

- a) directly below the wire
- b) at a point located in the plane of the paper, on the south side of the wire
- c) at a point located in the plane of the paper, on the north side of the wire
- d) directly above the wire

5. Match the following with the correct response: [1]

(1) Metal	(A) Acidic oxides
(2) Non-metal	(B) Neutral
(3) Amphoteric	(C) Both acidic and basic oxides
(4) Salts	(D) Basic oxides

- a) 1-D, 2-A, 3-C, 4-B
- b) 1-C, 2-B, 3-D, 4-A
- c) 1-A, 2-C, 3-B, 4-D
- d) 1-B, 2-D, 3-A, 4-C
6. Substance X is formed by the oxidation of an aldehyde. What will be the action of the substance formed on the litmus solution? [1]

- a) No action on litmus solution
- b) Turns blue litmus red
- c) Turns red litmus blue
- d) None of these

7. Find the incorrect statement: [1]

- A. The pH of the stomach is approximately 4.5
- B. Plants grow well in natural soil
- C. The pH of acid rain is nearly 5.6
- D. The pH of rainwater is nearly 7

- a) (A)
- b) (C)
- c) (D)
- d) (B)

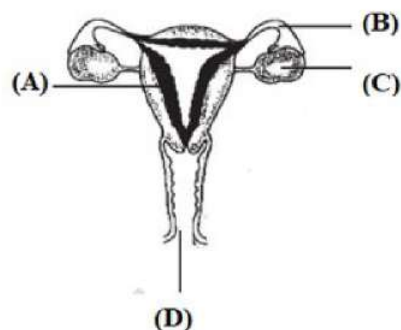
8. In human females, an event that reflects the onset of the reproductive phase is [1]

- a) growth of body
- b) changes in hair pattern
- c) menstruation
- d) change in voice

9. Four solutions P, Q, R and S have PH 2, 7, 9 and 13, respectively. Which of the solution will turn phenolphthalein pink? [1]

- a) R and S
- b) S only
- c) Q and S
- d) P only

10. Which part of the following is a site of implantation? [1]

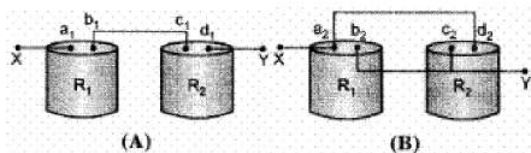


- a) B
b) C
c) A
d) D

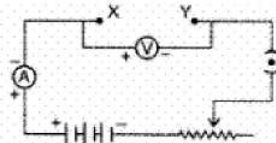
11. How are the two strands in a DNA molecule held together? [1]

- a) Covalent bond
b) Ionic bond
c) Hydrogen bond
d) Phosphate band

12. Students A and B connected the two resistors R_1 and R_2 given to them in the manners shown below : [1]



and then insert at X and Y into the measuring circuit shown below :



We can say that

- a) both the students will determine the equivalent resistance of the series combination of R_1 and R_2 .
b) Student A will determine the equivalent resistance of the series combination while student B will determine the equivalent resistance of the parallel combination of R_1 and R_2 .
c) both the student will determine the equivalent resistance of the parallel combination of R_1 and R_2 .
d) student A will determine the equivalent resistance of the parallel combination while student B will determine the equivalent resistance of the series combination of R_1 and R_2 .

13. If the focal length of a spherical mirror is 12.5 less cm, its radius of curvature will be: [1]

- a) 35 cm
b) 20 cm
c) 15 cm
d) 25 cm

14. Which of the following statement is correct: [1]

Statement A: Many compounds containing sulphur are used as medicines.

Statement B: Cast iron contains 3% to 5% carbon.

ii. Flow of energy in a food chain is unidirectional.

24. In the following food chain, 5 J of energy is available to man. How much energy was available at producer level? [2]

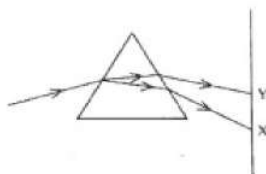
Plants → Sheep → Man



25. A convex lens of focal length 15 cm forms an image 10 cm from the lens. How far is the object placed from the lens? Draw the ray diagram. [2]

OR

In the figure given below, a narrow beam of white light is shown to pass through a triangular glass prism. After passing through the prism, it produces a spectrum XY on the screen.



- Name the phenomenon.
 - State the colours seen at X and Y.
 - Why do different colours of white light bend at different angles through a prism?
26. i. Write the formula and draw the electron dot structure of carbon tetrachloride. [2]
ii. What is saponification? Write the reaction involved in this process.

Section C

27. Identify the type of reaction in the following [3]
- $\text{ZnCO}_3 + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2\text{CO}_3(\text{aq})$
 - $2\text{NaBr}(\text{aq}) + \text{Cl}_2(\text{g}) \longrightarrow 2\text{NaCl}(\text{aq}) + \text{Br}_2(\text{aq})$
 - $2\text{CuO}(\text{s}) \xrightarrow{\text{heat}} 2\text{Cu}(\text{s}) + \text{O}_2(\text{g})$
28. Sudha finds out that the sharp image of window pane of her science laboratory is formed at a distance of 15 cm from the lens. She now tries to focus the building visible of her outside the window instead of the window pane without disturbing the lens. In which direction will she move the screen to obtain a sharp image of the building? What is the approximate focal length of this lens? [3]
29. Mention three important features of fossils which help in the study of evolution. [3]

OR

The embryo gets its nutrition from the mother's blood with the help of special tissue.

- What is this special tissue called?
- Give any other function of this tissue apart from one mentioned above.
- Explain the structure of this special tissue.

30. Why do different rays deviate differently in the prism? [3]
31. Write the balanced chemical equation for the following reaction: [3]
- Phosphorus burns in presence of chlorine to form phosphorus penta chloride.
 - Burning of natural gas.
 - The process of respiration
32. An individual inherits different traits from his parents. On what basis classification of traits as dominant and recessive is done? [3]

OR

Two plants, A with white flowers and B with red flowers were crossed. The F_1 progeny shows all red flowers and F_2 has three red and one white. Categorise the trait as dominant and recessive.

33. For a class, the physics teacher told her students that our eyes can live even after our death. She told them that by donating our eyes after we die, one pair of our eyes can give vision to two corneal blind people. Eye donors may belong from either sex or any age group. People who are suffering from diabetes, hypertension, asthma or any other non-communicable disease can donate eyes. Eye banks have been established for this purpose, where you can pledge to donate your eyes after your death? Read the given passage and answer the following questions: [3]
- Is it possible that people using spectacles or those who have been operated for cataract donate their eyes?
 - Why is the pledge necessary?
 - Do you intend to make such a pledge? Why?

Section D

34. i. List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal. [5]
- ii. Give reasons for the following:
- Most metals conduct electricity well.
 - The reaction of iron (III) oxide [Fe_2O_3] with heated aluminum is used to join cracked machine parts.

OR

Give two examples each of the metals that are good conductors and poor conductors of heat respectively.

35. Describe an experiment to demonstrate that CO_2 is essential for photosynthesis. [5]

OR

- Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body.
 - What happens when the system of blood vessels develop a leak?
36. How does a solenoid behave like a magnet? Can you determine north and south poles of current carrying solenoid with the help of bar magnet? Explain. [5]

Section E

37. **Read the text carefully and answer the questions:** [4]

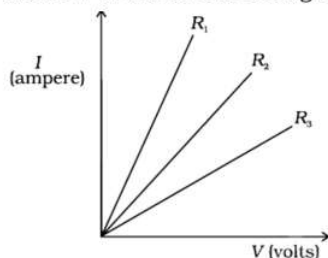
In 1827, a German physicist Georg Simon Ohm (1787-1854) found out the relationship between the current I , flowing in metallic wire and the potential difference across its terminals. He stated that the electric current flowing through a metallic wire is directly proportional to the potential difference V , across its ends provided its temperature remains the same.

The resistance of a circuit is defined as the ratio between the voltage applied to the current flowing through it.

Rearranging the above relation,

$$R = \frac{V}{I}$$

Electric charge flows easily through some materials than others. The electrical resistance measures how much the flow of this electric charge is restricted within the circuit.



- (i) What is the unit of electrical resistance?
- (ii) Define Ohm's law.

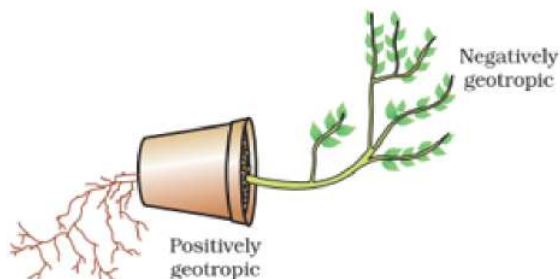
OR

From graph which resistance have high resistance?

38. **Read the text carefully and answer the questions:**

[4]

Environmental triggers such as light, or gravity will change the directions that plant parts grow in. These directional, or tropic, movements can be either towards the stimulus or away from it. So, in two different kinds of phototropic movement, shoots respond by bending towards light while roots respond by bending away from it. How does this help the plant? Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity, is, obviously, geotropism. If 'hydro' means water and 'chemo' refers to chemicals, what would 'hydrotropism' and 'chemotropism' mean? Can we think of examples of these kinds of directional growth movements? One example of chemotropism is the growth of pollen tubes towards ovules, about which we will learn more when we examine the reproductive processes of living organisms.



- (i) Where does negative phototropism occur in plants?
- (ii) Phototropism in shoots is attributed due to which plant hormone?
- (iii) Tendrils exhibit/ twining of tendrils show which type of tropic movement?

OR

If the stem grows towards sunlight and the root grows just opposite to it, then what type of movement of the stem is it?

39. **Read the text carefully and answer the questions:**

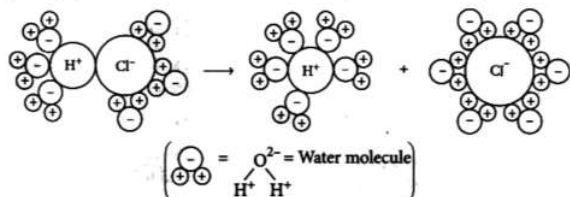
[4]

The acidic behaviour of acids is due to the presence of hydrogen (H^+) ions in them. They produce hydrogen ions in the presence of water. Water is a polar solvent and this property of water helps in weakening the bond between the ions and makes them soluble.

Hence, acids and bases produce ions in aqueous solutions. It may be noted that a dry HCl gas or a solution of hydrogen chloride in organic, non-polar solvents like toluene or benzene do not show acidic properties. This is

because hydrogen chloride does not undergo ionization in toluene.

The reason why HCl splits into H^+ and Cl^- ions in presence of water lies in the fact that water molecules, being polar, pull the H^+ and Cl^- ions apart and thus, the bond in HCl is broken.



Dissociation of HCl into H^+ and Cl^- ions in presence of water

- (i) Which acids are present in bee sting?
- (ii) If the pH of a solution is 8, then find its $[H^+]$ ion.
- (iii) If you are given water, Hydrochloric acid, and Acetic acid, then mention increasing the order of acid strength.

OR

If you are provided H_3PO_4 , C_2H_5OH , H_2CO_3 , and CH_3COOH , then which compound does not give H^+ ions in an aqueous solution?

Solution

SAMPLE PAPER - 7

Class 10 - Science

Section A

- (d) 2Ω**
Explanation: The resistance of each resistor = $\frac{1}{2}\Omega$
Maximum resistance can be found when the resistors are conned in series combination.
Thus for series combination
 $R_e = R_1 + R_2 + R_3 + R_4$
 $R_e = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{4}{2}$
 $R_e = 2\Omega$
- (d) Seven**
Explanation: Mendel selected 14 different varieties of the pea and grouped them into seven pairs. Each pair was considered for a specific trait (characteristic) such as flower colour or seed shape or stem length, etc. The two members of each pair showed contrasting forms of the chosen trait, e.g., in a pair selected for stem length, one variety had a tall stem (6-7 feet tall) while the other had a dwarf stem.
- (d) Carbon dioxide of the flask released by the seeds.**
Explanation: Carbon dioxide of the flask released by the seeds.
- (a) directly below the wire**
Explanation: Line WE show a straight conductor through which current is moving from E to W. When seen from the east, the magnetic field lines appear in a clockwise direction, i.e. S to N above the wire and N to S below the wire. This is in accordance with the Right-Hand Thumb Rule.
- (a) 1-D, 2-A, 3-C, 4-B**
Explanation: Most metals form basic oxides. Non-metals form acidic oxides. Amphoteric substances like zinc and aluminium form basic oxides as well as acidic oxides. Most salts are neutral in nature.
- (b) Turns blue litmus red**
Explanation: Oxidation of an aldehyde (-CHO group) leads to the formation of a carboxylic acid (-COOH group). A carboxylic acid turns blue litmus red.
- (a) (A)**
Explanation: The human stomach produces gastric juices which contain hydrochloric acid in them resulting in a pH of 1.4.
- (c) menstruation**
Explanation: Menstruation is the event that reflects the onset of the reproductive phase.
- (a) R and S**
Explanation: Phenolphthalein turns pink from colourless in presence of a base. A base has a pH range between 7 and 14. Neutral substances have pH 7. Here, solutions R and S have pH more than 7.
- (c) A**
Explanation: Uterus is a site of implantation.
- (c) Hydrogen bond**
Explanation: Each DNA molecule consists of two twisted strands of bases that form a shape called a double helix. The two strands are held together by hydrogen bonds between pairs of bases.
- (b) Student A will determine the equivalent resistance of the series combination while student B will determine the equivalent resistance of the parallel combination of R_1 and R_2 .**
Explanation: c_1, b_1 is the common node in A so series b_2, c_2 pair and a_2, d_2 pair of points are at same potential. So parallel in B.
- (d) 25 cm**
Explanation: Radius of curvature $R = 2f$
 $R = 2 \times 12.5 = 25\text{ cm}$

14. **(a)** Both the statements are true.
Explanation: Both statements are true. Cast iron contains 3% to 5% carbon. Many compounds containing sulphur are used as medicines. Sulphur and sulphur-containing compounds are one of the oldest antimicrobial substances in clinical use.
15. **(b)** Excitation of electron of chlorophyll
Explanation: The first step of photosynthesis is the excitation of electrons of chlorophyll. The energy from the sun, raises an energy level in the chlorophyll molecule, causing electrons to leave the molecule and travel along the electron transport chain (ETC) in a series of oxidation and reductions.
16. **(b)** Pollination, fertilization, embryo, seedling
Explanation: In pollination, the pollen grains transfer from stamen (anther) to stigma after which fertilization takes place during which germ cells fuse together to form a zygote which in turn leads to embryo formation. Fertilized ovule becomes seed and seeds germinate to produce a seedling.
17. **(c)** A is true but R is false.
Explanation: It is used to find the direction of force in a current-carrying conductor in the presence of magnetic field.
18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Water is never added to concentrated sulphuric acid as it is an exothermic reaction and releases a large amount of heat energy. It also results in the spurting of the acid, which can burn your skin. Concentrated sulphuric acid is added to water in small amounts and that too with constant stirring and cooling.
19. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: Both A and R are true but R is not the correct explanation of A.
20. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Both A and R are true and R is the correct explanation of A.

Section B

21. Detergents are also called 'soapless soaps' because though they act like soap in having the cleansing properties but they do not contain the composition of usual soaps like sodium stearate etc.

Traditionally soaps are Sodium or potassium salts of fatty acids. however, detergents are nor salts but are simply surface active chemicals showing soap like properties like sodium stearate hence they are called as soap less soaps.

OR

The element is silicon (Si). It belongs to group 14 of modern periodic table and shows catenation property as carbon shows but as its size is bigger than that of carbon, Si - Si bonds are comparatively weaker than C-C bonds.

Upto seven to eight, silicon atoms can be linked (Si-Si-Si-Si-Si-Si-Si) to form different compounds but the stability of these compounds decreases gradually . Thus, we can say catenation in Si ,is not as good as in C.

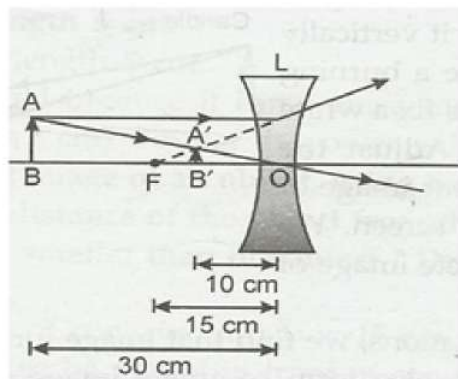
22. Hormonal responses are slower than the reflex actions because hormones, which initiate and control the responses, are chemicals transported by blood. On the other hand, in reflex actions, the impulses are electrical in nature and are transmitted by specialised cells called neurons that makeup nervous tissue. It does not need the involvement of the brain. It means, when the nerve signal travels to the spinal cord, it triggers an automatic response before the brain realizes it. The spinal cord then reacts by sending a signal causing the person to react.
23. i. Decomposers are essential in a biosphere as they return nutrients back to the environment by breaking down dead complex organic matter into recyclable simpler compounds.
 ii. The flow of energy through different steps in the food chain is unidirectional as the food chain progress the energy passes from lower trophic level to upper but never vice versa.
24. According to law if 5 J of energy is available to man then 10% energy is available to primary consumer so primary consumer is filled with 50J. Producers consume only 1% of energy which is available from sun therefore 5000J of energy is available to the producers.
25. $f = -15 \text{ cm}$, $v = -10 \text{ cm}$

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

$$\frac{1}{u} = \frac{1}{15} - \frac{1}{10} = -\frac{1}{30}$$

$$u = -30 \text{ cm}$$

Ray diagram as follows:



OR

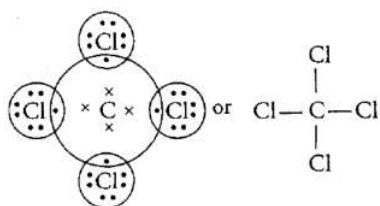
- i. The phenomenon is called dispersion.
- ii. X — Violet Y — Red
- iii. Different colours of white light bend through different angles with respect to the incident beam of light due to difference in speed of light of different wavelengths.

26. i. Electronic configuration of carbon, C(6) is $2, 4$ ^{K L}

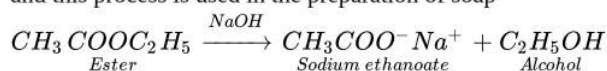
Electronic configuration of chlorine, Cl (17) is $2, 8, 7$ ^{K L M}

To attain octet configuration, carbon needs 4 electron and chlorine needs 1 electron.

So, carbon forms carbon tetra chloride(CCl₄)



- ii. The reaction of an ester in the presence of base to give sodium salt of carboxylic acid and alcohol is known as saponification and this process is used in the preparation of soap



Section C

27. a. Double decomposition reaction [An exchange of ions took place]
 - b. Displacement reaction [A more reactive non-metal displaces a less reactive non-metal from its salt solution.]
 - c. Decomposition reaction/Reduction reaction [A compound decomposes to form two or more products./CuO is reduced to Cu.]
28. Let us assume that the window pane is between F₂ and infinity from this lens and this is a convex lens. We know that when the object is between infinity and F₂, its inverted and real images is formed between 2F and 2F₂.

Now, the distant building is at infinity from the lens. Its image would be formed at 2F. So, the screen needs to be moved towards the lens in order to get a sharp image. Its approximate focal length is 10 cm (less than image distance in earlier case).

29. i. Fossils represent modes of preservation of ancient species.
- ii. Fossils help in establishing evolutionary traits among organisms and their ancestors that is their phylogeny.
- iii. The age of the fossil helps in determining the time period in which that species lived and how old are the fossils.

OR

- i. This special tissue that provides nutrition is called the placenta.
 - ii. Besides providing nutrition to the embryo, placenta helps in removing waste products from embryo, it also helps in providing oxygen to the embryo and eliminating carbon dioxide from embryo.
 - iii. The placenta is a disc-like structure that is attached to the wall of the uterus. It is formed by two sets of a minute finger-like process called villi. One set from uterine wall and other set from the embryo. The blood flows through the fine capillaries of the placenta.
30. Different wavelengths deviate differently in the prism because the angle of refraction for different colours having different wavelengths is different while passing through the glass prism (medium). A light ray is refracted when it passes from one medium to another at an angle and its speed changes. At the interface, it is bent in one direction if the material it enters is denser (when

light slows down) and in the other direction if the material is less dense (when light speeds up). Because different wavelengths (colours) of light travel through a medium at different speeds, the amount of bending is different for different wavelengths. Violet is bent the most and red the least because violet light has a shorter wavelength, and short wavelengths travel more slowly through a medium than longer ones do.

31. Balanced chemical equations are as follow:

- i. $P_4(s) + 10Cl_2(g) \rightarrow 4PCl_5(s)$
- ii. $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l) + \text{Heat energy}$
- iii. $C_6H_{12}O_6(s) + 6O_2(g) + 6H_2O \rightarrow 6CO_2(aq) + 12H_2O(l) + \text{Energy}$

32. A trait which is able to express itself both in homozygous condition as well as heterozygous conditions is called a dominant trait. A trait which expresses itself only in homozygous condition is called recessive trait.

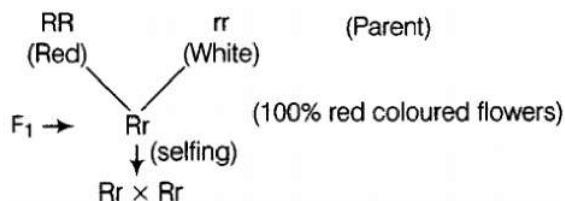
OR

When two plants, A with white flowers and B with red flowers were crossed,

In F_1 generation all the plants have red coloured flowers and in F_2 generation the ratio of red : white is 3 : 1.

The dominant trait is red colour in flowers.

The recessive trait is white colour in flowers.



Gametes	R	r
R	RR(red)	Rr(red)
r	Rr(red)	rr(red)

- i. Yes, it is possible that people using spectacles or those who have been operated for cataract can donate their eyes.
- ii. The eyes have to be removed from your dead body and then implanted in two corneal blind people. Your permission in the form of a pledge is essential. In fact, the pledge is to be signed in the presence of your near and dear ones, who will be in charge of the body after you die.
Eyes of a dead person can be donated to a person having corneal blindness. It will help him/her see the world. We can also register ourselves to donate our eyes. The organisations that put up eye donation camps preserve our eyes after our death and donate them to the needy.
- iii. Yes, I want to make a pledge for such a noble cause. Because after my death both my eyes will be used to give vision to two corneal blind people.

Section D

34. i. Difference between Metals and Non-metals:

Metals	Non-metals
They react with oxygen to form basic oxide. $2Mg + O_2 \rightarrow 2MgO$ <i>Magnesium Magnesium oxide</i>	They react with oxygen to neutral or basic oxide. $4C(s) + O_2(g) \rightarrow CO_2(s)$ <i>Carbon Carbondioxide</i>
They react with water to produce metal hydroxide and hydrogen gas. $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$	They do not react with water,
Generally, they do not combine with hydrogen except sodium, potassium, and calcium which form ionic hydrides.	They react with hydrogen to form covalent hydrides.

- ii. a. Metals for example Na have an electronic configuration of 2, 8, 1 i.e. It has one free electron. This electron moves through the metal and conducts an electric current due to the presence of a free electron. So, metals conduct electricity because they readily give up their valence electron.
- b. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe(l)$
(s) (s) s (Heat)
It is a thermite reaction.

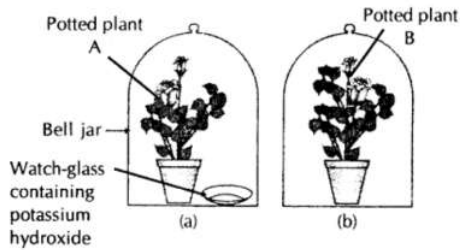
This reaction is an exothermic reaction the reaction produces a large amount of heat due to which iron metal is produced in molten form and use to join the tracks.

OR

Metals in general, are conductors of heat. Some are good conductors whereas some are poor conductors of heat. Owing to the number of free electrons they have, they are classified into good or poor conductors of heat. Those metals that have more number of free electrons are good conductors and those that have less number of free electrons are poor conductors of heat. For example,

- i. Metals that are good conductors of heat - Silver (Ag) and Copper (Cu).
- ii. Metals that are bad conductors of heat - Lead (Pb) and Mercury (Hg).

35. Two healthy potted plants of same size were taken. They were kept in a dark room for three days. Each plant was placed in a separate glass plate. By the side of one of the plant, a watch-glass containing potassium hydroxide was placed. Potassium hydroxide was used for the purpose of absorbing carbon dioxide. Both plants were covered in separate bell-jars. Vaseline was used to seal the bottom of the jars to make the setup airtight. After that, the plants were kept in sunlight for about two hours. The leaves of each plant were observed to find out whether both the leaves show the presence of the same amount of starch.



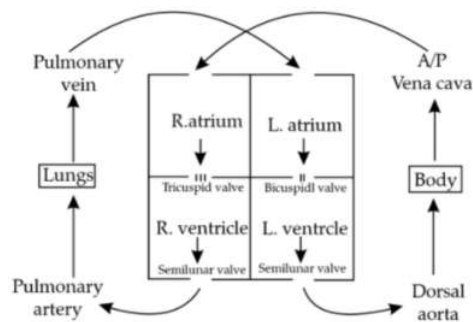
It was observed that the leaves of the plant in the jar containing potassium hydroxide remain colourless showing the absence of starch. On the other hand, the leaves of the other plant turned blue-black showing the presence of starch.

It can be concluded from the above experiment that the CO_2 was absorbed by KOH. Hence photosynthesis did not occur. In the other jar, photosynthesis takes place in the presence of CO_2 .

Therefore from the experiment, it can be concluded that CO_2 is essential for the process of photosynthesis.

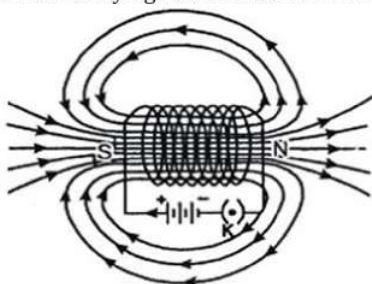
OR

- i. The correct sequence is blood flow from the Lungs $\xrightarrow[\text{vein}]{\text{Pulmonary}}$ Left sides of the heart \rightarrow Ventricle \rightarrow Aorta \rightarrow Body organs

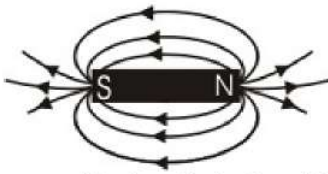


- ii. The leaked blood flows into surrounding tissues leading to accumulation of blood. This condition is known as hematoma.

36. Solenoid is a coil of a number of turns of insulated copper wire closely wrapped in shape of a cylinder. Magnetic field around a current carrying solenoid is shown in fig.



These appear to be similar to that of a bar magnet shown in below fig.



One end [right end] of solenoid behaves like north pole and the other end [left end] behaves like south pole. Magnetic field lines inside the solenoid are in the form of parallel straight lines. This means that the field is the same at all points inside the solenoid. When a soft iron rod is placed inside the solenoid, it behaves like an electromagnet.

Section E

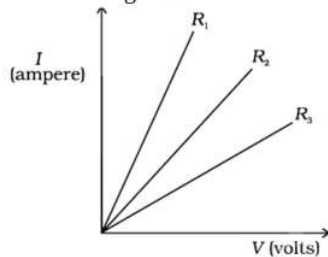
37. Read the text carefully and answer the questions:

In 1827, a German physicist Georg Simon Ohm (1787-1854) found out the relationship between the current I , flowing in metallic wire and the potential difference across its terminals. He stated that the electric current flowing through a metallic wire is directly proportional to the potential difference V , across its ends provided its temperature remains the same.

The resistance of a circuit is defined as the ratio between the voltage applied to the current flowing through it. Rearranging the above relation,

$$R = \frac{V}{I}$$

Electric charge flows easily through some materials than others. The electrical resistance measures how much the flow of this electric charge is restricted within the circuit.



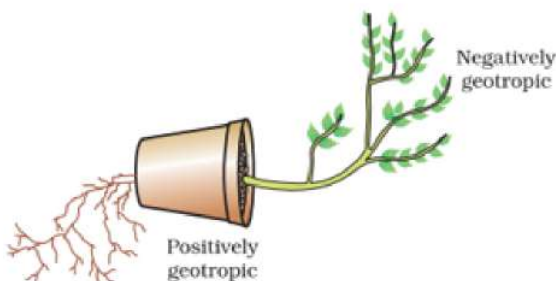
- (i) Ohm is the unit of electrical resistance.
- (ii) According to Ohm's law, there is a relation between the current flowing through a conductor and the potential difference across it. It is given by,
 $V \propto I$ $V = IR$

OR

R_3 resistance has high resistance.

38. Read the text carefully and answer the questions:

Environmental triggers such as light, or gravity will change the directions that plant parts grow in. These directional, or tropic, movements can be either towards the stimulus or away from it. So, in two different kinds of phototropic movement, shoots respond by bending towards light while roots respond by bending away from it. How does this help the plant? Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity, is, obviously, geotropism. If 'hydro' means water and 'chemo' refers to chemicals, what would 'hydrotropism' and 'chemotropism' mean? Can we think of examples of these kinds of directional growth movements? One example of chemotropism is the growth of pollen tubes towards ovules, about which we will learn more when we examine the reproductive processes of living organisms.



- (i) In plants, negative phototropism occurs in roots.
- (ii) Phototropism in shoots is attributed due to auxin in plants.
- (iii) Tendrils exhibit/ twining of tendrils show thigmotropism movement.

OR

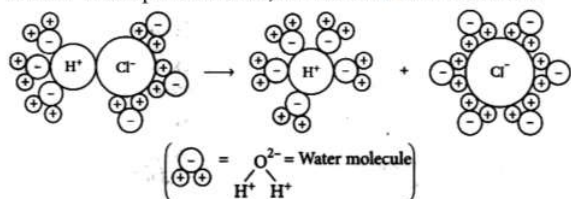
Positive phototropic movement.

39. Read the text carefully and answer the questions:

The acidic behaviour of acids is due to the presence of hydrogen (H^+) ions in them. They produce hydrogen ions in the presence of water. Water is a polar solvent and this property of water helps in weakening the bond between the ions and makes them soluble.

Hence, acids and bases produce ions in aqueous solutions. It may be noted that a dry HCl gas or a solution of hydrogen chloride in organic, non-polar solvents like toluene or benzene do not show acidic properties. This is because hydrogen chloride does not undergo ionization in toluene.

The reason why HCl splits into H^+ and Cl^- ions in presence of water lies in the fact that water molecules, being polar, pull the H^+ and Cl^- ions apart and thus, the bond in HCl is broken.



Dissociation of HCl into H^+ and Cl^- ions in presence of water

(i) Formic acid is the common name for methanoic acid and it is present in a bee stings.

(ii) $pH = -\log_{10} [H^+] = 8$

$$\log_{10} [H^+] = -8$$

$$[H^+] = 10^{-8} \text{ mol/L}$$

(iii) Water < Acetic acid < Hydrochloric acid

OR

C_2H_5OH is not an ionic compound, it is a covalent compound and hence does not give H^+ ions in aqueous solution.