
FOCUS
ACADEMY
Std.: K.G. to 12 Com. Eng. & Guj. Medium

17. pH of solution A is 6.

$\therefore$ It is acidic. The concentration of hydrogen ions would be more than 10^{-7} M.

(Nearly equal to 10^{-6} M)

$\rightarrow$ pH of solution B is 8.

$\therefore$ It is basic. The concentration of hydrogen ions would be less than 10^{-7} M. (Nearly equal to 10^{-8} M.)

Thus, solution A has more concentration of hydrogen ions. Out of these two solutions, solution A is acidic and solution B is basic.

18. When Al reacts with nitric acid, hydrogen gas is not evolved because HNO_3 is a strong oxidising agent. It oxidises the H_2 produced to water and itself is reduced to any of the nitrogen oxides (N_2O, NO or NO_2). Hence, aluminium does not release hydrogen gas with nitric acid.

19. The atomic number of an element is 17.

(1) This element is chlorine. Its electronic configuration is 2, 8, 7.

(2) The position of this element is in 17th Group and 3rd period of the Modern periodic table.

OR

19. The following criteria was used by Mendeleev in creating his periodic table :

(1) The properties of elements are the periodic function of their atomic masses.

(2) Elements with similar properties are arranged in the same group.

(3) The formula of oxides and hydrides formed by an element.

20. Blood passes through the heart twice during each cycle in human beings. This is called double circulation.

Deoxygenated blood from different organs is drained and finally through vena cava it is poured in right atrium. From here this blood is transported to lungs via right ventricle. In lungs, blood become oxygenated and is again transported to left atrium. From here it transports in left ventricle and then by aorta to different body parts.

It is necessary because it allows a highly efficient supply of oxygen to the body cells, which fulfill the high energy need of body.

OR

20. A process by which carbon dioxide and water is converted into carbohydrates in presence of sunlight and chlorophyll is called photosynthesis.

Equation for the process of photosynthesis:

$$6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \underset{\text{Glucose}}{C_6H_{12}O_6} + 6O_2 + 6H_2O$$

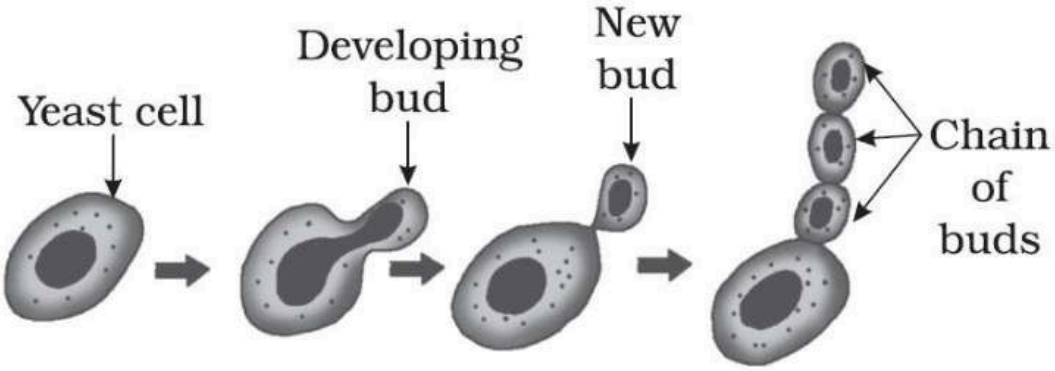
The following events occur in photosynthesis:

(1) Absorption of light energy by chlorophyll.

(2) Conversion of light energy into chemical energy and splitting of water molecules into hydrogen and oxygen.

(3) Reduction of carbon dioxide into carbohydrate (glucose).

21. Unicellular fungi yeast; small bud like outgrowth separates and grows further into an individual. In yeast, some times this process continues three to four times resulting in a multi-cellular colony.



22. If an object is kept between optical centre O and principal focus F of a convex lens, we get a virtual, erect and enlarged image of the object on the same side of the object, beyond the distance $2f$ from the lens. Thus, by keeping a watch between the lens and its principal focus, the watch repairer can see minute parts of the watch clearly, so that repairing becomes easy.

23. Different electrical devices are connected in parallel for domestic purpose because –

→ Each device gets the full and same voltage as that of the electric supply.

→ Also each device gets proper current depending on its resistance.

→ If one of the devices is switched OFF / ON, other electrical devices remain unaffected. Each device can be switch ON or OFF independantly.

OR

23. $V = 60\ \text{V}$ and $I = 4\ \text{A}$

According to Ohm's law

$$R = \frac{V}{I} = \frac{60\ \text{V}}{4\ \text{A}} = 15\ \Omega$$

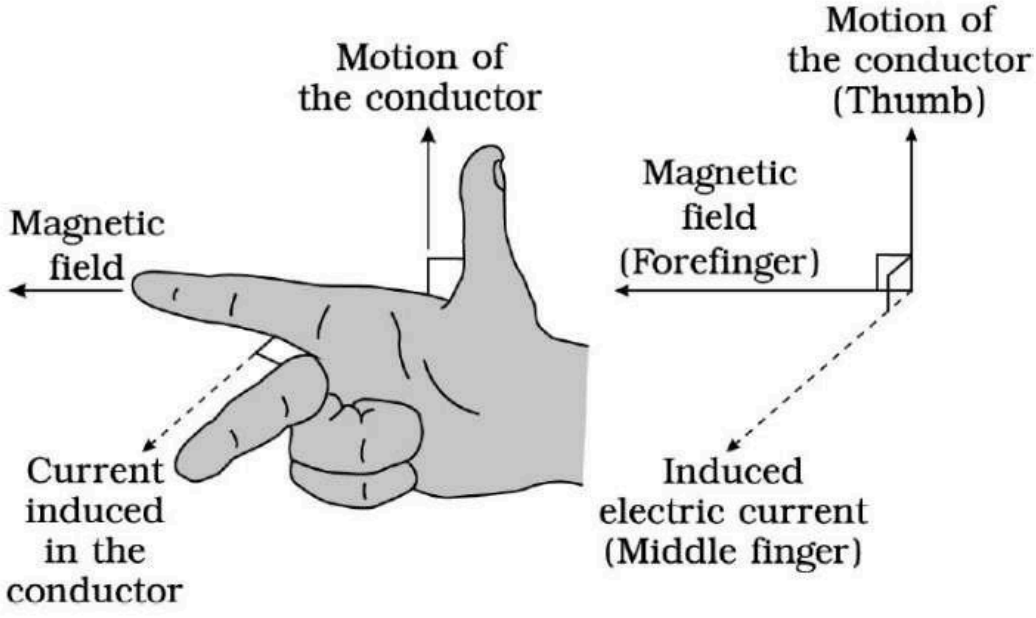
Now, $V = 120\ \text{V}$, then

Electric current $I = \frac{V}{R} = \frac{120\ \text{V}}{15\ \Omega} = 8\ \text{A}$

$\therefore$ Heater will withdraw 8 A current.

24. Direction of induced current in a conductor can be known with the help of Fleming's right-hand rule.

Fleming's right-hand rule : Stretch the thumb, forefinger and middle finger of right hand so that they are perpendicular to each other. If forefinger indicates the direction of the magnetic field and thumb shows the direction of motion of conductor, then the middle finger will show the direction of induced current.



25. Ozone O_3 layer is located at the higher levels of the atmosphere, i.e., in stratosphere.

→ Ozone (O_3) is formed by the action of UV (Ultraviolet) radiation on oxygen (O_2) molecule.

→ The higher energy of UV radiation convert some oxygen (O_2) molecules into free oxygen (O) atoms.

→ These free oxygen atoms combine with the molecular oxygen and form a molecule of ozone (O_3).

$$O_2 \xrightarrow[\text{(Photodissociation)}]{\text{UV radiation}} O + O$$

$$O + O_2 \longrightarrow O_3 \text{ (Ozone)}$$

Significance of ozone layer : Ozone shields the surface of the earth from ultraviolet (UV) radiation from the sun. The ozone molecules absorb shorter wavelength UV rays which are harmful to organisms. Thus, it protects life on the earth.

26. Significance of forests is as follows :

(1) Forests are most valuable resources. Food, fodder, fibres, timber, fuel wood, medicines, gum, resins, lac, rubber, catechu, bamboo, etc. are obtained from forests.

(2) Bamboos obtained from forests are mostly used to make slats for huts and baskets for storing things.

(3) Forests provide habitat to numerous plants and animals.

(4) Forests play a very important role in maintenance of environment. They play an important role in the maintenance of seasonal cycles, biochemical cycles, regularity of rainfall and conservation of soil.

(5) Forests reduce impact of heavy rains and strong winds. They control erosion of soil and leaching.

OR

26. We should use coal and petroleum judiciously because –

(1) Coal and petroleum are fossil fuels which are exhaustible and non-renewable resource.

(2) Reserves of coal and petroleum are limited.

(3) It takes millions of years for nature to replenish these resources.

(4) Burning of fossil fuels pollutes the atmosphere by forming oxides of carbon, nitrogen and sulphur, which accumulate in atmosphere.

(5) Carbon dioxide is a greenhouse gas which leads to global warming.

27. Decomposition reaction : A chemical reaction in which a single compound on heating **or** in presence of sunlight forms more than one products is called decomposition reaction.

Example 1 : $\underset{\text{Calcium carbonate}}{CaCO_3(s)} \xrightarrow{\text{Heat}} \underset{\text{Calcium oxide}}{CaO(s)} + CO_2(g)$

In above reaction, there is only one reactant $CaCO_3(s)$, which on heating forms two products – $CaO(s)$ and $CO_2(g)$. Thus, this reaction is a decomposition reaction.

Example 2 : $\underset{\text{Lead nitrate}}{2Pb(NO_3)_2(s)} \xrightarrow{\text{Heat}} \underset{\text{Lead oxide}}{2PbO(s)} + \underset{\text{Nitrogen dioxide}}{4NO_2(g)} + O_2(g)$

In above reaction, there is only one reactant is $(Pb(NO_3)_2)$, which on heating forms three products PbO, NO_2 and O_2.

28. When different metals are arranged in decreasing order of their reactivity (or activity) then it constitutes a series called reactivity (or activity) series of metals.

Reactivity (or activity) series for different metals is given in the following Table :

Activity series : Relative reactivities of metals

K	Potassium	Most reactive
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	Reactivity decreases
Fe	Iron	
Pb	Lead	
[H]	[Hydrogen]	
Cu	Copper	
Hg	Mercury	
Ag	Silver	
Au	Gold	Least reactive

OR

28. More reactive metals displace less reactive metals from the solution of their compounds. Such displacement reactions are highly exothermic. The amount of heat evolved is so large that the metals are produced in the molten state. This reaction is called as the thermit reaction.

e.g., the reaction of iron (III) oxide (ferric oxide – Fe_2O_3) with aluminium forms molten Fe, which is used to join railway tracks or cracked machine parts.

Chemical equation of thermit process :

$$Fe_2O_3(s) + 2Al(s) \xrightarrow{\Delta} 2Fe(l) + Al_2O_3(s) + Heat$$

29. Adrenaline hormone is secreted from adrenal gland in the body under the fight or flight situation.

The effect of adrenaline in body are as follows :

(1) The heartbeats become faster, resulting in supply of more oxygen to our muscles.

(2) The blood supply to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to skeletal muscles.

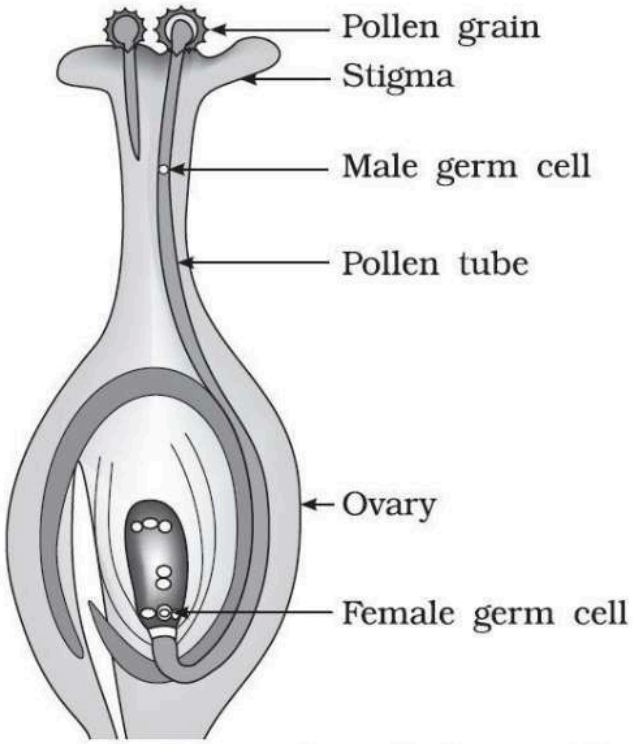
(3) The breathing rate increases because of the contractions of diaphragm and the rib muscles.

All these responses together enable the animal body to be ready to deal with the situation of fight or flight.

30. Pollen grains are produced in anther of a stamen while female gamete (egg cell) is produced in each ovule of an ovary.

Pollination : A process of transfer of pollen from anther of stamen to the stigma of pistil is called pollination.

Fertilisation : Pollens stick to stigma. Pollen grain germinates to give rise to pollen tube which develops in style and reaches upto ovule.



The male germ cell produced by pollen grain fuses with female gamete (egg cell) present in the ovule. This fusion of the germ cells is called fertilisation.

Zygote is formed due to the process of fertilisation. Zygote is capable of growing into a new plant.

Post fertilisation events : After fertilisation, zygote divides several times to form an embryo within the ovule. The ovule develops a tough coat and is gradually converted into a seed.

The ovary grows rapidly and ripens to form a fruit.

The seed contains the future plant or embryo which develops into a seedling under favourable condition. This process is called seed germination.

31. Homologous organs : Organs with similar basic structure but modified to perform different functions.

Examples : Forelimbs of frog, lizard, wings of bird and hands of human.

The forelimbs of frogs (amphibians), the forelimbs of lizards (reptiles), wings of birds (aves), the hands of human beings (mammals), etc. are homologous organs having similar structure.

The basic structure of the limbs is similar though it has been modified to perform different functions in various vertebrates.

→ Such a homologous characteristics helps to identify an evolutionary relationship between apparently different species.

OR

31. From wild variety of cabbage several different varieties of plants are cultivated by artificial selection. Before two thousand years farmers were producing wild cabbage as an edible variety of plant. Its closely arranged leaves at short distances were used as food.

Some farmers have obtained variety of cabbage in which flower development was arrested and then they were cultivated as **broccoli**.

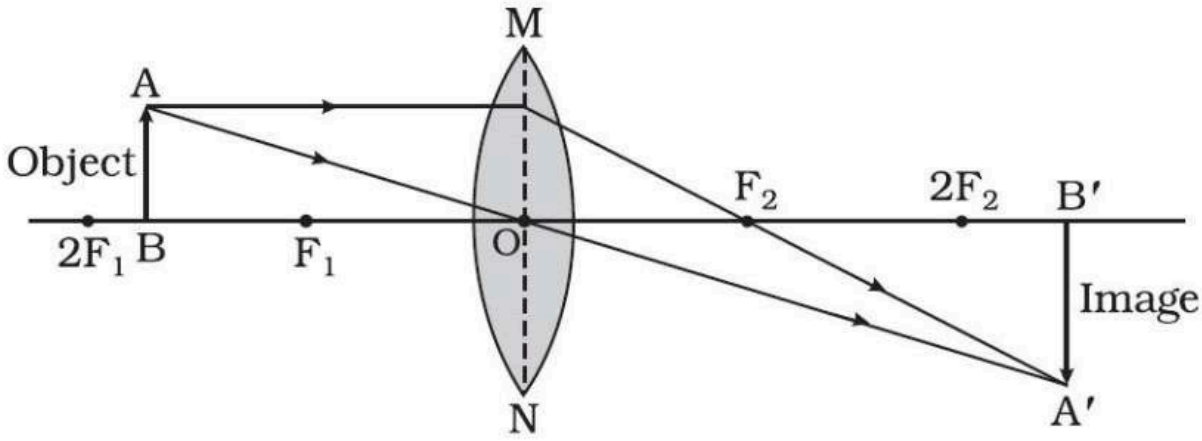
Some farmers have obtained variety of cabbage having sterile flowers and they were cultivated as **cauliflower**.

Some farmers selected the swollen portion of the wild cabbage and developed new variety called **Kohlrabi** from this.

Some farmers have developed a few larger leaves of the wild cabbage as a new variety called **Kale**, a leafy vegetable.

All these varieties are apparently quite different individually from the ancestral wild cabbage.

32. Position of the object : Between F_1 and $2F_1$



Position of the image : On the opposite side of the object and beyond $2F_2$

Nature of the image : Real and inverted

Size of the image : Bigger than the object (Enlarged)

OR

32. The focal length of convex mirror $f = +15$ cm, object-distance $u = -10$ cm

According to mirror formula, $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

$\therefore \frac{1}{v} = \frac{1}{f} - \frac{1}{u}$

$\therefore \frac{1}{v} = \frac{1}{15} - \frac{1}{-10}$

$\therefore \frac{1}{v} = \frac{1}{15} + \frac{1}{10} = \frac{2+3}{30} = \frac{5}{30} = \frac{1}{6}$

$\therefore v = +6$ cm

The image is formed behind the mirror at distance **6 cm**. The mirror is convex mirror hence image would be **virtual, erect** and **diminished.**

33. Parallel connection is seen in a domestic circuit. Its uses (or advantages) are as follows :

(1) In a parallel circuit, the total current is divided through different electrical gadgets and total resistance is also decreased. So this is helpful particularly when each gadget has different resistance and requires different current to operate properly (due to their different power ratings).

(2) In a parallel circuit, each electrical appliance gets the same voltage (p.d.) equal to 220 V as that of the power supply line. Due to this, all the appliances work properly.

(3) In a parallel circuit, if one electrical appliance stops working due to some defect, other appliances are not affected. They continue to work without any problem.

(4) In a parallel circuit, each appliance has its own switch due to which it can be turned 'ON' or turned 'OFF' independently, without affecting other appliances.

34. (1) In solar panel, solar energy is transformed into electrical energy.

(2) Approximately 0.7 W electricity is produced by one solar cell.

(3) Limitations of solar panel :

→ Its construction is expensive.

→ Its efficiency decreases in cloudy atmosphere and in monsoon season.

35. Preparation of washing soda : Sodium carbonate is obtained by heating baking soda.

$$2NaHCO_3 \xrightarrow{\text{Heat}} \underset{\text{Sodium carbonate}}{Na_2CO_3} + H_2O + CO_2$$

Recrystallisation of sodium carbonate forms washing soda.

$$Na_2CO_3 + 10H_2O \xrightarrow{\text{Recrystallisation}} \underset{\text{Washing soda}}{Na_2CO_3 . 10H_2O}$$

→ Washing soda is a basic salt.

Uses : (1) It is useful in the manufacture of glass, soap. (2) It is used for removing permanent hardness of water. (3) In paper and textile industries. (4) As a reagent in laboratory. (5) In manufacturing of sodium compounds like borax (6) As a cleaning agent for domestic purpose.

OR

35. (1) Neutral salt is formed by neutralisation of strong acid and strong base.

∴ The pH value of neutral salt is 7.

Acidic salt is formed by neutralisation of strong acid and weak base.

∴ The pH value of acidic salt is less than 7. Basic salt is formed by neutralisation of weak acid and strong base.

∴ The pH value of basic salt is more than 7.

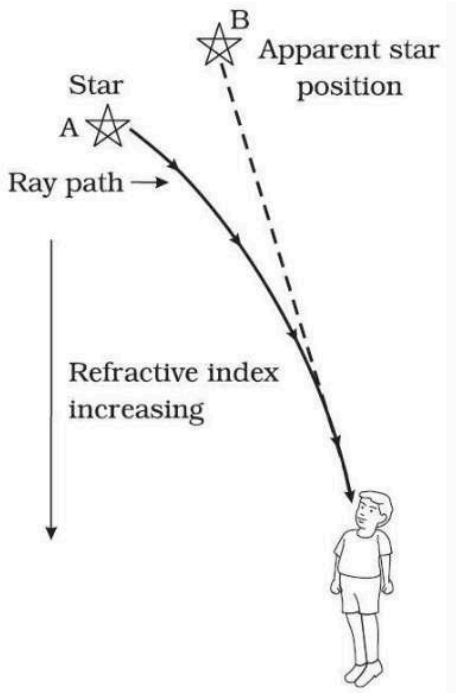
(2) The universal indicator is a mixture of several indicators. It is used to know quantitatively the amount of hydroxyl or hydronium ions presents in a solution. For example, the universal indicator shows different colours at different concentrations of hydroxyl ions or hydronium ions in a solution.

38. Twinkling of stars is due to atmospheric refraction of starlight.

→ Starlight, on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth.

→ As the optical density of air increases towards surface of the earth, light from the star travels from rarer to denser layers, bending every time towards the normal.

On producing the final refracted ray backwards as shown in the following figure, we find that the apparent position (B) of a star is higher than the actual position (A) of the star as shown in figure.



→ The star appears somewhat higher (above) than its actual position when viewed near the horizon.

→ Further, this apparent position of the star is not stationary, but keeps on changing slightly, since physical conditions of the earth's atmosphere are not stationary.

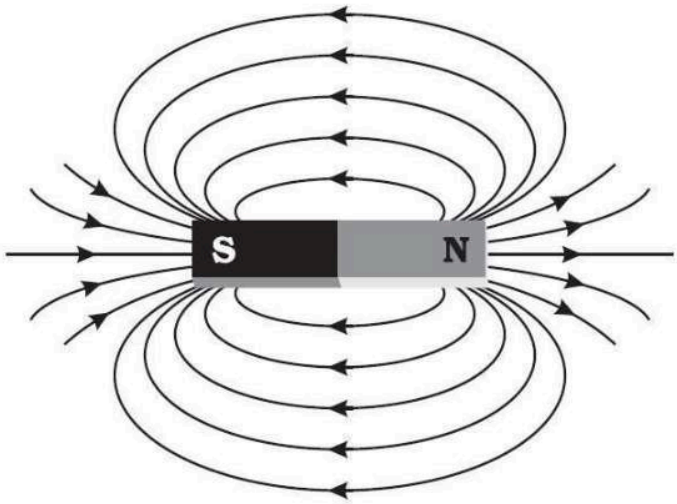
→ Since the stars are very distant, they appear as point-sized sources of light.

→ Due to a continuous change in the direction of propagation of light, the apparent position of the star fluctuates all the time and the amount of starlight entering the eye flickers, i.e., the brightness of the star changes continuously (the star sometimes appears brighter and at some other time fainter). This is called the twinkling of a star.

39. Magnetic field : The region surrounding a magnet in which the force of attraction and repulsion due to that magnet can be detected (using magnet or magnetic substances) is called the magnetic field.

Magnetic field lines : The lines along which the iron filings align / arrange themselves due to force acting on them in the magnetic field of a bar magnet are called magnetic field lines.

The diagram showing field lines around a bar magnet is as follows :



The characteristics of magnetic field lines are as follows :

(1) The magnetic field lines emerge from north pole and merge at the south pole outside the magnet, while inside the magnet the direction of field lines is from its south pole to its north pole.

Thus, the magnetic field lines are closed and continuous curve.

(2) The magnetic field lines are crowded near the pole where the magnetic field is strong and are far apart near the middle of the magnet and far from the magnet where the magnetic field is weak.

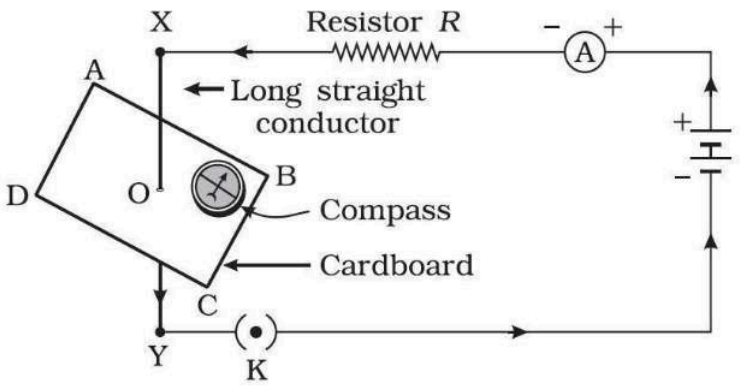
(3) The magnetic field lines never intersect each other because if they do so, there would be two directions of magnetic field at that point which is absurd.

(4) In case the field lines are parallel and equidistant, these represent a uniform magnetic field.

39. Aim : To show that the magnetic field is produced due to electric current.

Procedure :

(1) Take a straight thick copper wire and place it between points X and Y in an electric circuit, as shown in figure. Wire XY is kept perpendicular to the plane of the paper.



(2) Horizontally place a small compass near this copper wire.

→ See the position of its needle.

(3) Pass the current through the circuit by inserting the key into the plug.

→ Observe the change in the position of the compass needle.

→ What does it indicate ? (**or** What does it mean ?)

Observation :

→ When no current flows in the straight thick copper wire (i.e., when plug key K is open), the compass needle (i.e., magnetic needle) remains stationary in the geographical north-south direction of the earth.

→ On passing the current through the copper wire XY (i.e., conducting wire), by inserting the key into the plug, compass needle is deflected.

[Any change in the direction of current through copper wire will show a variation in deflection.]

→ This indicates (shows) that the electric current through copper wire (the conductor) has produced a magnetic effect. It means that magnetic field is produced around the (copper) wire.

Conclusion : Magnetic field is produced due to electric current. Thus, we can say that electricity and magnetism are linked to each other.

Searching for better education?

Focus Academy

Tuition Classes for Primary, 9 to 12
English&Gujarati Medium

9099818013. 8780038581