



(C) Trilobite

(D) New variations

a) 1-C, 2-B, 3-D, 4-A

b) 1-B, 2-D, 3-A, 4-C

c) 1-D, 2-A, 3-C, 4-B

d) 1-A, 2-C, 3-B, 4-D

3. The final product of glycolysis is

[1]

a) Glucose

b) Acetyl COA

c) Malic acid

d) Pyruvic acid

4. In our domestic electric supply we use following three colours of wire.

[1]

a) red, black, green

b) red, blue, green

c) black, green, yellow

d) red, black, blue

5. Reaction between X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z?

[1]

a) Occurs as solid

b) Conducts electricity in molten state

c) Has high melting point

d) Has low melting point

6. Match the following with the correct response:

[1]

(1) Soap	(A) Sodium salts of long-chain of sulphonic acids
(2) Detergents	(B) Esterification
(3) The reaction of $\text{CH}_3\text{COOH}$ with metal hydroxides	(C) Neutralization
(4) The reaction of $\text{CH}_3\text{COOH}$ with alcohols	(D) Sodium salts of long-chain fatty acids

a) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

b) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)

c) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

d) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

7. As the pH value of solution increases from 7 to 14, it represents

[1]

a) a decrease on the concentration of  $\text{OH}^-$  ions

b) an increase in the concentration in  $\text{OH}^-$  ion

c) no change in the concentration of  $\text{OH}^-$  ions

d) an increase in the concentration of  $\text{H}_3\text{O}^+$  ions.

8. In Amoeba, binary fission takes place by the following steps. The correct sequence is:

[1]

A. The cellular constriction increases and divides the whole body into equal halves and form two daughter Amoeba.

B. A constriction appears in the cell membrane and nuclear membrane.

C. Each daughter Amoeba contains a nucleus surrounded by cytoplasm and cell membrane.

D. Nuclear constriction increases and divides the nucleus into two daughter nuclei.

a) B, D, A, C

b) D, A, B, C

c) C, D, A, B

d) A, B, C, D

9. Calcium phosphate is present in tooth enamel. Its nature is

[1]

a) Acidic

b) Neutral

c) Amphoteric

d) Basic

10. Match the following with correct response.

[1]

Column A	Column B
(i) Ovary	(a) Tying or cutting the fallopian tubes
(ii) Vasectomy	(b) Form fruits and ovules from seeds
(iii) Tubectomy	(c) Individual having both the sexes
(iv) Hermaphrodite	(d) Tying or cutting the vas deferens

a) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)

b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

c) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

d) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

11. Which of the following organism has only one type of sex chromosome called X-chromosome?

[1]

a) Cricket

b) Lizard

c) Bee

d) Ant

12. Current flows through a wire only when there is \_\_\_\_\_ between the ends of the wire.

[1]

a) Potential difference

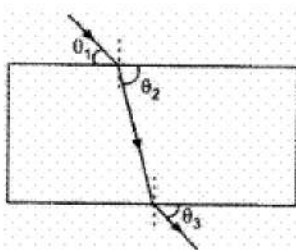
b) All of these

c) Work is done in moving a charge

d) Potential difference at one end is more than at the other end

13. A student, while doing the experiment, on tracing the path of a ray of light passing through a rectangular glass slab, measured the three angles marked as  $\theta_1$ ,  $\theta_2$  and  $\theta_3$  in the figure. His measurements could be correct if he were to find:

[1]



a)  $\theta_1 > \theta_2$  but  $\theta_2 = \theta_3$

b)  $\theta_1 > \theta_2 > \theta_3$

c)  $\theta_1 < \theta_2$  but  $\theta_1 = \theta_3$

d)  $\theta_1 < \theta_2 < \theta_3$

14. What happens when dilute sulphuric acid is poured on a copper platen?

[1]

a) No reaction takes place.

b) Copper chloride formed.

c) Zinc sulphate formed.

d) Copper sulphate formed.

15. Which of the following sequence of materials is required to set up an experiment to determine the percentage of water absorbed by raisins? Select the correct order of use while conducting the experiment.

[1]

a) raisins, beaker of water, balance, weight box

b) raisins, beaker of water, blotting paper, weight box, balance

c) raisins, beaker, balance, weight box

d) raisins, water, blotting paper, balance

16. The ability of a cell to divide into several cells during reproduction in Plasmodium is called

[1]

a) multiple fission

b) budding



c) binary fission

d) reduction division

17. **Assertion (A):** A direction current flows through a metallic rod, produced a magnetic field only outside the rod. [1]

**Reason (R):** There is no flow of charge carriers inside the rod.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A):** The acidity of  $Mg(OH)_2$  is two. [1]

**Reason (R):** The acidity of a base is equal to the number of hydroxyl ions.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

19. **Assertion (A):** Nerve impulse is one-way conduction. [1]

**Reason (R):** Nerve impulse is transmitted from dendrite to axon terminals.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** Ozone is both beneficial and damaging. [1]

**Reason (R):** Stop the release of chlorofluorocarbons to protect the ozone.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

### Section B

21. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved. [2]

OR

An organic compound A is a constituent of many medicines and used as an antifreeze and has the molecular formula  $C_2H_6O$ . Upon reaction with alk.  $KMnO_4$ , compound A is oxidised to another compound B with formula  $C_2H_4O_2$ .

Identify the compounds A and B. Write the chemical equation for the reaction which leads to the formation of B.

22. Write a short note on Pineal gland. [2]

23. What are the problems caused by non-biodegradable wastes that we generate? [2]

24. i. What is meant by non-biodegradable waste? [2]

ii. Identify biodegradable waste from the following.

Empty packet of chips, empty plastic bottle of mineral water, empty paper box of sweets, empty tin of cold drink.

25. Should the mirror always be made of glass? [2]

OR

A convex lens forms a real and inverted image of a needle at a distance of 50 cm from it. Where is the needle be placed in front of the convex lens if the image is equal to size of the object? Also, find the power of the lens.

26. What happens when ethanol reacts with [2]

- i. sodium
- ii. potassium permanganate solution.

### Section C

27. A brown substance X on heating in air forms a substance Y. When hydrogen gas is passed over heated Y, it again [3]  
changes back into X. Name the substances X and Y.
28. A student wants to project the image of a candle flame on a screen 80 cm in front of a mirror by keeping the [3]  
candle flame at a distance of 20 m from its pole.
- i. Which type of mirror should the student use?
  - ii. Find the magnification of the image produced.
  - iii. Find the distance between the object and its image.
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.

- i. What is this special tissue called?
  - ii. Give any other function of this tissue apart from one mentioned above.
  - iii. Explain the structure of this special tissue.
30. For a class, the physics teacher told her students that our eyes can live even after our death. She told them that by [3]  
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:
- i. Is it possible that people using spectacles or those who have been operated for cataract donate their eyes?
  - ii. Why is the pledge necessary?
  - iii. Do you intend to make such a pledge? Why?
31. A solution of a substance 'X' is used for whitewashing [3]
- i. Name the substance 'X' and write its formula.
  - ii. Write the reaction of the substance 'X' named in (i) above with water.
32. Mendel, in one of his experiments with pea plants, crossed a variety of pea plant having round seeds with one [3]  
having wrinkled seeds. State Mendel's observations giving reasons of  $F_1$  and  $F_2$  progeny of this cross. Also, list  
any two contrasting characters, other than round seeds of pea plants that Mendel used in his experiments.

OR

A man with blood group A married a person with blood group O. Their daughter has blood group O. Is this  
information enough to tell you which of the blood group trait A or O is dominant. Why or why not?

33. How can changes of size of eyeball be one of the reasons for [3]
- i. myopic and
  - ii. hypermetropic eye?
- Compare the size of eyeball with that of a normal eye in each case. How does this change of size affect the  
position of image in each case?

### Section D

34. i. Write the electron-dot structures for sodium, oxygen and magnesium. [5]  
ii. Show the formation of  $Na_2O$  and  $MgO$  by the transfer of electrons.



iii. What are the ions present in these compounds?

OR

Two ores A and B were taken. On heating, ore A gives  $\text{CO}_2$ , whereas, ore B gives  $\text{SO}_2$ . What steps will you take to convert them into metals?

35. What is the significance of photosynthesis? [5]

OR

Describe the three pathways of break down of glucose.

36. What are essential precautions to be used while using electricity ? [5]

#### Section E

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

We know that a battery or a cell is a source of electrical energy. The chemical reaction within the cell generates the potential difference between its two terminals that sets the electrons in motion to flow the current through a resistor or a system of resistors connected to the battery. To maintain the current, the source has to keep expanding its energy. Where does this energy go? A part of the source energy in maintaining the current may be consumed for useful work (like in rotating the blades of an electric fan). The rest of the source energy may be expended in heat to raise the temperature of the gadget. We often observe this in our everyday life. For example, an electric fan becomes warm if used continuously for a long time, etc. On the other hand, if the electric circuit is purely resistive, that is, a configuration of resistors only connected to a battery; the source energy continually gets dissipated entirely in the form of heat. This is known as the heating effect of electric current. This effect is utilized in devices such as an electric heater, electric iron, etc.



- (i) Explain Joule's heating law.
- (ii) In practical situations, when an electric appliance is connected to a known voltage source, then how does the heating effect of electric current can be calculated?

OR

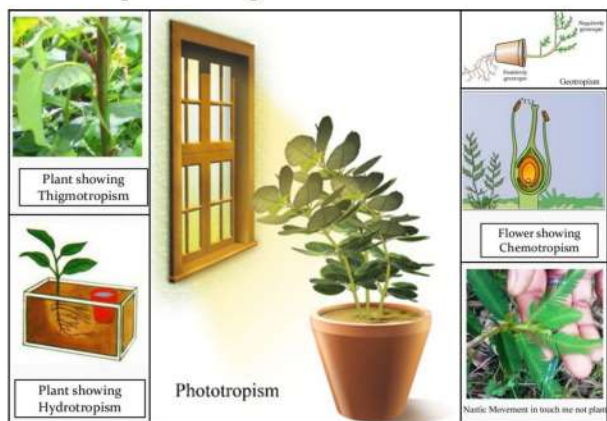
Write the relation between heat energy produced in a conductor when a potential difference  $V$  is applied across its terminals and a current  $I$  flows through for  $t$ .

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

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chhui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch. There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement. So plants show two different types of movement - one dependent on growth and the



other independent of growth.



- (i) Plants neither have nervous system nor muscles, then how does chemical coordination occur in plants?
- (ii) Why *Mimosa pudica* leaves drop down when we touched? Write its another name also.
- (iii) What is turgor movement?

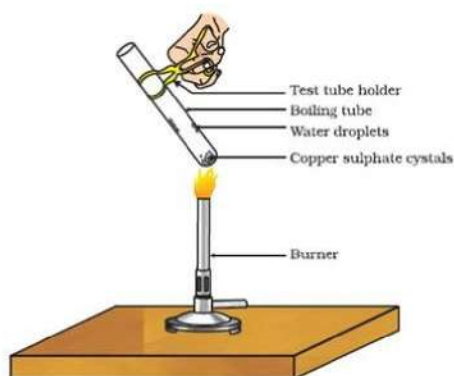
**OR**

What is a tropic movement? Explain with an example

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

**[4]**

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water molecules and became calcium sulphate hemihydrate.



- (i) If the crystal is moistened with water, then which colour of the crystal reappears?
- (ii) What is the commercial name of calcium sulphate hemihydrate?
- (iii) How many water molecules are present in one formula unit of copper sulphate?

**OR**

What is obtained when gypsum is heated at 373K?



**Solution**  
**SAMPLE PAPER - 3**  
**Class 10 - Science**  
**Section A**

1. **(c)** circuit (I) only  
**Explanation:** In II option, the deflection will be reverse (below zero).
2. **(b)** 1-B, 2-D, 3-A, 4-C  
**Explanation:** A) variation causes speciation.  
B ) genetic drift cause variations.  
C) male gamete contains male germ cell and is also called sex cell.  
D) paleozoic arthropod is a trilobite.
3. **(d)** Pyruvic acid  
**Explanation:** Glycolysis involves the breaking down of sugar (generally glucose, although fructose and other sugars may be used) into more manageable compounds in order to produce energy. The net end products of glycolysis are two Pyruvate, two NADH, and two ATP.
4. **(b)** red, blue, green  
**Explanation:** The mains supply is delivered to houses using three core wiring called the live, neutral, and the earth. The live wire is red in colour and brings in the current, the neutral coloured blue is the return wire. The earth is green or yellow. These wire supply electricity to separate circuits within the house.
5. **(d)** Has low melting point  
**Explanation:** Given that the compound X and Y form compound Z.  
Here, X loses electron and Y gains electron meaning that an ionic or an electrovalent bond is formed. Thus, the compound Z is a crystalline solid, has high melting and boiling point. It conducts electricity in the molten state.  
The compound Z cannot have a low melting point.
6. **(c)** (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)  
**Explanation:**
  - Soaps are sodium or potassium salts of long-chain fatty acids.
  - Detergents are sodium salts of a long chain of sulphonic acids.
  - The reaction of acetic acid with metal hydroxides is a neutralization reaction.  
$$\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$$
  - The reaction in which a carboxylic acid combines with an alcohol to form an ester is called esterification. When acetic acid  $\text{CH}_3\text{COOH}$  reacts with alcohol, an ester is formed along with water.  
$$\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$$
7. **(b)** an increase in the concentration in  $\text{OH}^-$  ion  
**Explanation:** The pH scale measures how acidic or basic a substance is. The pH scale ranges from 0 to 14. A pH of 7 is neutral. A pH less than 7 is acidic. A pH greater than 7 is basic. The higher the concentration of  $\text{H}^+$  ions, the lower is the pH value. The increase of pH from 7 to 14 indicates the increase in the concentration of  $\text{OH}^-$  ions.
8. **(a)** B, D, A, C  
**Explanation:** The correct sequence is B, D, A, C.  
Amoeba is a unicellular organism. They reproduce by fission asexually, different from the human's method. It has a porous cell membrane that encloses the cell organelles and cytoplasm. After replicating its genetic material through mitotic (equal) division, the cell divides into two equal-sized daughter cells. The genetic material is also equally partitioned; therefore the daughter cells are genetically identical to each other and the parent cell. In this process, the nucleus of the Amoeba first divides to form two daughter nuclei by the process of Karyokinesis (a division of cell nucleus). After the nucleus has divided into two, the process of Cytokinesis(a division of the cytoplasm) takes place in which the cytoplasm in the mother cell divides into two daughter cells. This leads to the formation of the two daughter Amoebae cell having a nucleus and its own cell organelles.
9. **(d)** Basic  
**Explanation:** Calcium phosphate is present in tooth enamel and it is known as hydroxyapatite which is basic in nature. It is





present in bones also. It is the hardest known material in the whole body. It is present on the outside part of the crown area in a tooth.

10. (b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

**Explanation:**

- A flower is a plant's reproductive structure. One major part is the carpel, the female reproductive structure that includes the ovary. Inside the ovary is an ovule that, when fertilized, will develop into a seed. A seed contains an embryo (baby plant), the endosperm (food for the embryo), and a seed coat.
- Vasectomy is a surgical procedure for male sterilization or permanent contraception. During the procedure, the male vas deferens are severed and then tied or sealed in a manner so as to prevent sperm from entering into the urethra and thereby prevent fertilization.
- Tubal ligation or tubectomy (also known as having one's "tubes tied") is a surgical procedure for sterilization in which a woman's fallopian tubes are clamped and blocked or severed and sealed, either of which prevents eggs from reaching the uterus for implantation.
- Hermaphrodite is an animal having both male and female sex organs or other sexual characteristics, either abnormally or (in the case of some organisms) as the natural condition.

11. (a) Cricket

**Explanation:**

- The X0 sex-determination system is a system that determines the sex of offspring among grasshoppers, crickets, cockroaches, and some other insects. In this system, there is only one sex chromosome, referred to as X. Males only have one X chromosome (X0), while females have two (XX).
- The zero (sometimes, the letter O) signifies the lack of a second X. Maternal gametes always contain an X chromosome, so the sex of the animals' offspring depends on whether a sex chromosome is present in the male gamete. Its sperm normally contain either one X chromosome or no sex chromosomes at all.

12. (b) All of these

**Explanation:** All of these

13. (c)  $\theta_1 < \theta_2$  but  $\theta_1 = \theta_3$

**Explanation:** For  $i = (90 - \theta_1)$ , the value of  $r = (90 - \theta_2)$  will be less. So  $\theta_2 > \theta_1$ .

As long as the surfaces of the slab are parallel the  $\angle e = \angle i$

i.e.  $(90 - \theta_3) = (90 - \theta_1)$  or  $\theta_3 = \theta_1$

14. (d) Copper sulphate formed.

**Explanation:** Copper sulphate formed.

15. (b) raisins, beaker of water, blotting paper, weight box, balance

**Explanation:** Raisins have to be weighed first then to be put into a beaker of water. Swollen raisins are to be dried with blotting paper, so these materials are required.

16. (a) multiple fission

**Explanation:** The ability of a cell to divide itself into several cells during reproduction is called multiple fission. e.g., Plasmodium.

17. (b) Both A and R are true but R is not the correct explanation of A.

**Explanation:** In the case of metallic rod, the charge carries flow through the whole of the cross-section. Therefore, the magnetic field exists both inside as well as outside. However, the magnetic field inside the rod will go on decreasing as we go towards the axis.

18. (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.

19. (c) A is true but R is false.

**Explanation:** Nerve impulses are always transmitted across a synapse from the axon terminals of one neuron to the dendrite/cell body of the next neuron but never in the reverse direction. Since the neurotransmitter is present only in the axon terminals and not in the dendrite or cell body, it cannot be released from the dendrite or cell body even if the impulse reaches there.

20. (b) Both A and R are true but R is not the correct explanation of A.

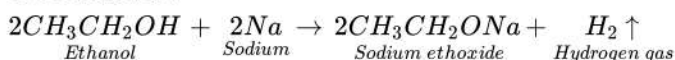
**Explanation:** Ozone is damaging as it is a deadly poison. It is beneficial as it shields the surface of the earth from UV

radiations of the Sun. We should stop the release of Chlorofluorocarbons (CFCs) to protect the ozone.

### Section B

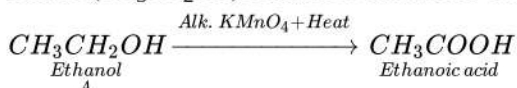
21. The gas evolved is hydrogen.

The reaction is :



OR

The organic compound A which is a constituent of many medicines and act as antifreeze with the molecular formula  $\text{C}_2\text{H}_6\text{O}$  is ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ ). Ethanol is oxidised to ethanoic acid (B) upon reaction with alk.  $\text{KMnO}_4$ .



22. Pineal gland is situated as a stalk - like organ on the roof of third ventricle. This gland is considered as a vestigial organ. It is well developed in children, shrinks after about 7th year and is reduced to a little knot of tissue after puberty. It is reported that it secretes a hormone called melatonin which influences skin colouration and is not a protein. It is antagonistic as it may delay sexual development and may reduce reproductive activity.

23. Following problems are caused by the Non biodegradable waste:

(a) Plastics which do not get decomposed get accumulated in soil, water bodies & pollute these natural resources.

(b) Non-biodegradable substances like pesticides and fertilizers mix with run off to water & enter the water bodies. Excess fertilizers in water bodies cause excess growth of algae on the surface leading to oxygen depletion in water bodies, affecting the growth of aquatic organisms. Pesticides being toxic also affect the aquatic plants & animals.

(c) Some of the non-biodegradable pesticides like DDT enter the food chain and cause biomagnification in humans and other animals.

24. Substances that cannot be broken down into simpler substances by the action of microorganisms are called non-biodegradable.

They stay in environment for years and cause pollution

From the list, empty paper box of sweets is biodegradable

25. It should be any reflecting surface. Even a polished spoon is a convex mirror on outer and concave mirror on inner side.

OR

Here  $u = ?$ ,  $v = +50$  cm,  $-h' = h$ ,  $f = ?$ ,  $P = ?$

$$m = \frac{h'}{h} = \frac{v}{u} \text{ But } \frac{h'}{h} = -1$$

Inverted image is of the size of the object

$$-1 = \frac{50}{u} \text{ or } u = -50 \text{ cm}$$

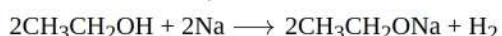
$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{50} - \frac{1}{-50} = \frac{1}{50} + \frac{1}{50} = \frac{2}{50} = \frac{1}{25}$$

$$f = 25 \text{ cm} = 0.25 \text{ m}$$

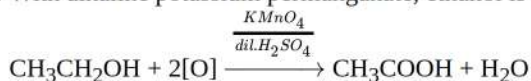
$$P = \frac{1}{f} = \frac{1}{0.25}$$

$$P = 4 \text{ dioptre}$$

26. i. With sodium metal, sodium ethoxide is formed.

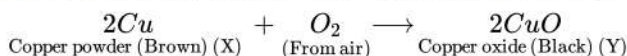


ii. With alkaline potassium permanganate, ethanol is oxidised to ethanoic acid.

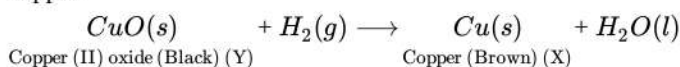


### Section C

27. The substance X is copper. On heating in air, it forms copper oxide, Y.



When hydrogen gas is passed over black copper oxide, hydrogen acts as a reducing agent and it turns copper oxide back into copper.



28. i. Concave Mirror

ii. It is given, object distance  $u = -20$ m, distance  $v = 80$ m

Magnification is given as  $M = -v/u$

$$M = -v/u = -(-80/-20) = 4$$



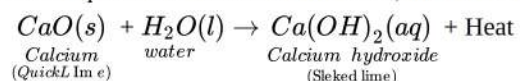
iii. Distance between object and image  $v-u = -80m - (-20m) = -60m$

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. 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.

31. i. The substance whose solution in water is used for white washing is calcium oxide. Its formula is **CaO**.  
 ii. When quicklime is mixed with water, the following reaction takes place:

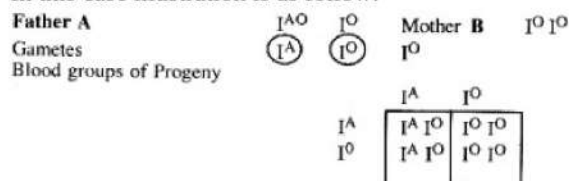


32. i. In first generation progeny (F<sub>1</sub> progeny) all plants with round seeds.  
 ii. In second generation progeny (F<sub>2</sub> progeny) all plants with round and wrinkled seeds.  
 iii. (i) Tall and dwarf plants.  
 (ii) Yellow and green seeds.  
 (iii) White and purple flowers.

OR

Blood groups being a hereditary character, the knowledge of blood groups of parents can give information about the possible blood groups of children and vice-versa.

In this case illustration is as follow:



In the above cross 50 per cent of progeny will have A blood group and 50 per cent O blood group.

At the same time this data is insufficient. It is not mentioned father has homozygous or heterozygous A blood group. If it is homozygous A then 100 per cent of progeny will have A blood group as Gene  $I^A$  is dominant over Gene  $I^O$ .

33. i. The eye suffering from myopia or short-sightedness, has long eyeball than that of normal eye due to which the retina is at a larger distance from the eye lens thus image formation occurs before retina rather than onto it.  
 ii. The eye suffering from hypermetropia or long-sightedness has short eyeball than that of normal eye due to which the retina is at smaller distance from the eye lens thus, the formation of the image occurs behind the retina and not on retina.

#### Section D

i.

	Metal	Symbol	Atomic number	Electronic configuration K, L, M, N	No. of outermost electrons	Electron dot structures
34.	Sodium	Na	11	2,8, 1	1	Na.

Oxygen	O	8	2,6	6	:O::
Magnesium	Mg	12	2,8, 2	2	Mg:

ii. Formation of  $Na_2O$ :

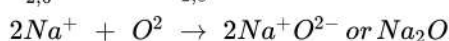
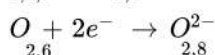
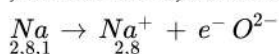
The atomic number of sodium is 11 and it has only one valence electron.

Hence, electronic configuration of  ${}_{11}Na$  is 2, 8, 1.

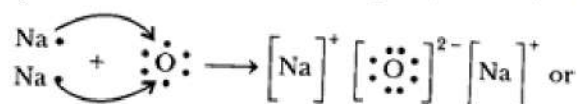
The atomic number of oxygen is 8 and it has 6 electrons in its valence shell.

Hence, electronic configuration of  ${}_8O$  is 2, 6.

Sodium has a tendency to lose the valence electron and oxygen has a tendency to gain the electron lost by sodium. Since, sodium can lose only one electron of the valence shell, and oxygen atom needs two electrons to complete its octet in the valence electron, two atoms of sodium combine with one atom of oxygen. By losing valence electron, sodium is changed into  $Na^+$  and by gaining two electrons lost by two sodium atoms, oxygen atom is changed into an oxide anion,  $O^{2-}$ . In this process, both the atoms, sodium and oxygen, obtain the stable electronic configuration of the noble gas neon.



The oppositely charged sodium ion,  $Na^+O^{2-}$  and oxide ion,  $O^{2-}$  are now held together by electrostatic force of attraction or by ionic or electrovalent bond.  $Na_2O$  is, therefore, an ionic or electrovalent compound.

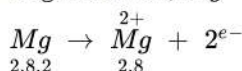


Formation of  $MgO$ :

The atomic number of magnesium = 12

Its electronic configuration is  $K, L, M$   
 $2, 8, 2$

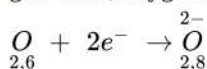
It has two electronic in its outermost shell. So, the magnesium atom donates its 2 valence electrons and forms a stable magnesium ion,  $Mg^{2+}$  to attain the electronic arrangement of neon atom.



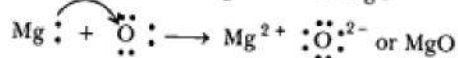
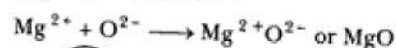
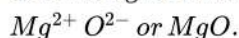
The atomic number of oxygen = 8

Electronic configuration =  $K, L$   
 $2, 6$

It has 6 electrons in its valence shell. Therefore, it requires 2 more electrons to attain the stable electronic arrangement of neon gas. Thus, oxygen accepts 2 electrons donated by magnesium atom and forms a stable oxide ion,  $O^{2-}$



The oppositely charged magnesium ions,  $Mg^{2+}$ , and oxide ions, are held together by a strong force of electrostatic attraction to form magnesium oxide compound.



MgO is ionic compound.

iii. The ions present in  $Na_2O$  are sodium ions ( $2Na^+$ ) and oxide ion  $O^{2-}$ .

The ions present in  $MgO$  are magnesium ion ( $Mg^{2+}$ ) and oxide ion  $O^{2-}$ .

OR

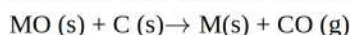
i. Ore A is a carbonate ore.

The steps involved in the extraction of metal M from ore A are as follows:

a. The carbonate ore is heated strongly in the limited supply of air to produce a metal oxide. **[calcination]**



b. The oxide ore is reduced with carbon(coke).

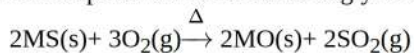




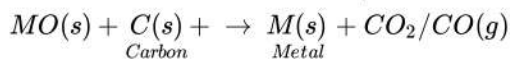
ii. Ore B is a sulphide ore.

The steps involved in the extraction of metal M from ore B are as follows:

a. The sulphide ore is heated strongly in the presence of the excess of air to produce a metal oxide. [roasting]



b. The oxide of metal B is reduced by carbon to obtain the corresponding metal.



35. Photosynthesis is the most important and basic process which sustains life on this earth. It has manifold significance such as :

- It synthesises food from inorganic substances. This food becomes the ultimate source of energy and life for all the living organisms.
- It is the only known method which release oxygen in the atmosphere and keeps the O<sub>2</sub> concentration constant. The consumption of O<sub>2</sub> by living organisms during respiration is compensated by photosynthesis.
- It also helps to keep the CO<sub>2</sub> concentration in the atmosphere constant. The CO<sub>2</sub> being released due to the respiration of living organisms is being incorporated into glucose during photosynthesis.
- Coal, petroleum and natural gas are fossil fuels. These have been produced by the application of heat and compression on the past plants.
- All useful plant products such as timber, rubber, resins, drugs, oils, fibres etc. are derived from the process of photosynthesis.
- Green plants are the main producers of food in the ecosystem. All other organisms directly or indirectly depend on green plants for food.

OR

Glucose is broken down to release energy in presence of oxygen as well as in absence of oxygen.

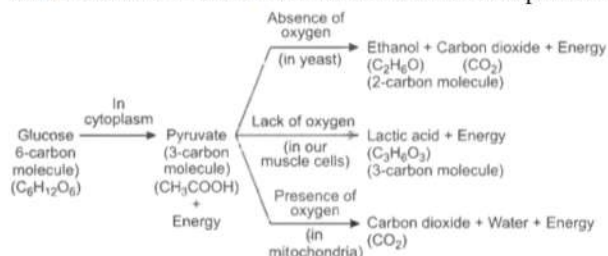
i. **Aerobic respiration:** Here glucose is completely oxidized in presence of an excess supply of oxygen. In human beings, glucose is first broken down to pyruvic acid in the cytoplasm by the process of glycolysis releasing only 2 ATP molecules. Then pyruvate in mitochondria by Krebs's cycle process completely breaks down to release carbon dioxide and water. A total of 38 molecules of ATP are released during this process.

ii. **Anaerobic respiration:** It takes place in absence of oxygen. Pyruvate gets converted to lactic acid and carbon dioxide under anaerobic conditions mainly in muscle cells during strenuous exercise.

In yeast, pyruvate gets converted to ethanol and carbon dioxide by the process of fermentation.

iii. **Lack of Oxygen**

At times when there is a lack of oxygen in our body, mainly during vigorous activity, in our muscles, pyruvate is converted into lactic acid which is a 3-carbon molecule compound. The formation of lactic acid in muscles causes cramps.



36. **Precautions to be followed for using electricity are :**

- All connects must be tight. Wires must be covered the proper insulation and of proper thickness. All joints must be covered with insulating tape. Defective switches should be immediately replaced.
- Switch off all switches including main switch whenever there is a sparking or fire.
- Fuse must be of proper rating and should always be connected to live wire.
- Always put dry rubber shoes while repairing the circuit.
- Fuses should be always connected to live wire. The earth wire must be connected to the body of electric appliance.
- If in spite of all the precautions, a person gets shock due to accidental touching a live wire, one should try to provide such a person with support of some non-conducting material like wood, plastic or rubber. Never try to pull away person by your hand.
- Whenever repairs are needed, switch off main switch. If however, repairs need a direct handling of live wire, use of rubber gloves or rubber shoes or a plier with insulated handle is a must.

#### Section E

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

We know that a battery or a cell is a source of electrical energy. The chemical reaction within the cell generates the potential difference between its two terminals that sets the electrons in motion to flow the current through a resistor or a system of resistors



connected to the battery. To maintain the current, the source has to keep expanding its energy. Where does this energy go? A part of the source energy in maintaining the current may be consumed for useful work (like in rotating the blades of an electric fan). The rest of the source energy may be expended in heat to raise the temperature of the gadget. We often observe this in our everyday life. For example, an electric fan becomes warm if used continuously for a long time, etc. On the other hand, if the electric circuit is purely resistive, that is, a configuration of resistors only connected to a battery; the source energy continually gets dissipated entirely in the form of heat. This is known as the heating effect of electric current. This effect is utilized in devices such as an electric heater, electric iron, etc.



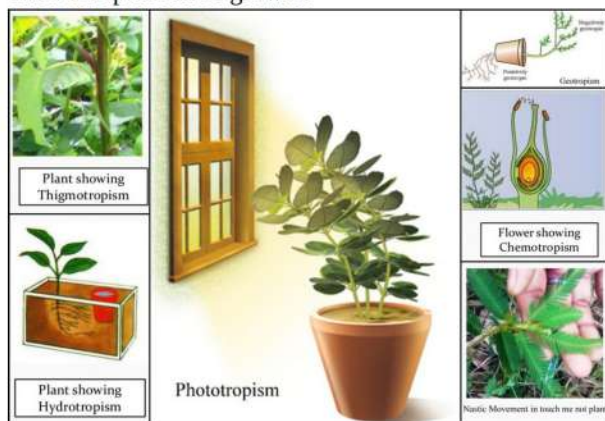
- (i) The law implies that heat produced in a resistor is
- directly proportional to the square of current for a given resistance,
  - directly proportional to resistance for a given current, and
  - directly proportional to the time for which the current flows through the resistor.
- (ii) Firstly, we calculate the current flowing through it, using the relation  $I = \frac{V}{R}$ . Then we apply the formula  $H = I^2Rt$  to calculate the heating effect.

OR

Heat produced,  $H = VI t$

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

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chhui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch. There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement. So plants show two different types of movement - one dependent on growth and the other independent of growth.



- (i) In plants, **chemical coordination** occurs with the help of plant hormones (Phytohormones).
- (ii) *Mimosa pudica's* leaves drop down when we touch it. It is due to the turgor pressure difference between the upper and lower halves of the base of the petiole. Its other name is "touch-me-not" or "chui-mui".
- (iii) Turgor movement is the movement due to the difference in turgidity of the cells in the lower half and the upper half of pulvinus (petiole of a leaf).

OR

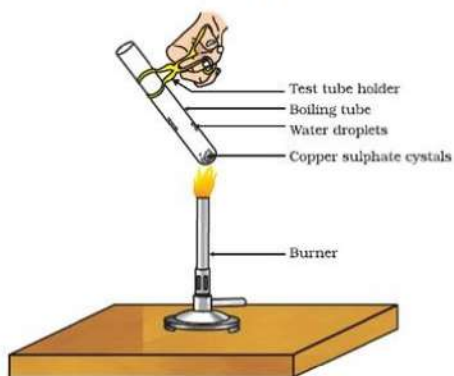
The movements which are in a particular direction in relation to the stimulus are called tropic movements. Tropic movements happen as a result of the growth of a plant part in a particular direction. For example; the shoot usually grows in the direction of sunlight. This is called positive phototropic movement.

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

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1



formula unit of copper sulphate. On heating gypsum at 373K, it loses water molecules and became calcium sulphate hemihydrate.



- (i) If the crystal is moistened with water, then the blue colour of the crystal reappears.
- (ii) The commercial name of calcium sulphate hemihydrate is Plaster of Paris.
- (iii) Five water molecules are present in one formula unit of copper sulphate.

OR

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  is obtained when gypsum is heated at 373K.

Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.