

MP Board Class 10 Science Previous Year Question Paper 2019 Solution

1. Choose and write the correct alternative.

(i) A solution turns red litmus blue, its pH is likely to be:

- a) 1
- b) 4
- c) 5
- d) 10

Answer: d

(ii) The kidneys in human beings are a part of the system for:

- a) Nutrition
- b) Respiration
- c) Excretion
- d) Transportation

Answer: c

(iii) The human eye forms the image of an object at its:

- a) A Cornea
- b) Iris
- c) Pupil
- d) Retina

Answer: d

(iv) S.I. unit of electric current is –

- a) Joule
- b) Watt
- c) Volte
- d) Ampere

Answer: d

(v) Which of the following constitute is a food chain?

- a) Grass, Wheat and Mango
- b) Grass, Goat and Human
- c) Grass, Cow and Elephant

d) Grass, Fish and Goat

Answer: b

2. Fill in the blanks.

- Those reactions in which heat is released along with the formation of products are called _____ reactions.
- There are _____ groups in modern periodic table.
- Mendal proposed the law of _____.
- The least distance of distinct vision for young adult with normal vision is about _____.
- The energy transfer is _____ percent from one tropical level to another.

Answer (i) Those reactions in which heat is released along with the formation of products are called **exothermic** reactions.

Answer (ii) There are **18** groups in modern periodic table.

Answer (iii) Mendal proposed the law of **inheritance**.

Answer (iv) The least distance of distinct vision for young adult with normal vision is about **25 cm**

Answer (v) The energy transfer is 10 percent from one tropical level to another.

3. Match the columns "A" with "B".

A	B
Sodium	Our arm and a dog's foreleg
Nephron	Voltametre
Endocrine gland	Highly reactive metal
Homologous Organ	Hormone
Measurement of Potential Difference	Liquid Metal
	Structural Unit of Kidney

Answer:

A	B
Sodium	Highly reactive metal
Nephron	Structural Unit of Kidney
Endocrine gland	Hormone
Homologous Organ	Our arm and a dog's foreleg
Measurement of Potential Difference	Voltametre

4. Write the answers in one sentence each.

- i. What is the pH value of pure water?
- ii. Write the name of pigment found in leaf of green plants.
- iii. Which disease is found in human due to the deficiency of iodine?
- iv. Write the names of two fossil fuels.
- v. Write mirror formula.

Answer i: The pH value of pure water is 7.

Answer ii: The name of pigment found in leaf of green plants is Chlorophyll.

Answer iii: The disease found in human due to the deficiency of iodine is Goitre.

Answer iv: Coal and Petroleum

Answer v: Mirror Formula – $1/f = 1/u + 1/v$

5. Define rancidity

Answer: Rancidity can be defined as chemical decomposition of oils and fats which in another words is spoiling food materials that difficult for consumption. It can be prevented by following methods:

- i. The packing of food materials should be replaced the air with Nitrogen.
- ii. The food materials should be placed at very low temperatures.
- iii. Addition of antioxidants also prevents rancidity process.

OR

Why do we apply paint on iron articles?

Answer: We apply paint on iron articles to protect them from corrosion. After painting iron surface does not come in contact with moisture and air which cause rusting. Rusting is the common term for corrosion of iron and its alloys, such as steel.

6. Define valency.

Answer: The combining capacity of an atom is known as its valency. The number of bonds that an atom can form as part of a compound is expressed by the valency of the element.

OR

Write the two limitations of Newland's law of octaves.

Answer: The two limitations of Newland’s law of Octaves are as follows:

- Newlands’ Law of Octaves applicable to elements up to Calcium
- Newland assumed there are 56 elements in the nature and no more elements would be discovered in the future.

7. What is pollination?

Answer: Pollination is a method where pollen grains are picked from an anther, which is the male part of a flower and transferred to the flower’s female part called the stigma. To make the pollination work successfully, the pollen grains must be transferred from the same species of flower.

OR

How does binary fission differ from multiple fission?

Answer: Differences between Binary Fission and Multiple Fission

Binary fission	Multiple fission
2 daughter cells are formed from the splitting of the parent’s cell or Nucleus.	Many daughter cells are formed from the splitting of the parent’s cell or Nucleus.
Occurs during favourable conditions.	Occurs during unfavourable conditions.
Divides only once.	Divides repeatedly.
Both the Nucleus and cytoplasm divide simultaneously.	First, the nucleus divides and is surrounded by cytoplasm.
Includes definite pattern of division.	Has no definite pattern of division.
Example: Amoeba, Bacteria, Euglena, etc.,	Example: <i>Plasmodium</i> , Sporozoans, Algae, etc.

8. What is fossils?

Answer: The preserved remains of animals or plants or other organisms from the distant past are called fossils. These fossils tell us about many extinct animals and also give insights into how the evolution could have taken place.

OR

Define homologous organ.

Answer: Analogous organs are the organs possessing a different basic structural design but they are similar in the functions they carry out. These structures develop in unrelated entities and exhibit convergent evolution. For instance, even though the wings of bats and bird look similar, wings of bats have skin foldings whereas the wings of birds are covered with fur.

9. Define the centre of curvature of the spherical mirror?

Answer: Centre of curvature is the centre of the sphere of which the spherical mirror is a part.

OR

Define the principal focus of a concave mirror.

Answer: Light rays that are parallel to the principal axis of a concave mirror converge at a specific point on its principal axis after reflecting from the mirror. This point is known as the principal focus of the concave mirror.

10. Define exothermic reaction and endothermic reaction with example.

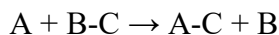
Answer: Endothermic Reactions - The endothermic process is a term that describes a reaction where the system absorbs the energy from its surrounding in the form of heat. Few examples of endothermic process is photosynthesis, evaporating liquids, melting ice, dry ice, alkanes cracking, thermal decomposition, ammonium chloride in water and much more.

Exothermic Reactions - The exothermic reaction is the opposite of an endothermic reaction. It releases energy by light or heat to its surrounding. Few examples are neutralization, burning a substance, reactions of fuels, deposition of dry ice, respiration, solution of sulfuric acid into water and much more.

OR

Define displacement and double displacements reaction with example.

Answer: Displacement Reaction - A displacement reaction is the one wherein the atom or a set of atoms is displaced by another atom in a molecule. For instance, when Iron is added to a copper sulphate solution, it displaces the copper metal.

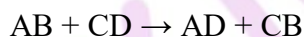


The above equation exists when A is more reactive than B.

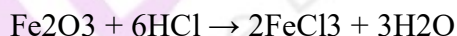
A and B have to be either:

- Halogens where C indicates a cation.
- Different metals wherein C indicates an anion.

Double Displacements Reaction - Those reactions in which two compounds react by an exchange of ions to form two new compounds are called double displacement reactions. In double replacement reactions, the positive ions exchange negative ion partners. A double replacement reaction is represented by the general equation.



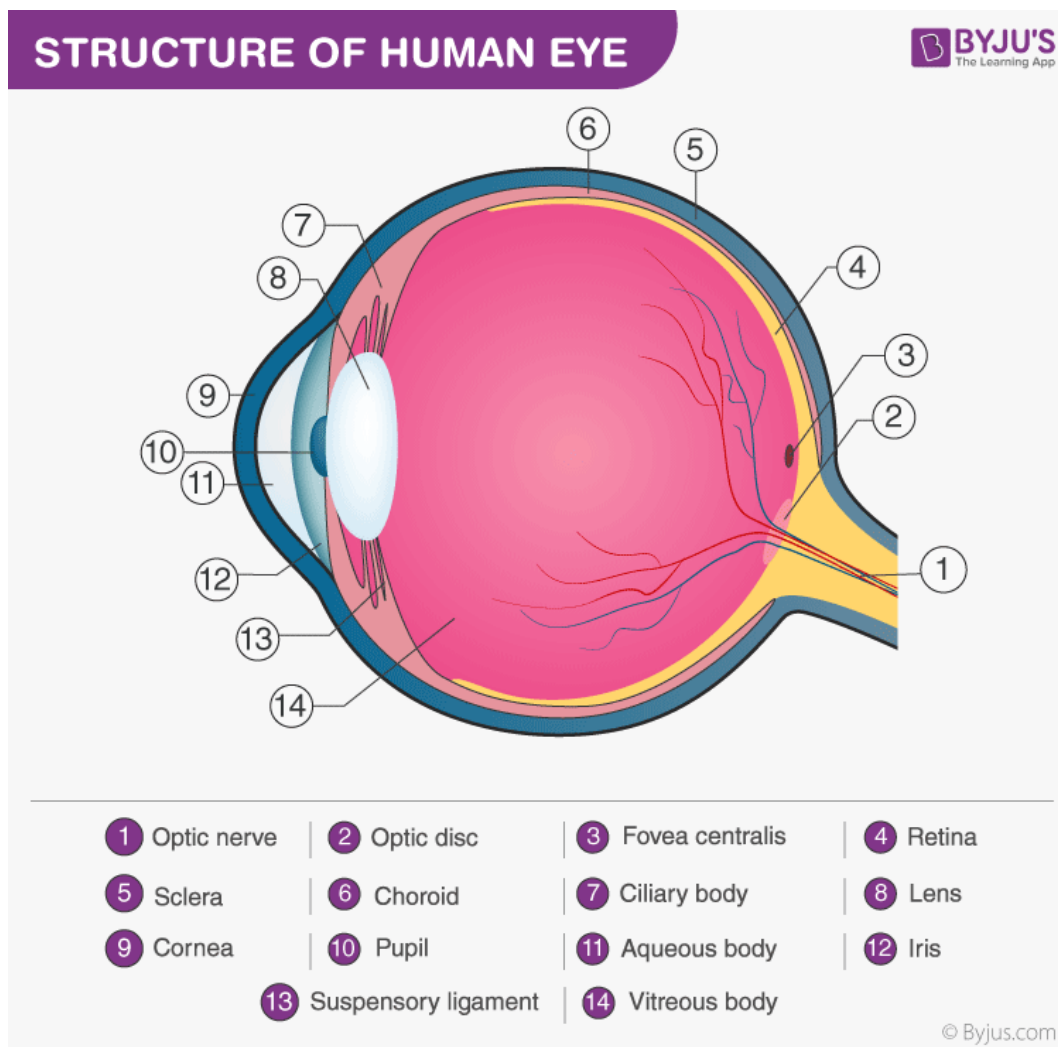
In a double displacement reaction, atoms from two different compounds switch places. The reactants are two compounds and the products are two different compounds. Double displacement reactions can also be called double replacement reactions.



Many double displacement reactions occur between ionic compounds that are dissolved in water.

11. Draw a well labelled diagram of human eye.

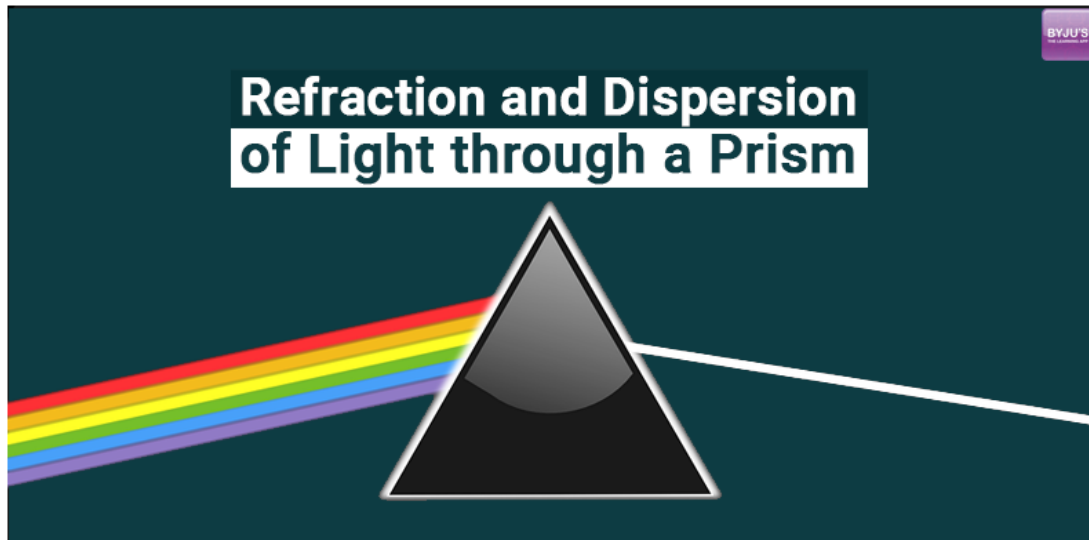
Answer:



OR

Draw a diagram of dispersion of white light by the glass prism.

Answer:



12. Write any three properties of magnetic field lines.

Answer: The properties of magnetic lines of force are as follows.

- Magnetic field lines emerge from the North Pole and merge at the South Pole.
- As the distance between the poles increases, the density of magnetic lines decreases.
- The direction of field lines inside the magnet is from the South Pole to the North Pole.
- Magnetic lines do not intersect with each other.

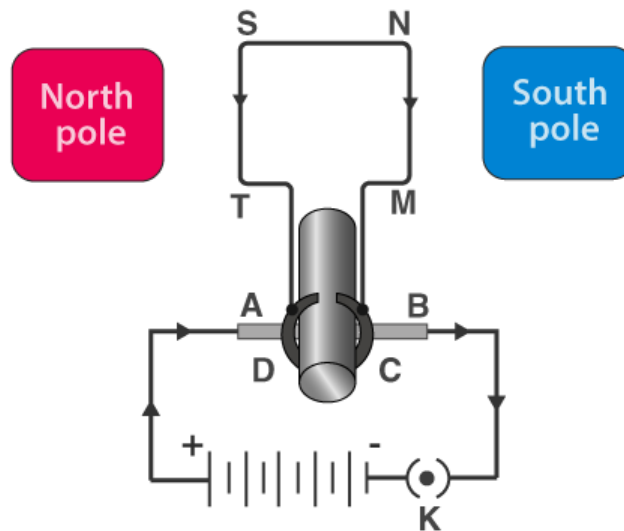
OR

State Fleming's left-hand rule.

Answer: Fleming's Left hand rule states that if we arrange our thumb, forefinger and middle finger of the left hand right angles to each other, then the thumb points towards the direction of the magnetic force, the forefinger points towards the direction of magnetic field and the middle finger points towards the direction of current.

13. Draw a well labelled diagram of electric motor.

Answer: An electric motor is a device that converts electrical energy to mechanical energy. It works on the principle of magnetic effect of current. The figure listed below shows a simple electric motor.

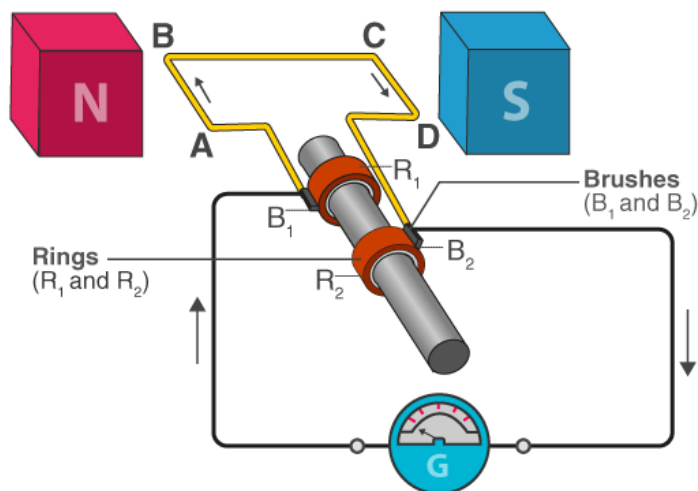


When current is made to flow through the coil MNST by closing the switch, the coil starts to rotate in the anticlockwise direction. This is due to the downward force acting on the length MN and simultaneously an upward force acting along the length ST. As a result of which the coil rotates in the anticlockwise direction. Current in the length MN flows from M to N and the magnetic fields act from left to right normal to the length MN. According to Fleming's Left Hand rule, a downward force acts along the length MN. Similarly, the current along the length ST flows from S to T and the magnetic field acts from left to right. Therefore, an upward force acts along the length ST. These two forces together cause the coil to rotate anti-clockwise. After half a rotation, the position of MN and ST interchange. The half ring C come in contact with brush B and the half ring D comes in contact with brush A. Hence the direction of current in the coil MNST gets reversed.

OR

Draw a well labelled diagram of electric generator.

Answer: The electric generator converts the mechanical energy into the electrical energy. The working principle of the electric generator is the electromagnetic induction. It generates electricity by rotating a coil in the magnetic field. The figure below shows the construction of a simple AC generator.



In the diagram,

A and B are brushes,

C and D are slip rings

X is the axle

G is the galvanometer

When the axle X is rotated clockwise, MN moves upwards while ST moves downward. The movement of MN and ST in the magnetic field results in the production of electric current due to electromagnetic induction. MN moves upwards and the magnetic fields act from left to right. Therefore, according to Fleming's right hand rule, the direction of the induced current will be from M to N along the length MN. Similarly, the direction of the induced current will be from S to T along the length ST. The direction of the current in the coil is MNST. Hence, galvanometer shows a deflection in a particular direction.

After half a rotation, length MN starts moving downwards while the length ST starts moving upwards. Now, the direction of the induced current reverses to TSNM. Since the direction of the induced current reverses every half rotation, the current induced is known as alternating current.

14. Write the advantages of using a solar cooker.

Answer: The advantages of using a solar cooker are as follows:

- i. Solar cooker uses Sun's energy to heat and cook food.
- ii. It is inexhaustible and clean renewable source of energy.
- iii. It is free for all and available in unlimited amount. Hence, operating a solar cooker is not expensive.

OR

What are the qualities of an ideal sources of energy?

Answer: An ideal source of energy must be:

- i. Economical
- ii. Easily accessible
- iii. Smoke/pollution free
- iv. Easy to store and transport
- v. Able to produce huge amount of heat and energy on burning

15. (a) Define neutralization reaction with example.

Answer: A neutralization reaction can be defined as a chemical reaction in which an acid and base quantitatively react together to form a salt and water as products. Eg: Formation of Sodium Chloride (Common Salt): $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$.

(b) Write the chemical formula of following:

1. Bleaching powder
2. Plaster of Paris

Answer 1: The formula of Bleaching powder is $\text{Ca}(\text{OCl})_2 \cdot \text{H}_2\text{O}$

Answer 2: The chemical formula of plaster of Paris is $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$.

OR

Write two important uses of washing soda and baking soda.

Answer: Two important uses of washing soda are:

- Used as a cleansing agent in industries and household.
- It finds its application in paper, textile, soap, and detergent industries.

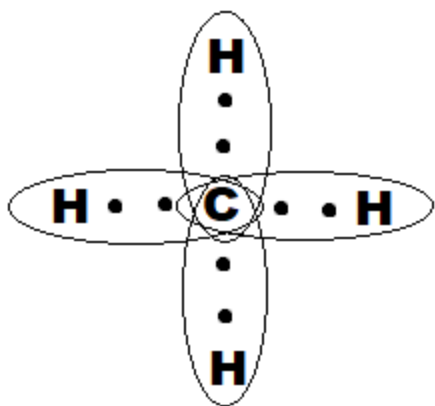
Two important uses of baking soda are:

- Reduces the acidity in the stomach
- Acts as an antacid which is used to treat stomach upset and indigestion

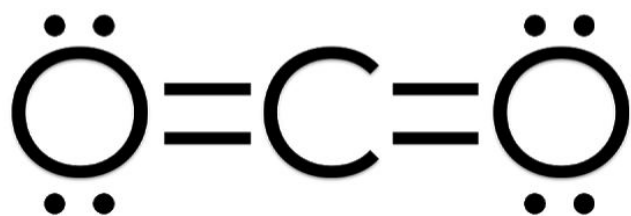
16. (a) Draw the electron dot structure of following:

1. CH_4
2. CO_2

Answer 1:



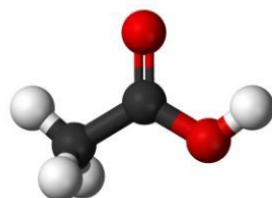
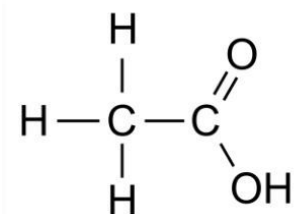
Answer 2:



(b) Draw the structures for the following:

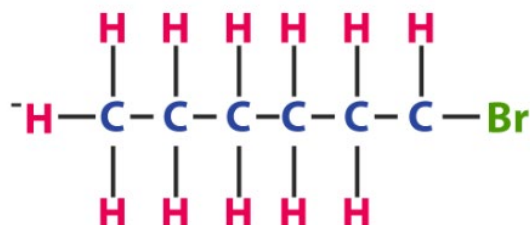
1. Ethanoic acid
2. Bromopentane

Answer 1:



Answer 2:

2. Bromopentane



OR

- (a) Write any two differences between soap and detergent.
 (b) Define the homologous series.

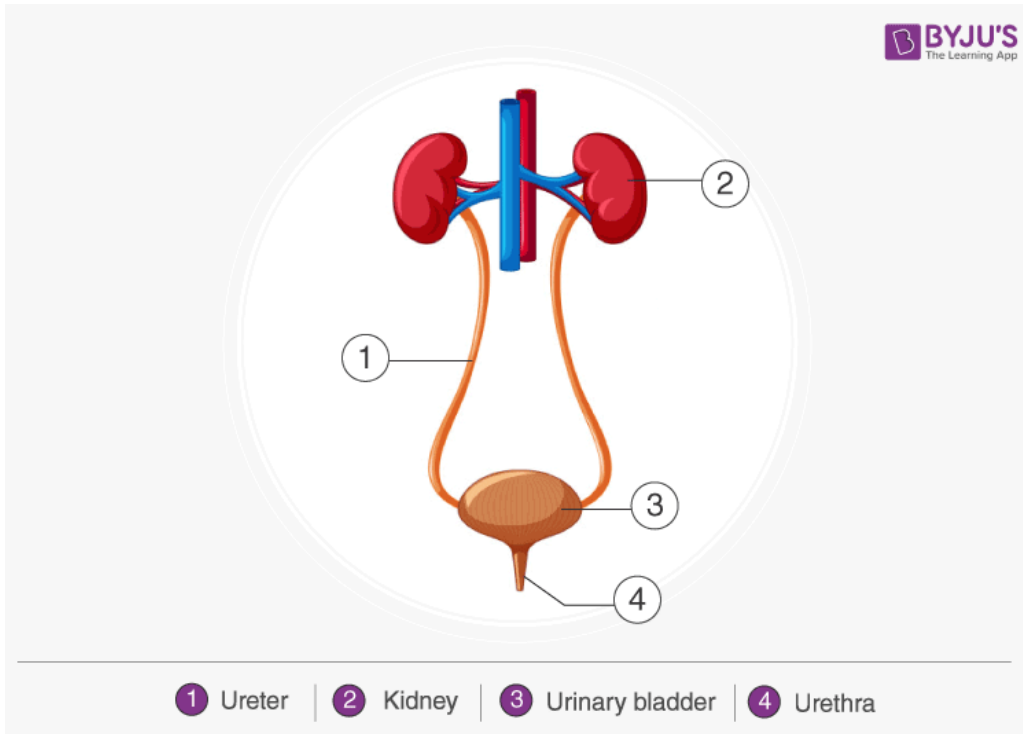
Answer a:

Difference Between Soap and Detergent	
Soaps	Detergents
Consist of a '-COONa' group attached to a fatty acid having a long alkyl chain.	Consist of a '-SO ₃ Na' group attached to a long alkyl chain.
They are not effective in hard water and saline water	They do not lose their effectiveness in hard water and saline water.

Answer b: Homologous series is a series of compounds with similar chemical properties and same functional group differing from the successive member by CH₂. Carbon chains of varying length have been observed in organic compounds having the same general formula. Such organic compounds that vary from one another by a repeating unit and have the same general formula form a series of compounds. Alkanes with general formula C_nH_{2n+2}, alkenes with general formula C_nH_{2n} and alkynes with general formula C_nH_{2n-2} form the most basic homologous series in organic chemistry.

17. Draw a well labelled diagram of human excretory system.

Answer: The diagram below represents the different parts of the human excretory system.



OR

What are the different ways in which glucose is oxidized to provide energy in various organism?

Answer: At first glucose (6 carbon molecules) is broken in the cytoplasm of cells of all organisms. This process yields a 3 carbon molecule compound called pyruvate. Further break down of pyruvate takes place in different manners in different organisms.

Anaerobic Respiration: This process takes place in absence of oxygen, e.g. in yeast during fermentation. In this case pyruvate is converted into ethanol and carbon dioxide.

Aerobic Respiration: In aerobic respiration, breakdown of pyruvate takes place in presence of oxygen to give rise 3 molecules of carbon dioxide and water. The release of energy in aerobic respiration is much more than anaerobic respiration.

Lack of Oxygen: Sometimes, when there is lack of oxygen, especially during vigorous activity, in our muscles, pyruvate is converted into lactic acid (3 carbon molecule compounds). Formation of lactic acid in muscles causes cramp.

18. Write the names and functions of four plant hormones.

Answer: Plant hormones control all the growth and development activities like cell division, enlargement, flowering, seed formation, dormancy and abscission.

The names and functions of four plant hormones are mentioned below:

1. Auxin Hormone - Auxin means “to grow”. They are widely used in agricultural and horticultural practices. They are found in growing apices of roots and stems and then migrate to other parts to act.

Natural: Indole-3-acetic acid (IAA), Indole butyric acid (IBA)

Synthetic: 2,4-D (2,4-dichlorophenoxy acetic acid), NAA (Naphthalene acetic acid)

Functions

- Cell elongation of stems and roots
- Apical dominance, IAA in apical bud suppresses the growth of lateral buds
- Induces parthenocarpy i.e. development of fruit without fertilisation e.g. in tomatoes
- Prevents premature fall of leaves, flowers, fruits
- Useful in stem cuttings and grafting where it initiates rooting
- Promotes flowering e.g. in pineapple
- 2,4-D is widely used as a herbicide to kill undesirable weeds of dicot plants without affecting monocot plants
- Helps in cell division and xylem differentiation

2. Gibberellins Hormone - There are more than 100 gibberellins (GA1, GA2, GA3.....) found. They are acidic in nature. These are found in higher plants and fungi.

Functions:

- Promotes bolting, i.e. sudden elongation of internodes just before flowering in rosette plants like cabbage, beet
- Delays senescence
- Induces parthenocarpy
- Elongation of the stem and reverses dwarfism
- Induces maleness in certain plants like cannabis
- Induces formation of hydrolytic enzymes such as lipase, amylase in the endosperm of germinating cereal grains and barley seeds
- Breaks seed dormancy

3. Cytokinins Hormone - Cytokinins play an important role in cytokinesis process. Cytokinins are naturally synthesised in the plants where rapid cell division occurs e.g. root apices, shoot buds, young fruits, etc. Movement of cytokinins is basipetal and polar.

Natural: Zeatin (corn kernels, coconut milk), isopentenyladenine

Synthetic: Kinetin, benzyladenine, diphenylurea, thidiazuron

Functions

- It promotes lateral and adventitious shoot growth and used to initiate shoot growth in culture
- Helps in overcoming apical dominance induced by auxins
- Stimulate the formation of chloroplast in leaves
- Promotes nutrient mobilisation and delay leaf senescence

4. Ethylene Plant Hormone

It acts as a growth promoter as well as an inhibitor. Occurs in gaseous form. It is synthesised in the ripening fruits and tissues undergoing senescence. It regulates many physiological processes and one of the most widely used hormones in agriculture.

Functions

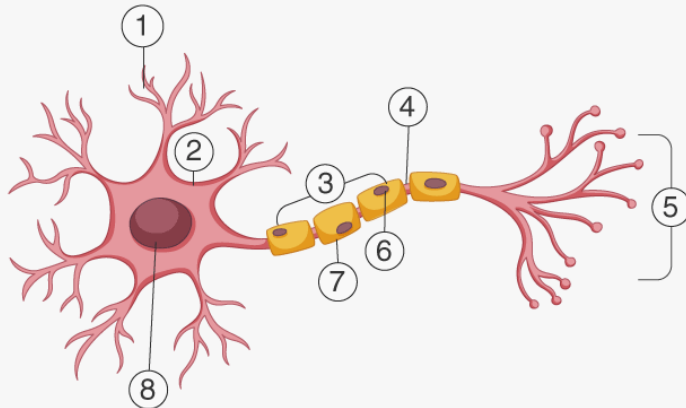
- It hastens the ripening of fruits
- Controls epinasty of leaves
- Breaks seed and bud dormancy
- Stimulates rapid elongation of petioles and internodes
- Promotes senescence and abscission of leaves and flowers
- Induces root growth and root hair formation thereby increasing the absorption surface
- Stimulates femaleness in monoecious plants
- Apical hook formation in dicot seedlings

OR

Draw a well labelled diagram of neuron (nerve cell).

Answer:

NEURON



- | | | | |
|-----------------|----------------|-----------------|-------------------|
| 1 Dendrite | 2 Soma | 3 Axon | 4 Node of Ranvier |
| 5 Axon Terminal | 6 Schwann Cell | 7 Myelin Sheath | 8 Nucleus |

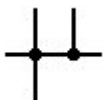
19. Write the conventional symbols of the following components used in electric circuit diagram –

- (a) an electric cell
- (b) a wire joint
- (c) electric bulb
- (d) Voltmeter

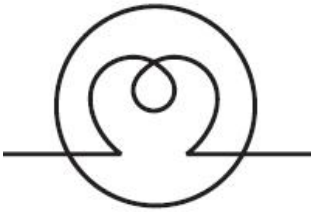
Answer a:



Answer b:



Answer c:



Answer d:



OR

1. State Ohm's law.
2. Define electric current and write its S.I. unit.

Answer 1: Ohm's Law states that the current flowing through a conductor is directly proportional to the potential difference applied across its ends, provided the temperature and other physical conditions remain unchanged. Mathematically it can be represented as,

Potential difference \propto Current

$$V \propto I$$

When the value of V increases the value of I increases simultaneously

$$V = IR$$

Where,

- V is Voltage in volts (V)
- R is Resistance in ohm (Ω)
- I is Current in Ampere (A)

Answer 2: Electric Current - The electrical current in the basic term is the flow of electric charge. The common electric charge carriers are electrons, but they can also be ions as in the case of chemical batteries. To understand how electrical current works let us look at the flow of water as an analogy.

There are two basic types of Electrical Current depending on how they flow. They are Direct Current (DC) and Alternating Current (AC).

The SI unit of electric current is Ampere.

20. a. Define the term

- (i) Ore
- (ii) Gangue

b. Differentiate between metal and non-metal on the basis of their chemical properties. (any three).

Answer i: Ore - Ores are minerals from which metal can be extracted Ex: Bauxite $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ is the ore of Al, copper pyrite CuFeS_2 . All minerals are not considered as ores but all ores are also minerals.

Answer ii: Gangue - Ores mined from the earth are naturally contaminated with sand, rocky materials. There are impurities present in the ore which are known as gangue.

Answer b:

Metals	Non-metals
When metals are heated with oxygen, they form ionic oxides which are basic in nature and form bases on dissolving with water. This turn red litmus paper to blue.	When non-Metals are heated with oxygen, they form covalent oxides which are acidic in nature which form acid on dissolving with water. This turn blue litmus paper to red.
They are electro positive, lose electrons readily and become a positive ion.	They are electro negative, gain electrons and become negative ions.
Metals are lustrous.	Non-metals are non-lustrous; graphite is the exception
Reducing agents.	Good oxidizing agents.
Metals are the good conductors of electricity and heat.	Non-metals are non-conductors of electricity and heat; graphite is the exception
All metals are solids except mercury.	Non-metals are in solid-liquid and gaseous states

OR

(a) State two ways to prevent the rusting of iron.

(b) Give reasons.

- (i) Platinum, gold and silver are used to make jewellery.
- (ii) Ionic compounds have high melting points.

Answer a: Iron and its alloys are widely used in the construction of many structures and in many

machines and objects. Therefore, the prevention of the corrosion of iron is very important. Some preventive methods are listed below.

Galvanization - Galvanization is the process of applying a protective layer of zinc on a metal. It is a very common method of preventing the rusting of iron. This can be done by dipping the metal to be protected in hot, molten zinc or by the process of electroplating. Zinc is a relatively cheap metal that sticks to steel easily. It also offers cathodic protection to the iron surface by acting as an anode. The zinc layer is corroded instead of the iron due to this. The disadvantages of galvanization are that it only provides protection from corrosion for a limited amount of time since the zinc layer is eaten up in the process. It is not very effective in highly corrosive areas (where cadmium coating can be used instead).

Cathodic Protection - Providing the metals with an electric charge can help inhibit the electrochemical reactions that lead to rusting. This can be done by making the iron/steel a cathode by attaching a sacrificial anode to it. This sacrificial anode must have an electrode potential that is more negative than that of iron. Metals that are commonly used as sacrificial anodes are magnesium, zinc, and aluminum. Once they are corroded away, they must be replaced in order to protect the iron/steel.

Answer b.i: Platinum, gold and silver are used to make jewellery because the metals used in jewellery are always be chosen on the basis of its reactivity. It should be unreactive so that the metal does not tarnish. Many metals used for jewellery are expensive as well because they are rare.

Platinum Gold and silver are used to make jewellery because of the following reasons.

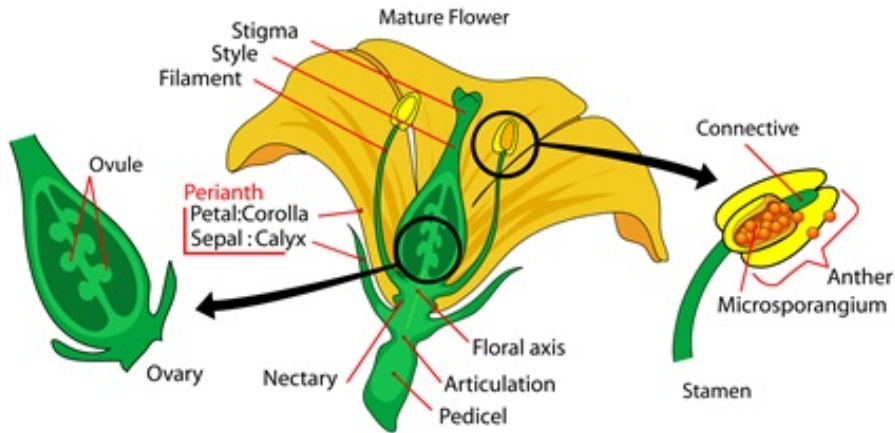
- They are highly lustrous metals which are resistant to corrosion.
- They are highly malleable and ductile so can be transformed into any shape or design.
- The main reason is that gold and platinum are not readily oxidized by oxygen or other nonmetals, they do not tarnish readily.

Answer b.ii: Ionic compounds have an equal number of positive and negative ions arranged in the three-dimensional lattice due to which they have high melting points. The strong force of attraction between oppositely charged ions means that ionic compounds have high melting and boiling points. When dissolved in water ionic compounds form a solution in which ions can move. This means that these solutions can conduct electricity. Similarly, if ionic compounds are heated up so that they melt the ions can move and molten ionic compounds can also conduct electricity.

The positive and negative ions formed during ionic bonding are held together by enormously strong forces of attraction between the oppositely charged ions. These ionic bonds between the charged particles result in a giant structure of ions. Because the ions are held together tightly in this giant structure it takes a lot of energy to break all the bonds. As a result, ionic compounds have high melting and boiling points.

21. Draw a labelled diagram of the longitudinal section of flower.

Answer:

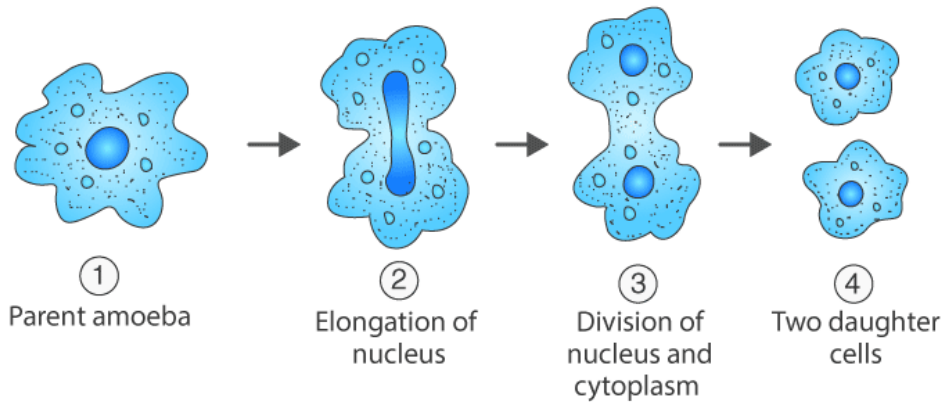


OR

- (a) Draw in sequence, different stages of binary fission in amoeba.
- (b) What is vegetative propagation?

Answer a:

BINARY FISSION IN AMOEBIA



Answer b: Vegetative propagation is potentially something very unique to plants. The very same attribute is also used for the commercial value and by ardent gardeners who know their plants well. Seeds are not always essential for plants to grow. The system of vegetative propagation including grafting and budding allows new crops to grow from older plants. It is a form of asexual plant reproduction. There, only one specific plant is involved and both the genetically and morphologically identical offspring to the parent plant is created.

22. (a) Write the laws of reflection.

(b) Find the focal length of a lens of power -2.0 D. What type of lens is this?

Answer a:

1. The law of reflection defines that upon reflection from a smooth surface, the angle of the reflected ray is equal to the angle of the incident ray, with respect to the normal to the surface that is to a line perpendicular to the surface at the point of contact.
2. The reflected ray is always in the plane defined by the incident ray and the normal to the surface at the point of contact of the incident ray.

Answer b: The focal length of a lens of power -2.0 D is mentioned below

$$\text{Power of Lens} = 1/f$$

$$\text{So, } 1/f = 1/-2$$

$$f = 0.50 \text{ m or } -50 \text{ m}$$

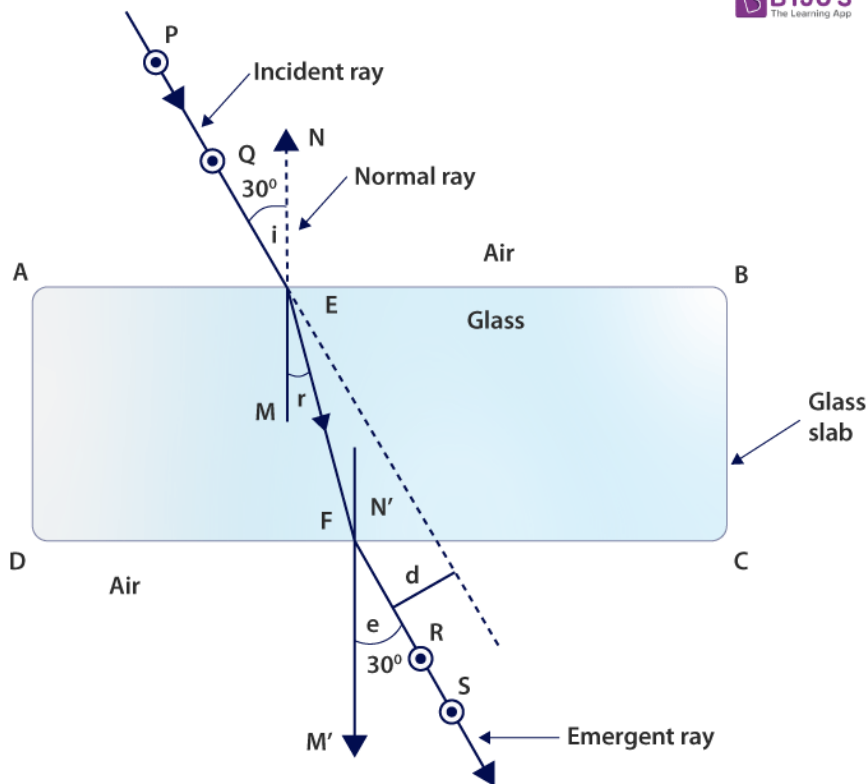
The type of lens is concave lens.

OR

(a) Draw a ray diagram of refraction of light through a rectangular glass slab.

(b) Write any three uses of concave mirror.

Answer a:



Refraction of light through a rectangular glass slab

Answer b: The three uses of concave mirror are as follows:

1. Concave mirror uses in the ophthalmoscope

Concave mirrors are used in optical instruments such as Ophthalmoscope. Ophthalmoscope consists of a concave mirror with a hole in the center. The doctor focuses through the small hole from behind the concave mirror while a light beam is directed into the pupil of the patient's eye. This makes the retina visible and makes it easy for doctors to check.

2. Uses of concave mirror in astronomical telescopes

Concave mirrors are also used in making astronomical telescopes. In an astronomical telescope, a concave mirror of a diameter of 5 meters or more is used as the objective.

3. Concave mirrors used in headlights

Concave mirrors are widely used in headlights of automobiles and motor vehicles, torch lights, railway engines, etc. as reflectors. The light source is placed at the focus of the mirror, so after reflecting the light rays travel over a huge distance as parallel light beams of high intensity.