

مركز أم الإمارات



Grade 12 General / physics
Trimester 2 / Academic Year 2019-2020
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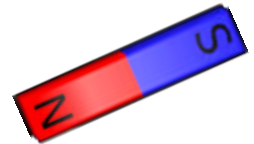


Section 1: Understanding magnetism

Properties of Magnets

1- What are the properties of the magnets?

- Polarized (they have two opposite ends called poles).
- Like poles repel and unlike poles attract.
- It is impossible to get a monopole from a magnet.



2- What are the types of magnets?

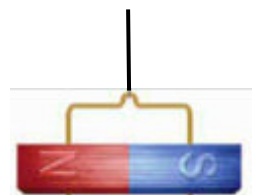
- Temporary magnet (that lose its magnetization by time or by removing the impact)
- Permanent magnet (that does not lose its magnetization by time)

3- Define ferromagnetic materials.

The materials (contain elements like Iron- Nickel- Cobalt) that strongly attract to magnets and can become temporary magnets.

4- If you suspend a bar magnet on a string, in what direction the magnet will point when it comes to rest?

It is always pointing in the north-south direction, the north pole point to the geographic north pole of the earth, and the south pole point to the geographic south pole of the earth.



Explanation: the because Earth itself is a giant magnet, the north pole of the earth's magnet near the south geographic pole of the earth, and the south pole of the earth's magnet near the north geographic pole of the earth.

South geographic pole



North geographic pole

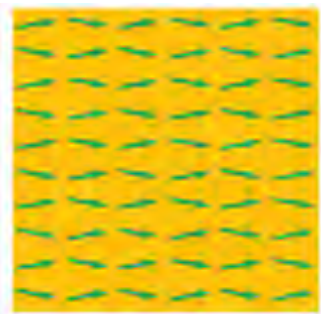


5- Define the magnetic domains.

Each atom in ferromagnetic materials acts like a tiny magnet, each has two poles. Domain is a group of neighboring atoms whose poles are aligned.



The domains of nonmagnetized material



The domains of magnetized material

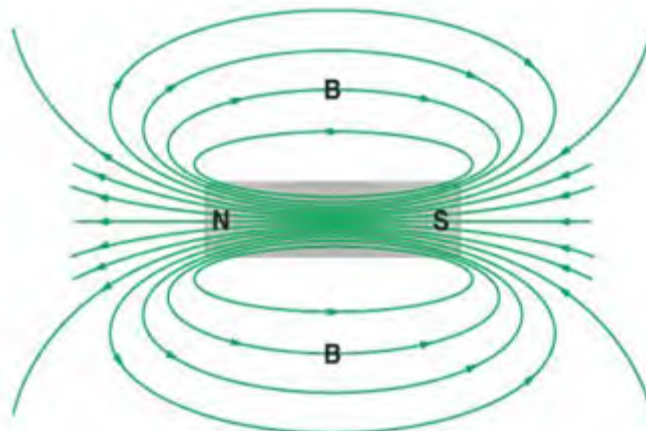
6- What are the steps of making commercial permanent magnets?

- Heating an object contains ferromagnetic materials in the presence of strong magnet.
- Thermal energy frees the atoms in each of the object's domains.
- The domains can rotate and align with the magnet's poles.
- The object is then cooled, and its atoms become less free to rotate.

Magnetic fields around magnets

1- Define the magnetic fields?

Magnetic fields are fields that exist in space where magnets would experience a force.

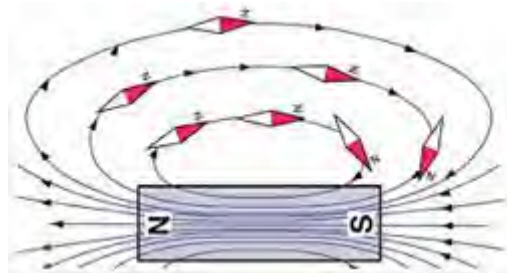


Chapter 5 – Magnetic fields

2- What are the characteristics of the magnetic field lines?

- Magnetic field lines are not real.
- Field lines emerge from a magnet's north pole and enter its south pole.
- Field lines form closed loops continuing through a magnet from its south pole to its north pole.
- Magnetic flux is most concentrated at magnetic poles.

3- **Note:** the direction of the magnetic field line is defined as the direction in which the north pole of a compass points when placed in a magnetic field.



Applications

1- If you hold a bar magnet in each hand and bring your hands close together, will the force be attractive or repulsive if the magnets are held in the following ways?

- A. The two north poles are brought close together:
- B. A north pole and a south pole are brought together:

2- The figure shows five disk magnets floating above each other. The north pole of the top-most disk faces up. Which poles are on the top side of each of the other magnets?

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3- The ends of a compass needle are marked N and S, how would you explain to someone why the pole marked N points north?

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4- A magnet attracts a nail, which, in turn, attracts many small tacks, as shown in the figure. If the north pole of the permanent magnet is the left end.



A. Which end of the nail is the south pole?

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B. How does the nail become a magnet?

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C. Is the nail a temporary or permanent magnet in this case? Explain your answer.

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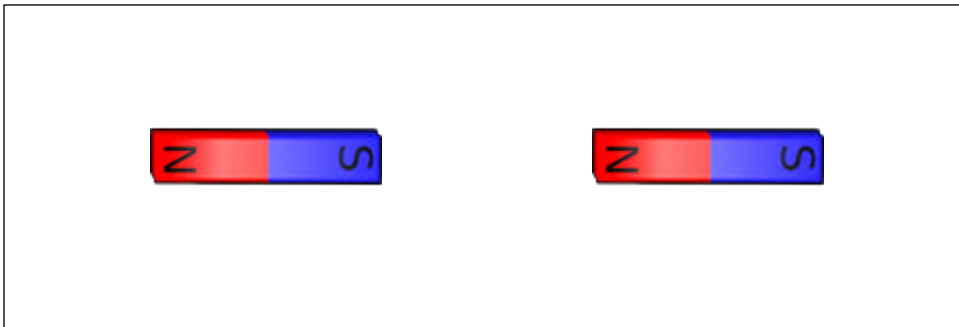
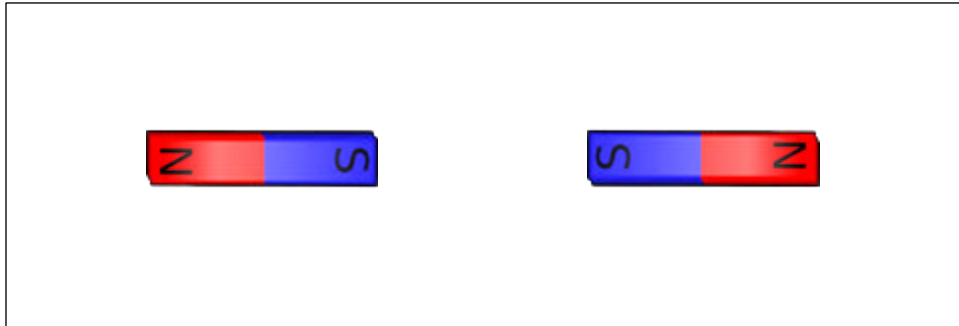
5- Why do magnetic compasses sometimes give false readings?

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Chapter 5 – Magnetic fields

Exercises

1- Draw the magnetic field between two like magnetic poles and then between two unlike magnetic poles. Show the directions of the fields

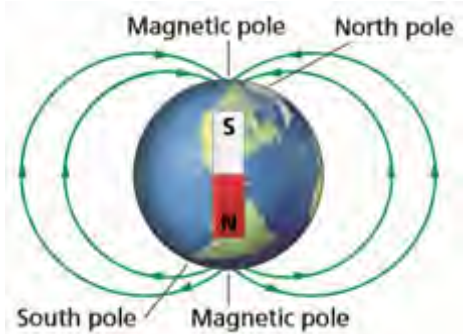


2- If you broke a magnet in two, would you have isolated north and south poles? Explain

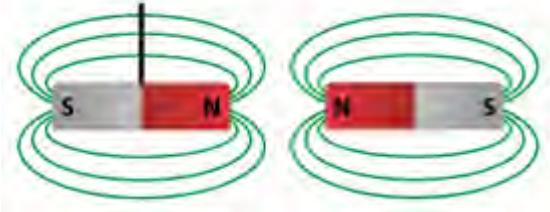
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3- Earth's magnetic field lines are shown in the figure, what location, poles or equator, is the magnetic field strength greatest? Explain.

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4- As the magnet below in the Figure moves toward the suspended magnet, what will the magnet suspended by the string do?



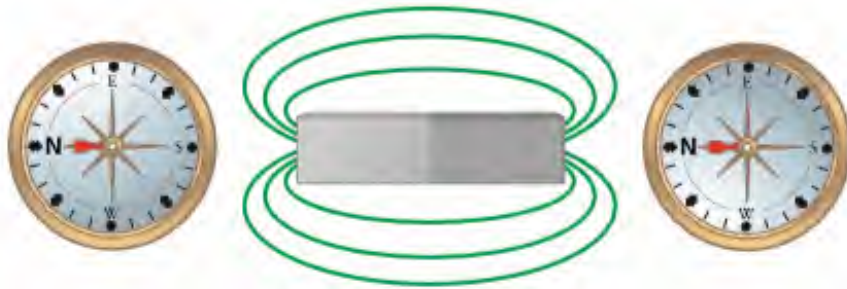
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5- Refer to the following figure to answer the following questions.

- A. Where are the poles?
- B. Where is the north pole?
- C. Where is the south pole?



6- The figure below shows the response of a compass in two different positions near a magnet. Where is the south and the north poles of the magnet located? (Draw on the figure)



The end of part 1