

# Magnetism and Electromagnetism Test

## Remediation Notes

- 8.PS2.2) Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
- 8.PS2.1) Design and conduct investigations depicting the relationship between magnetism and electricity in electromagnets, generators, and electrical motors, emphasizing the factors that increase or diminish the electric current and the magnetic field strength.
- 8.ETS1.1) Develop a model to generate data for ongoing testing and modification of an electromagnet, a generator, and a motor such that an optimal design can be achieved.

Remember to write two facts from each slide

OR

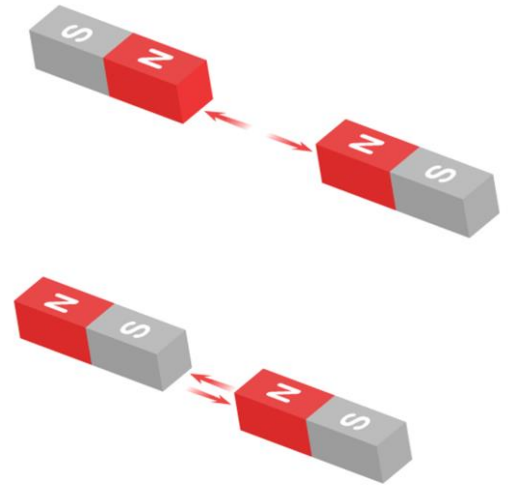
Answer the questions on the slide

Once you are finished, watch the video on Ms. Bullock webpage titled

CFA #6 Electromagnets and Induction Video

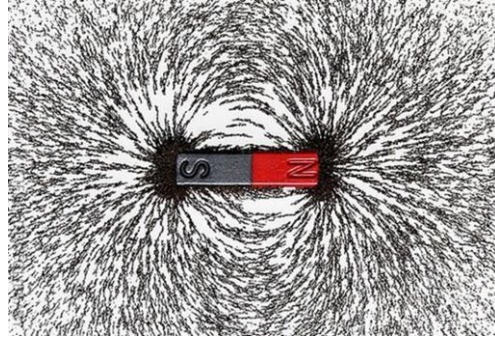
# Magnetism

- A magnet can exert forces on other magnets and magnetic material
- Like poles will repel or push away from each other
- Opposite poles will attract or pull towards each other
- These forces can happen at the same time.

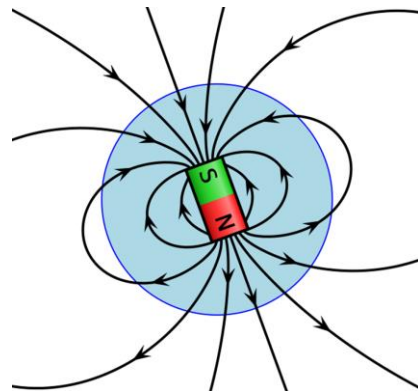


# Magnetism

- The region around the outside of a magnet is the magnetic field.



- The Earth's magnetic field is generated by rotation.
- The Earth's magnetic field has a North and South pole.
- A compass needle is attracted to the Earth's magnetic field.



# Magnetism

Question:

Explain why the compass is affected by the bar magnet.

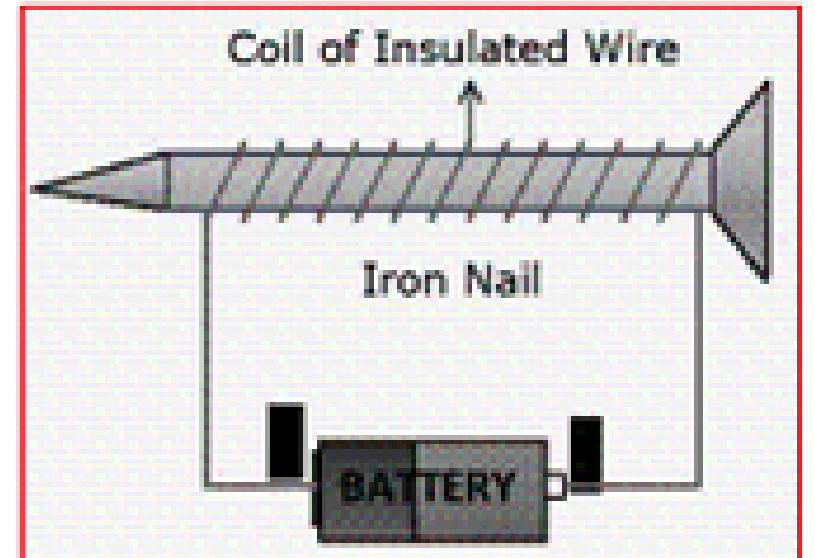


# Electromagnets

## 3 Basic Parts:

- Power source (battery)
- Coiled wire
- Iron core

E-mags produce a magnetic field around the outside of the iron core while the electricity is following.



# Electromagnets

- Electromagnets can be controlled in several ways:
  1. strength
  2. polarity
  3. on/off
- 1. Strength can be improved in several ways: increase the electricity, increase the coils, compress the coils, or used an easily magnetizable core
- 2. Change the direction of the current to change the placement of North and South Pole
- 3. The magnetic field only works when the electricity is turned “on”

# Questions

1. What is the device in the picture?

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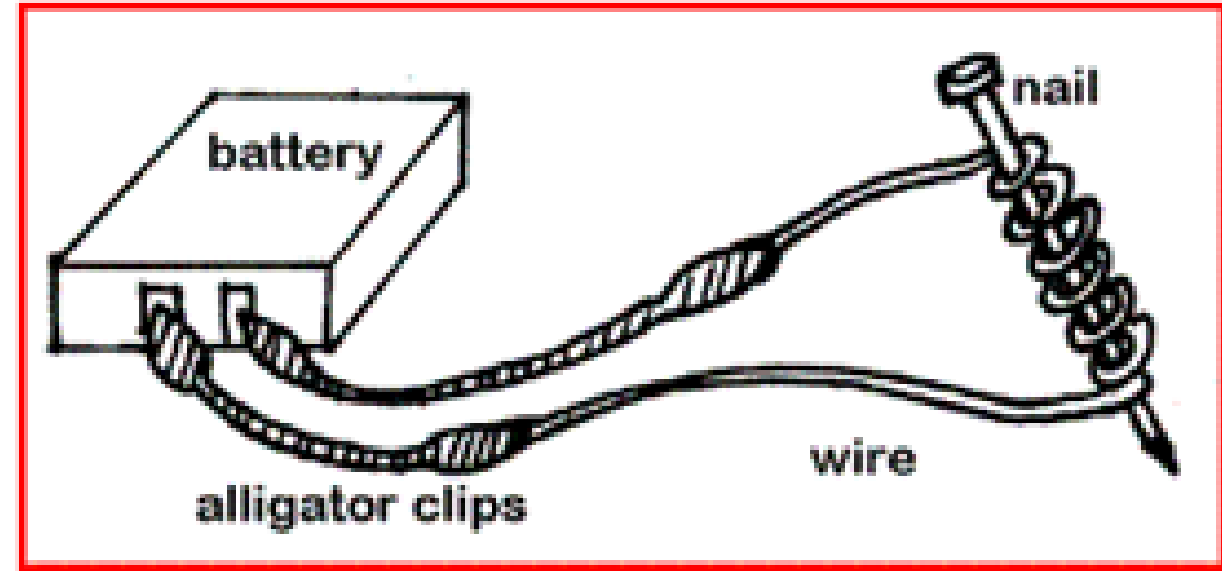
2. How can the strength of the magnetic field produced by the device be increased?

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# Electromagnetic Induction

## 2 Basic Parts

- Coil of wire
- Magnet

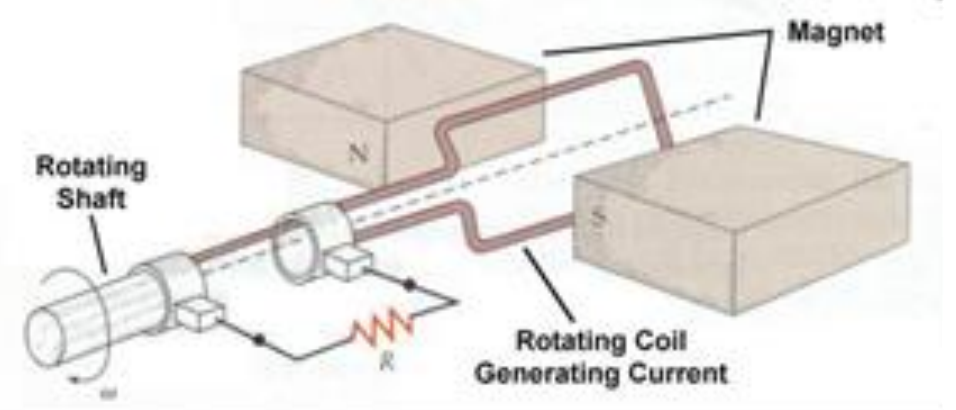
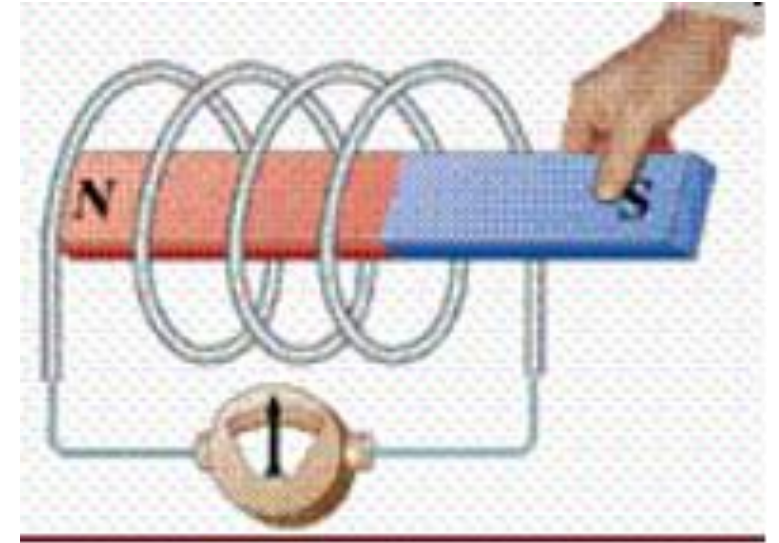
The magnetic field must change or move in order to induce electricity

- the magnet can move between the coils
- the coil can spin between the poles of a magnetic field



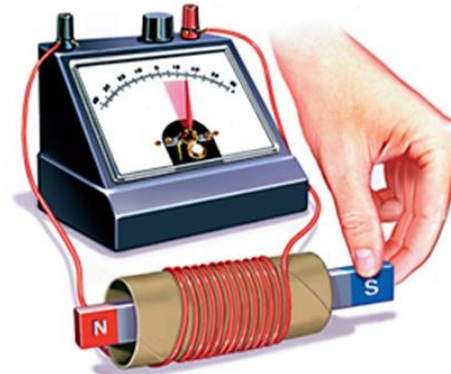
# Electromagnetic Induction

- In the first diagram the magnet is moving inside the coil. The meter can detect the electricity produced.
- The second diagram shows the coil of wire rotating inside the poles of a magnet.
- Both diagrams show electricity being induced
- Both diagrams show types of electric generators

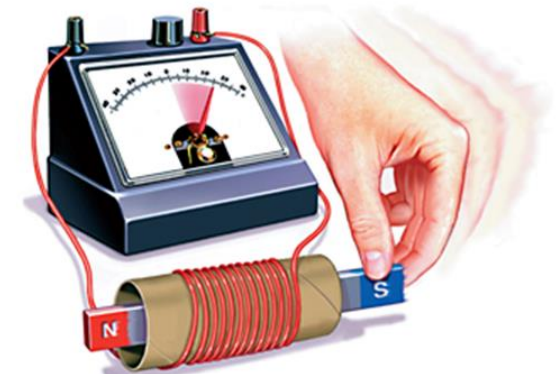


# Electromagnetic Induction

- Increasing the number of coils of wire will increase the amount of electricity being induced.



**a** An electric current is induced when you move a magnet through a coil of wire because the magnetic field is changing relative to the coil of wire.

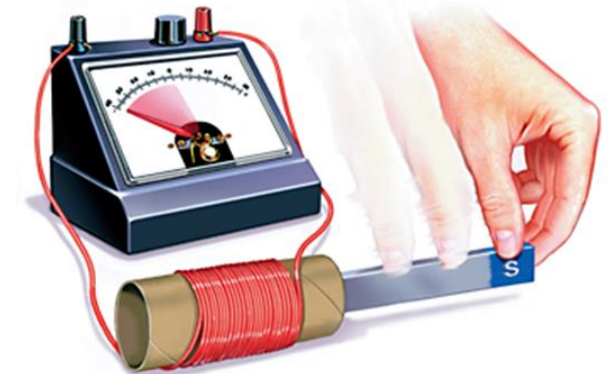


**b** A greater electric current is induced if you move the magnet faster through the coil because the magnetic field is changing faster.

- Increasing the speed of the magnet will increase the amount of electricity being induced.



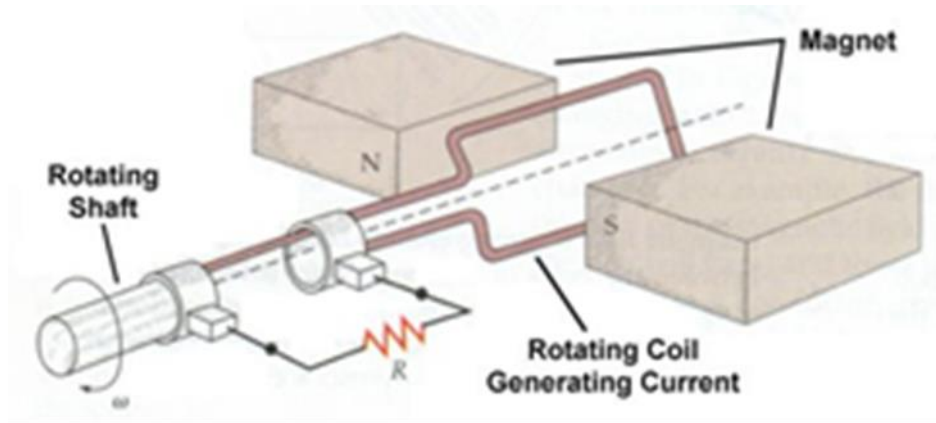
**c** A greater electric current is induced if you add more loops of wire. This magnet is moving at the same speed as the magnet in **b**.



**d** The induced electric current reverses direction if the magnet is pulled out rather than pushed in.

# Electromagnetic Induction

- Electric Generators induce electricity as the coil of wire rotates between the poles of a magnet.



Question:

1. What can be done to increase the electricity being produced?
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# Electric Motors

- Motors use electricity to make mechanical energy.
- Motors have two magnetic fields attracting and repelling to create movement.
- The magnetic field surrounding the coils is attracted and repelled by the magnetic field from the magnet, causing the coil to spin.

