a shaft rotate

2. List three uses of electric motors.

1. Industry 2. Agriculture 3. Transportation
(DVD Players, CD Players, Computers, Hair Dryers, Appliances, Cars)

3. What are the three main parts of an electric motor?

1. Wire Coil 2. Permanent Magnet 3. Battery

4. Match each term with the correct definition.

1. A - Brushes A. Conducting pads connected to the battery.
2. B - Commutator B. Conducting metal ring that is split. (Each half connected to coil)

5. Complete the flowchart showing how electromagnets are used in electric motors.

Current flows into a coil, causing the coil to rotate between magnets.

↓

Coil rotates until no contact occurs between the brushes & the commutator.

↓

Current ceases to flow, but inertial forces keep the coil rotating.

↓

Coil rotates until contact occurs again between the brushes & the commutator.

↓

The commutator reverses direction of the current in the coil.

↓

North & south poles of the magnetic field around the coil flip.

↓

Repulsion of poles causes the coil to rotate, and the process repeats itself.