Board – ICSE	Class –9th	Topic – Magnetism

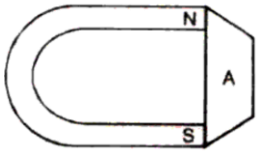
1. Answer the following:
   (i) What is the general law of attraction and repulsion between magnetic poles?
   (ii) What defines the direction of the magnetic field?
   (iii) The middle region of a bar magnet is:
      1. A north pole
      2. A north seeking pole
      3. Unmagnetized
      4. Magnetized
   (iv) Name two magnetic substances.

   Answer:

   (i) Like poles repel and unlike poles attract each other.
   (ii) The direction of the magnetic field at any point is the direction of force experienced by a north pole (hypothetical) placed at that point.
   (iii) The middle region of a bar magnet is unmagnetized.
   (iv) Iron, Steel, Nickel, Cobalt.
2. Name the magnetic elements at a place on the surface of the Earth that completely specify the earth's magnetic field at that point.

   Answer:

   Three magnetic elements are:
   (i) Magnetic declination.
   (ii) Magnetic dip or inclination.
   (iii) Horizontal component of earth's magnetic field.
3. A horse-shoe magnet, when not in use, is kept with a metal piece 'A' that is held to the north and south poles.



   (a) What is the metal piece 'A' called?
   (b) What is 'A' made of?
   (c) What is the function of piece A?
   (d) Explain how the piece 'A' serves the purpose, on the basis of molecular (or domain) theory of magnetism.

Answer:

(i) The metal piece 'A' is called the magnetic keeper.

(ii) A is made of soft iron.

(iii) Piece 'A' preserves the magnetism in the magnet.

(iv) According to molecular (or domain) theory of magnetism, the magnet consists of a large number of tiny molecular magnets arranged in a particular direction. When a metal piece A is held between the north and the south poles of the magnet 'A' becomes a strong induced magnet. The magnetic dipoles in the horseshoe magnet and the metal piece 'A' form a closed loop with no free poles left. Thus, the metal piece 'A' serves the purpose of preventing demagnetization

4. It is known that the Earth's core contains iron; yet, it cannot be regarded as the source of Earth's magnetism. Why?

Answer:

Inside the earth's core, the temperature is very high and due to this, iron is in its molten state. In molten state, iron loses its ferromagnetic properties. Hence, iron cannot be regarded as the source of Earth's magnetism.

5. Metal bars are brought near each pole of a compass needle in turn. Complete the following table:

Nature of bar	Action on compass needle	
	North pole	South pole
Non-magnetic	No action	No action
……..	Attracted	Attracted
North pole of a bar magnet	……	……
……..	Attracted	Repelled

Answer:

Nature of bar	Action on compass needle	
	North pole	South pole
Non-magnetic	No action	No action
Magnetic	Attracted	Attracted
North pole of a bar magnet	Repelled	Attracted
South pole of a bar magnet	Attracted	Repelled

6. Can your separate the two magnetic poles?

   Answer:

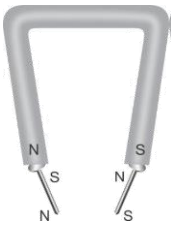
   No, on breaking a magnet each piece becomes a complete magnet, i.e. it consists of North Pole and South Pole. Hence, the two poles cannot be separated.

7. Answer the following:

   (i) Two long needles are attached to the poles of a horse-shoe magnet. Show the positions occupied by the needles on a diagram and name the phenomenon which comes into play.

   (ii) State one way in which magnetism can be lost.

   Answer:



   (i) Figure shows the lower ends of the needles near each other (or touching each other). They have opposite polarities developed due to induction. The upper ends are touching the poles of the magnet, having polarities opposite to that of the magnet. This phenomenon is called magnetic induction.

   (ii) Magnetism can be lost by heating.

8. Answer the following:

   1. What are the poles of a bar magnet?
   2. What are neutral points?

   Answer:

   (i) The magnetic force appears to be concentrated near the ends of a bar magnet. These ends are called the poles of the bar magnet.

   (ii) Neutral points are the points where the magnetic field of a magnet is equal in magnitude to the earth's horizontal magnetic field but in the opposite direction

9. A small magnet is suspended through a silk thread from a rigid support such that the magnet can freely swing. How will it rest?

   Answer:

   A freely suspended magnet will rest in north-south direction with its north pole pointing towards the geographical north pole of the earth making some angle with the horizontal

10. You are given following three bars exactly similar in size and shape:

    (i) A permanent magnet

    (ii) A bar of soft iron

(iii) A bar of non-magnetic substance.

Describe how you will identify each of the bars if only a piece of thread is supplied to you as the extra piece of apparatus.

Answer:

Suspend each of the three bars separately by means of a thread. We will observe that one bar sets itself in a particular direction even after being disturbed and the other two can stay in any direction. The one having a fixed direction will be a permanent magnet. Remove this bar and bring it near the other bars. One of them will be attracted by the magnet bar at both the ends. This is the soft iron bar. The third bar will be of a non-magnetic substance.

11. Answer the following:

(i) Why will heating the magnet strongly remove its magnetism?

(ii) What are neutral points?

Answer:

On heating the magnet, the molecular magnets present in the magnet start vibrating and move out of the magnetic alignment. Hence, the magnet loses its magnetism. Neutral points are the points where the magnetic field of the magnet is equal in magnitude to the earth's horizontal magnetic field, but in the opposite direction. Thus, the resultant (or net) magnetic field at the neutral points is zero.

12. Give a short account of the earth's magnetic field.

Answer:

The cause of Earth's magnetism is not very clear. However, for the sake of simplicity, the following assumptions are made regarding Earth's magnetism.

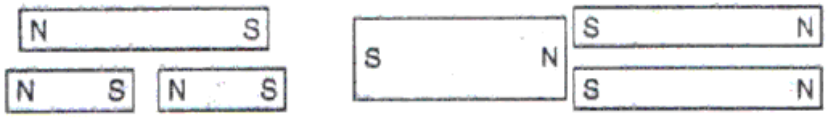
1. It is assumed that at the centre of the Earth, a huge bar magnet is buried.
2. The south end of the Earth's bar magnet points towards the geographic North Pole and vice versa.
3. The axis of the Earth's magnet is not in line with geographical axis, but makes a small angle with it.
4. The magnetic lines of force of the Earth's magnet originate from its north pole (which is towards its geographic South Pole) and end up at its south pole.
5. The magnetic lines of force at any place on the surface of earth, travel parallel to each other and hence, Earth's magnetic field at a given place is uniform.

6. The intensity of the magnetic field of the Earth is maximum at magnetic poles and minimum at magnetic equator.

13. What happens to a bar magnet, if it is cut into two equal pieces:
    (i) transverse to the length
    (ii) along the length.

Answer:

If a bar magnet is cut into two equal pieces (either transverse to length or along the length), the magnetic strength of each part becomes half of the magnetic strength of the original magnet.



(1) (2)

14. (i) Is it possible to isolate the poles of a magnet?
    (ii) Define lines of force in a magnetic field.

Answer:

(i) No, it is not possible to isolate the poles of a magnet.

(ii) A line of force is a continuous curve in the magnetic field such that the tangent to it at any point gives the direction of the magnetic field at that point

15. A bar of soft iron is placed near a magnet.
    (i) State the magnetic properties it acquires.
    (ii) The magnet is now removed. What happens to the magnetic property acquired?

Answer:

(i) When a bar of soft iron is placed near a magnet then it acquires induced magnetism.

(ii) When the magnet is removed, the iron bar loses its magnetism because iron has low retentively.