Bihar Board Class 10 Science Set (B) 2024 Question Paper with Solutions

Time Allowed :2 Hours 45 Minutes	**Maximum Marks :**80	**Total questions :**110

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Candidates must enter his/her Question Booklet Serial No. (10 Digits) in the OMR Answer Sheet.
2. Candidates are required to give their answers in their own words as far as practicable.
3. Figures in the right-hand margin indicate full marks.
4. The booklet has two sections: Section A and Section B.
5. Section A has 80 objective type questions; 40 questions are compulsory. Each carries 1 mark. Darken the correct circle on the OMR sheet.
6. Section B has Short Answer Type questions and Long Answer Type questions.
7. Use of electronic appliances is strictly prohibited.

SECTION - A
(Objective Choice Type Questions)

Question Nos. 1 to 80 are of objective type. Answer any 40 questions. Each question has four options, out of which only one is correct. You have to mark your selected option on the OMR sheet.

1. Zn + $CuSO_4$ $\rightarrow$ $ZnSO_4$ + Cu, the above reaction is an example of:

(A) Combination reaction

(B) Displacement reaction

(C) Double displacement reaction

(D) Decomposition reaction

Correct Answer: (B) Displacement reaction

Solution: The given reaction involves zinc (Zn) reacting with copper sulfate ($CuSO_4$), resulting in the displacement of copper (Cu) by zinc. This type of reaction is called a displacement reaction, where a more reactive element displaces a less reactive element from a compound.

Quick Tip

In a displacement reaction, one element replaces another in a compound. The more reactive element always displaces the less reactive one.

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2. On moving from right to left across the period of the modern periodic table, the atomic size:

(A) increases

(B) decreases

(C) remains unchanged

(D) none of these

Correct Answer: (A) increases

Solution: As we move from right to left across a period in the modern periodic table, the atomic size increases. This occurs because the effective nuclear charge decreases, leading to a lesser attraction between the nucleus and outer electrons, causing the atomic radius to expand.

Quick Tip

Atomic size generally decreases across a period from left to right due to an increasing nuclear charge, pulling electrons closer. However, moving from right to left reverses this trend, causing atomic size to increase.

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3. When magnesium ribbon is ignited, the flame produced by it is:

(A) Yellow

(B) Blue

(C) Dazzling white

(D) Red

Correct Answer: (C) Dazzling white

Solution: When magnesium ribbon is ignited in the presence of oxygen, it burns with a dazzling white flame. This is due to the high energy released during the combustion of magnesium, forming magnesium oxide (MgO) as a white powder.

Quick Tip

Magnesium burns with a bright white flame due to its high reactivity with oxygen. This property is utilized in fireworks, flares, and flash photography.

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4. The molecular formula of ethane is C_2H_6. It has:

(A) 9 covalent bonds

(B) 8 covalent bonds

(C) 7 covalent bonds

(D) 6 covalent bonds

Correct Answer: (B) 8 covalent bonds

Solution: Ethane (C_2H_6) consists of two carbon (C) atoms forming a single covalent bond (C-C) and six hydrogen (H) atoms bonded to carbon atoms via single covalent bonds (C-H). Since each carbon forms four bonds, the total number of covalent bonds in ethane is 8.

Quick Tip

In alkanes like ethane (C_2H_6), each carbon follows the tetravalency rule, forming four single covalent bonds.

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5. The chemical substance used as a cast for setting broken bones in surgery is:

(A) Washing soda

(B) Plaster of Paris

(C) Quicklime

(D) Gypsum

Correct Answer: (B) Plaster of Paris

Solution: Plaster of Paris (POP) is chemically calcium sulfate hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$). When mixed with water, it forms a paste that hardens as it dries, making it ideal for use as a cast in medical applications to immobilize broken bones.

Quick Tip

Plaster of Paris (POP) is commonly used in orthopedic applications, moldings, and sculptures due to its quick-setting nature.

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6. Which one of the following is a covalent compound?

(A) KCl

(B) $MgCl_2$

(C) CH_4

(D) NaCl

Correct Answer: (C) CH_4

Solution: Methane (CH_4) is a covalent compound because it consists of carbon (C) sharing electrons with four hydrogen (H) atoms, forming strong covalent bonds. Covalent compounds involve electron sharing rather than electron transfer, which is characteristic of ionic compounds like KCl, $MgCl_2$, and NaCl.

Quick Tip

Covalent compounds are formed when atoms share electrons to achieve a stable electronic configuration. These compounds typically involve nonmetals.

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7. An aqueous solution of ammonium chloride is:

(A) Neutral

(B) Acidic

(C) Basic

(D) None of these

Correct Answer: (B) Acidic

Solution: Ammonium chloride (NH_4Cl) is a salt formed from a strong acid (HCl) and a weak base (NH_3). When dissolved in water, it hydrolyzes, releasing H^+ ions, making the solution acidic.

Quick Tip

Salts derived from a strong acid and a weak base result in an acidic solution.

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8. Which of the following is a good conductor of electricity?

(A) Plastic

(B) Iodine

(C) Sulphur

(D) Graphite

Correct Answer: (D) Graphite

Solution: Graphite is a good conductor of electricity due to the presence of free-moving delocalized electrons in its structure. Unlike other non-metals, graphite's hexagonal layers allow electron flow.

Quick Tip

Graphite is the only non-metal that conducts electricity due to its free electrons.

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9. The atomic number of magnesium is 12. What is its valency?

(A) 1

(B) 2

(C) 3

(D) 4

Correct Answer: (B) 2

Solution: Magnesium has an atomic number of 12, meaning its electronic configuration is 2,8,2. It donates two electrons to achieve a stable noble gas configuration, making its valency 2.

Quick Tip

Valency is determined by the number of electrons lost, gained, or shared to achieve stability.

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10. Which of the following metals is displaced from its salt solution by iron?

(A) Copper

(B) Sodium

(C) Calcium

(D) Magnesium

Correct Answer: (A) Copper

Solution: Iron is more reactive than copper but less reactive than sodium, calcium, and

magnesium. Therefore, iron can displace copper from its salt solution based on the reactivity series.

Quick Tip

A more reactive metal displaces a less reactive metal from its salt solution.

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11. The commercial production of ethyl alcohol is done by which chemical process?

(A) Oxidation

(B) Reduction

(C) Fermentation

(D) Roasting

Correct Answer: (C) Fermentation

Solution: The commercial production of ethyl alcohol (ethanol) is primarily carried out by the fermentation of sugars using yeast. Yeast converts glucose into ethanol and carbon dioxide through anaerobic respiration.

Quick Tip

Fermentation is a biological process in which microorganisms break down sugars into alcohol and gases.

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12. What is the chemical formula of quicklime?

(A) $Ca(OH)_2$

(B) CaO

(C) $Ca(HCO_3)_2$

(D) $CaCO_3$

Correct Answer: (B) CaO

Solution: Quicklime is chemically known as calcium oxide (CaO). It is obtained by the thermal decomposition of limestone ($CaCO_3$) in a process known as calcination.

Quick Tip

Quicklime (CaO) reacts with water to form slaked lime ($Ca(OH)_2$), which is used in whitewashing.

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13. Iodized salt is:

(A) NaCl + KIO_3

(B) NaCl + KI

(C) Both (a) and (b)

(D) None of these

Correct Answer: (C) Both (a) and (b)

Solution: Iodized salt contains either potassium iodate (KIO_3) or potassium iodide (KI) along with sodium chloride (NaCl). It is used to prevent iodine deficiency disorders.

Quick Tip

Iodized salt helps in the prevention of goiter and other iodine deficiency diseases.

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14. What is the chemical name of Plaster of Paris?

(A) Calcium sulphate

(B) Calcium sulphate monohydrate

(C) Calcium sulphate hemihydrate

(D) Calcium chloride

Correct Answer: (C) Calcium sulphate hemihydrate

Solution: Plaster of Paris (POP) is chemically calcium sulphate hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$). It is obtained by heating gypsum ($CaSO_4 \cdot 2H_2O$) to remove water.

Quick Tip

Plaster of Paris is widely used in construction, medical casts, and sculptures due to its quick-setting properties.

15. What is present in cathode rays?

(A) Electron

(B) Proton

(C) Neutron

(D) None of these

Correct Answer: (A) Electron

Solution: Cathode rays consist of negatively charged electrons. They were discovered by J.J. Thomson using a cathode ray tube, leading to the identification of the electron.

Quick Tip

Cathode rays are streams of electrons emitted from the negative electrode (cathode) in a vacuum tube.

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16. Which mode of nutrition is found in fungi?

(A) Holozoic

(B) Saprophytic

(C) Autotrophic

(D) None of these

Correct Answer: (B) Saprophytic

Solution: Fungi obtain nutrients by breaking down dead organic matter through extracellular digestion, making their mode of nutrition saprophytic.

Quick Tip

Saprophytes decompose organic matter and play a crucial role in nutrient recycling in ecosystems.

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17. Which of the following is the male gamete?

(A) Ovum

(B) Sperm

(C) Ovary

(D) Fallopian tube

Correct Answer: (B) Sperm

Solution: Sperm is the male gamete responsible for fertilization in sexual reproduction. It fuses with the female gamete (ovum) to form a zygote.

Quick Tip

Male gametes are motile and produced in large numbers, whereas female gametes are non-motile and produced in limited numbers.

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18. An example of a parasitic plant is:

(A) Mushroom

(B) Bryophyllum

(C) Cuscuta

(D) Pinus

Correct Answer: (C) Cuscuta

Solution: Cuscuta, also known as dodder, is a parasitic plant that absorbs nutrients from its host plant through specialized structures called haustoria.

Quick Tip

Parasitic plants depend on their host for nutrients and can weaken or even kill the host plant.

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19. Binary fission is found in:

(A) Sponge

(B) Hydra

(C) Bacteria

(D) None of these

Correct Answer: (C) Bacteria

Solution: Binary fission is an asexual reproduction method where a single parent cell divides into two identical daughter cells. It is commonly observed in bacteria.

Quick Tip

Binary fission allows rapid population growth in bacteria, enabling them to adapt quickly to new environments.

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20. Which hormone is secreted from the pancreas?

(A) Epinephrine

(B) Testosterone

(C) Norepinephrine

(D) Insulin

Correct Answer: (D) Insulin

Solution: The pancreas secretes insulin, which regulates blood sugar levels by facilitating glucose uptake into cells.

Quick Tip

Diabetes is caused by insufficient insulin production or ineffective insulin utilization in the body.

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21. Which among the following is responsible for clotting of blood?

(A) Blood platelets

(B) WBC

(C) RBC

(D) None of these

Correct Answer: (A) Blood platelets

Solution: Blood clotting is primarily carried out by platelets (thrombocytes), which help prevent excessive bleeding when an injury occurs.

Quick Tip

Platelets work with clotting factors to form a fibrin clot, sealing wounds and preventing excessive blood loss.

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22. Which type of nitrogenous wastes is excreted by living organisms?

(A) Urea

(B) Ammonia

(C) Uric acid

(D) All of these

Correct Answer: (D) All of these

Solution: Living organisms excrete nitrogenous wastes in different forms. Mammals excrete urea, amphibians and fish excrete ammonia, and birds, insects, and reptiles excrete uric acid.

Quick Tip

Excretory products vary among organisms: - Ammonotelic: Ammonia (e.g., fish, amphibians) - Ureotelic: Urea (e.g., mammals) - Uricotelic: Uric acid (e.g., birds, reptiles)

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23. The change in body that occurs during adolescence is due to:

(A) Testosterone

(B) Thyroxine

(C) Estrogen

(C) Both (A) and (C)

Correct Answer: (D) Both (A) and (C)

Solution: Testosterone (in males) and estrogen (in females) are responsible for secondary sexual characteristics that develop during adolescence.

Quick Tip

Testosterone leads to male characteristics such as deepening voice and facial hair, while estrogen is responsible for female characteristics like breast development.

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24. The body is balanced by the organ:

(A) Cranium

(B) Cerebrum

(C) Cerebellum

(D) Brain stem

Correct Answer: (C) Cerebellum

Solution: The cerebellum is responsible for maintaining balance, posture, and coordination of voluntary movements in the human body.

Quick Tip

The cerebellum is often called the ”little brain” and plays a key role in movement coordination.

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25. The chemical formula of chalk is:

(A) $MgCO_3$

(B) Na_2CO_3

(C) $CaCO_3$

(D) $Mg(HCO_3)_2$

Correct Answer: (C) $CaCO_3$

Solution: Chalk is chemically calcium carbonate ($CaCO_3$), which is commonly found in limestone and shells.

Quick Tip

Calcium carbonate is widely used in construction (cement), as an antacid, and in school chalk.

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26. Which of the following metals is the most ductile?

(A) Gold

(B) Copper

(C) Iron

(D) Zinc

Correct Answer: (A) Gold

Solution: Gold is the most ductile metal, meaning it can be drawn into very thin wires without breaking.

Quick Tip

A single gram of gold can be drawn into a wire of about 2 kilometers in length!

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27. How many structural isomers of pentane, having molecular formula C_5H_{12}, are possible?

(A) 2

(B) 3

(C) 4

(D) 5

Correct Answer: (B) 3

Solution: Pentane (C_5H_{12}) has three structural isomers: 1. n-Pentane (straight chain) 2. Iso-pentane (branched chain) 3. Neo-pentane (highly branched)

Quick Tip

Structural isomers have the same molecular formula but different connectivity between atoms.

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28. The functional group Functional group >CO is called:

(A) Aldehyde group

(B) Ether group

(C) Alcohol group

(D) Carbonyl group

Correct Answer: (D) Carbonyl group

Solution: The carbonyl group (>CO) is a functional group consisting of a carbon atom double-bonded to an oxygen atom. It is found in aldehydes, ketones, and carboxylic acids.

Quick Tip

The carbonyl group is crucial in organic chemistry and plays a role in many biochemical reactions.

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29. A metal reacts with oxygen to form a compound with a high melting point. This compound is soluble in water. Which of the following elements can it be?

(A) Silicon

(B) Carbon

(C) Calcium

(D) Iron

Correct Answer: (C) Calcium

Solution: Calcium reacts with oxygen to form calcium oxide (CaO), which has a high melting point and is soluble in water, forming calcium hydroxide ($Ca(OH)_2$).

Quick Tip

Calcium oxide, also known as quicklime, is widely used in the construction industry and for neutralizing acids.

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30. Malachite is an ore of which metal?

(A) Mg

(B) Cu

(C) Fe

(D) Au

Correct Answer: (B) Cu

Solution: Malachite is an ore of copper (Cu). It is a green-colored mineral composed of copper carbonate hydroxide ($Cu_2(CO_3)(OH)_2$).

Quick Tip

Malachite is not only a copper ore but is also used in jewelry and pigments due to its vibrant green color.

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31. The process of coating a layer of zinc on iron is called:

(A) Electroplating

(B) Corrosion

(C) Electrolysis

(D) Galvanisation

Correct Answer: (D) Galvanisation

Solution: Galvanisation is the process of applying a protective layer of zinc to iron to prevent rusting.

Quick Tip

Galvanisation is commonly used for protecting steel pipes, car bodies, and iron structures from rusting.

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32. Which of the following acids is found in vinegar?

(A) Acetic acid

(B) Sulphuric acid

(C) Formic acid

(D) Hydrochloric acid

Correct Answer: (A) Acetic acid

Solution: Vinegar primarily contains acetic acid (CH_3COOH), which gives it a sour taste.

Quick Tip

Acetic acid is widely used in food preservation and as a cleaning agent.

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33. Which of the following lenses is used to remove short-sightedness?

(A) Cylindrical

(B) Convex

(C) Concave

(D) Bifocal

Correct Answer: (C) Concave

Solution: Short-sightedness (myopia) is corrected using concave lenses, which help diverge light rays before they reach the eye.

Quick Tip

Concave lenses are thinner at the center and thicker at the edges, helping correct near-sighted vision.

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34. Most of the refraction of the light rays entering the eye occurs at:

(A) Interface of eye lens

(B) Interface of aqueous humour

(C) Outer surface of cornea

(D) None of these

Correct Answer: (C) Outer surface of cornea

Solution: Most of the refraction of light rays entering the eye occurs at the outer surface of the cornea, as it has the highest refractive index, bending the light towards the lens.

Quick Tip

The cornea plays a crucial role in focusing light on the retina for clear vision.

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35. Which of the following is the unit of power of lens?

(A) Dioptre

(B) Watt

(C) erg

(D) Joule

Correct Answer: (A) Dioptre

Solution: The unit of the power of a lens is dioptre (D), which is the reciprocal of the focal length measured in meters.

Quick Tip

The power of a lens (P) is calculated as $P = \frac{1}{f}$, where f is the focal length in meters.

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36. What type of lens is found in the human eye?

(A) Convex

(B) Bifocal

(C) Concave

(D) Cylindrical

Correct Answer: (A) Convex

Solution: The lens in the human eye is a convex lens, which helps in focusing light onto the retina to form a clear image.

Quick Tip

The convex shape allows light to converge, providing clear vision when focused on the retina.

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37. Which mirror is used as a shaving mirror?

(A) Concave mirror

(B) Plane mirror

(C) Convex mirror

(D) None of these

Correct Answer: (A) Concave mirror

Solution: A concave mirror is used as a shaving mirror because it produces an enlarged, virtual image of the face, helping with detailed grooming.

Quick Tip

Concave mirrors are converging mirrors and are used in applications requiring magnified images.

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38. If the image of an object formed by a concave mirror is virtual, erect, and larger than the object, then where should be the location of the object?

(A) Beyond the centre of curvature

(B) Between principal focus and centre of curvature

(C) At the centre of curvature

(D) Between the pole and principal focus of the mirror

Correct Answer: (D) Between the pole and principal focus of the mirror

Solution: For a concave mirror, when the object is placed between the pole and the principal focus, the image formed is virtual, erect, and magnified.

Quick Tip

Concave mirrors form magnified, virtual images when the object is within the focal point.

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39. The capacity to bend rays of light is called:

(A) The power of lens

(B) The reciprocal of the power of the lens

(C) The power of accommodation of the lens

(D) None of these

Correct Answer: (A) The power of lens

Solution: The capacity of a lens to bend rays of light is described as the power of the lens, which is the reciprocal of the focal length.

Quick Tip

Power is measured in dioptres and describes how much a lens can bend light rays to form a focused image.

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40. The image obtained by a concave lens is:

(A) Diminished

(B) Erect

(C) Virtual

(D) All of these

Correct Answer: (D) All of these

Solution: A concave lens forms a diminished, erect, and virtual image, which is smaller than the object.

Quick Tip

Concave lenses are diverging lenses that always produce virtual images that are smaller than the object.

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41. Latex is found in:

(A) Pinus

(B) Rose

(C) Nerium

(D) Mango

Correct Answer: (A) Pinus

Solution: Latex is a milky fluid found in Pinus (pine trees) and other plants, such as rubber trees, where it serves as a defensive mechanism.

Quick Tip

Latex from rubber trees is commonly processed into rubber products like tires and gloves.

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42. Androgen is secreted by the:

(A) Ovary

(B) Testes

(C) Duodenum

(D) Stomach

Correct Answer: (B) Testes

Solution: Androgen is a male sex hormone primarily secreted by the testes, which are responsible for male secondary sexual characteristics.

Quick Tip

Testosterone is the primary androgen responsible for male physical traits like facial hair and deep voice.

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43. Style is part of:

(A) Filament

(B) Gynoecium

(C) Ovary

(D) Stamen

Correct Answer: (B) Gynoecium

Solution: The style is a part of the gynoecium, the female reproductive organ in flowers, connecting the stigma to the ovary.

Quick Tip

The style supports the stigma and aids in the reception of pollen.

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44. Duodenum is a part of:

(A) Buccal cavity

(B) Stomach

(C) Large intestine

(D) Small intestine

Correct Answer: (D) Small intestine

Solution: The duodenum is the first part of the small intestine and plays a major role in the digestion of food.

Quick Tip

The duodenum receives bile and pancreatic juices that help in breaking down food further.

45. In human beings, nasal cavity, larynx, trachea, and lungs combine to form:

(A) Excretory system

(B) Reproductive system

(C) Digestive system

(D) Respiratory system

Correct Answer: (D) Respiratory system

Solution: The respiratory system consists of organs like the nasal cavity, larynx, trachea, and lungs, which help in breathing and gas exchange.

Quick Tip

The primary function of the respiratory system is to supply oxygen to the blood and remove carbon dioxide.

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46. In plants, xylem is responsible for:

(A) Oxygen conduction

(B) Amino acid conduction

(C) Water conduction

(D) Food conduction

Correct Answer: (C) Water conduction

Solution: In plants, xylem is responsible for the transport of water and minerals from roots to other parts of the plant.

Quick Tip

Xylem vessels allow water and minerals to move upward in plants through a process called transpiration.

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47. Gibberellin is:

(A) A phytohormone

(B) An enzyme

(C) Carbohydrate

(D) Fat

Correct Answer: (A) A phytohormone

Solution: Gibberellin is a plant hormone that stimulates growth, especially elongation of stems and the development of fruits and seeds.

Quick Tip

Gibberellin is commonly used in agriculture to enhance plant growth and promote seed germination.

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48. Wilting of leaves is due to which phytohormone?

(A) Ethylene

(B) Abscisic acid

(C) Cytokinin

(D) Auxin

Correct Answer: (B) Abscisic acid

Solution: Abscisic acid (ABA) causes stomatal closure, leading to water conservation and the wilting of leaves under stress conditions.

Quick Tip

ABA plays a key role in plant response to drought stress by regulating water loss.

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49. The radius of curvature of a concave mirror of focal length 20 cm is:

(A) 15 cm

(B) 10 cm

(C) 40 cm

(D) 60 cm

Correct Answer: (C) 40 cm

Solution: The relationship between the focal length f and radius of curvature R is $R = 2f$. Therefore, for $f = 20$ cm, $R = 40$ cm.

Quick Tip

For concave and convex mirrors, the focal length is half the radius of curvature.

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50. A white ray is incident obliquely on a glass slab. Which of the following will occur with the first refraction?

(A) Deviation

(B) Total reflection

(C) Dispersion

(D) All of these

Correct Answer: (A) Deviation

Solution: When a white ray is incident on a glass slab at an oblique angle, the first refraction causes the ray to deviate from its original path due to the change in speed as it passes from air to glass.

Quick Tip

Refraction occurs when light passes from one medium to another, causing a change in speed and direction.

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51. In a domestic electric circuit, the colour of neutral wire is:

(A) Red

(B) Green

(C) Black

(D) Yellow

Correct Answer: (C) Black

Solution: In domestic electrical circuits, the neutral wire is typically black. It completes the circuit by carrying current away from the load.

Quick Tip

In most domestic circuits, the colour coding for wires is: - Live wire: Red or Brown - Neutral wire: Black or Blue - Earth wire: Green or Yellow

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52. In which device does the split ring act as a commutator?

(A) Electric motor

(B) Galvanometer

(C) Voltmeter

(D) Electric generator

Correct Answer: (A) Electric motor

Solution: The split ring acts as a commutator in an electric motor, which reverses the direction of current flow and keeps the motor rotating in one direction.

Quick Tip

The commutator is an essential component in DC motors, converting alternating current into direct current.

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53. The device which directly converts solar energy into electricity is:

(A) Daniel cell

(B) Dry cell

(C) Solar cell

(D) Eveready cell

Correct Answer: (C) Solar cell

Solution: A solar cell directly converts solar energy into electrical energy using the photovoltaic effect.

Quick Tip

Solar cells are used in solar panels to generate clean and renewable energy.

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54. The resistance of the filament of an electric bulb is 1200 ohms. How much electric current will the bulb draw from an electric source of 220 volts?

(A) 12 ampere

(B) 2.8 ampere

(C) 2 ampere

(D) 0.18 ampere

Correct Answer: (D) 0.18 ampere

Solution: We can use Ohm's Law: $I = \frac{V}{R}$, where $V = 220$ volts and $R = 1200$ ohms. Substituting the values: $I = \frac{220}{1200} \approx 0.18$ ampere.

Quick Tip

Ohm's Law is used to calculate the current, voltage, or resistance in an electric circuit.

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55. The electromotive force of a cell is 1.5 V. The work done on passing a charge of 1 C will be:

(A) 1.5 V

(B) 3 J

(C) 1.5 J

(D) 0

Correct Answer: (C) 1.5 J

Solution: The work done W is given by: $W = V \times Q$, where $V = 1.5\,\text{V}$ and $Q = 1\,\text{C}$. Thus, $W = 1.5\,\text{V} \times 1\,\text{C} = 1.5\,\text{J}$.

Quick Tip

The work done in moving a charge through a potential difference is the energy transferred to the charge.

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56. Why is a rainbow colourful?

(A) Dispersion of white light by water droplets

(B) Absorption of water droplets

(C) Dispersion of white light by air

(D) None of these

Correct Answer: (A) Dispersion of white light by water droplets

Solution: A rainbow is formed due to the dispersion of white light when it passes through water droplets, separating the light into its constituent colors.

Quick Tip

Dispersion occurs because different colors of light bend by different amounts when passing through water droplets.

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57. The absolute refractive index of air is actually:

(A) Less than 1

(B) More than 1

(C) Equal to 1

(D) 0

Correct Answer: (C) Equal to 1

Solution: The refractive index of air is approximately 1, as air is the medium through which light travels at a speed close to its speed in a vacuum.

Quick Tip

The refractive index of a medium is defined as the ratio of the speed of light in vacuum to the speed of light in that medium.

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58. Mirror used by ENT (Ear-Nose-Throat) doctor is:

(A) Convex mirror

(B) Concave mirror

(C) Plane mirror

(D) None of these

Correct Answer: (B) Concave mirror

Solution: ENT doctors use a concave mirror for examining the ears, nose, and throat, as it provides a magnified and clearer view of the examined area.

Quick Tip

Concave mirrors are useful for magnifying small objects, which is why they're used by doctors in some medical examinations.

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59. Which of the following gases is used in welding?

(A) Methane

(B) Ethyne

(C) Ethane

(D) Ethene

Correct Answer: (B) Ethyne

Solution: Ethyne (acetylene) is used in welding because it burns at a very high temperature, making it ideal for tasks such as cutting and welding metals.

Quick Tip

Ethyne (CH) is often used in oxy-acetylene welding due to its high flame temperature.

60. The general formula of an alkene is:

(A) C_nH_{2n+2}

(B) C_nH_{2n-2}

(C) C_nH_{2n}

(D) C_nH_{2n-1}

Correct Answer: (C) C_nH_{2n}

Solution: The general formula for alkenes, which are hydrocarbons with one or more double bonds, is C_nH_{2n}, where n is the number of carbon atoms.

Quick Tip

Alkenes are unsaturated hydrocarbons containing at least one double bond between carbon atoms.

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61. Which one of the following is a clean energy source?

(A) Coal

(B) Wood

(C) Natural gas

(D) All of these

Correct Answer: (C) Natural gas

Solution: While all of these sources are used for energy production, natural gas is considered the cleanest among them as it produces less carbon dioxide when burned compared to coal and wood.

Quick Tip

Clean energy sources are those that have minimal environmental impact, emitting low levels of pollutants and carbon.

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62. Within which pH range does our body work?

(A) 4.0 to 4.8

(B) 5.0 to 5.8

(C) 6.0 to 6.8

(D) 7.0 to 7.8

Correct Answer: (D) 7.0 to 7.8

Solution: The human body generally operates within a slightly alkaline pH range, which is between 7.0 and 7.8, maintaining this range for proper metabolic function.

Quick Tip

The body maintains a pH balance within the blood, typically around 7.4, which is essential for enzyme activity and metabolic functions.

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63. Which of the following is the chemical formula of glucose?

(A) C_2H_5OH

(B) $C_6H_8O_6$

(C) $C_6H_{12}O_6$

(D) C_6H_6

Correct Answer: (C) $C_6H_{12}O_6$

Solution: The chemical formula for glucose is $C_6H_{12}O_6$, a simple sugar important in cellular respiration.

Quick Tip

Glucose is a monosaccharide and is the primary source of energy for cells.

---

64. The atomic number of sodium is:

(A) 17

(B) 20

(C) 11

(D) 14

Correct Answer: (C) 11

Solution: The atomic number of sodium (Na) is 11, meaning it has 11 protons in its nucleus.

Quick Tip

The atomic number represents the number of protons in an atom's nucleus.

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65. The word 'Gene' was coined by:

(A) Mendel

(B) Johannsen

(C) Lamarck

(D) Darwin

Correct Answer: (B) Johannsen

Solution: The term 'gene' was coined by Johannsen in 1909 to describe a unit of heredity.

Quick Tip

Johannsen's work in genetics laid the foundation for the modern understanding of heredity.

---

66. In which of the following binary fission does not occur?

(A) Yeast

(B) Paramecium

(C) Euglena

(D) Amoeba

Correct Answer: (A) Yeast

Solution: Yeast does not reproduce by binary fission. It undergoes budding, while other organisms listed reproduce by binary fission.

Quick Tip

Yeast reproduction occurs mainly by budding, not binary fission like the other organisms listed.

---

67. Pollen grains are formed in which of the following?

(A) Ovary

(B) Style

(C) Leaves

(D) Anther

Correct Answer: (D) Anther

Solution: Pollen grains are produced in the anther of the stamen in flowering plants.

Quick Tip

The anther is part of the male reproductive organ of a flower and is responsible for producing pollen.

---

68. Blood pressure is controlled by which of the following?

(A) Testis

(B) Thymus

(C) Thyroid

(D) Adrenal

Correct Answer: (D) Adrenal

Solution: The adrenal glands secrete hormones such as aldosterone and adrenaline, which help regulate blood pressure by controlling salt balance and vascular constriction.

Quick Tip

The adrenal glands, located above the kidneys, play a key role in blood pressure regulation.

69. Which disease is related to the respiratory system?

(A) Diabetes

(B) Malaria

(C) Pneumonia

(D) Diarrhoea

Correct Answer: (C) Pneumonia

Solution: Pneumonia is an infection that inflames the air sacs in one or both lungs, leading to difficulty in breathing.

Quick Tip

Pneumonia affects the lungs, causing inflammation and fluid buildup, which makes breathing difficult.

---

70. The sugar level in blood is controlled by which of the following?

(A) Estrogen

(B) Progesterone

(C) Insulin

(D) Relaxin

Correct Answer: (C) Insulin

Solution: Insulin is a hormone produced by the pancreas that regulates blood sugar levels by facilitating glucose uptake in cells.

Quick Tip

Insulin is crucial for glucose metabolism and helps maintain normal blood sugar levels.

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71. Which is the longest cell in the human body?

(A) Muscles

(B) Nerve cell

(C) Blood cell

(D) Heart cell

Correct Answer: (B) Nerve cell

Solution: The nerve cell (neuron) is the longest cell in the human body, with some neurons extending up to a meter in length.

Quick Tip

Neurons transmit electrical signals over long distances, making them the longest cells in the body.

---

72. Which part of food is digested in the buccal cavity?

(A) Carbohydrate

(B) Protein

(C) Fat

(D) Nucleic acid

Correct Answer: (A) Carbohydrate

Solution: In the buccal cavity, salivary amylase starts the digestion of carbohydrates by breaking down starch into maltose.

Quick Tip

The enzyme salivary amylase is responsible for the initial breakdown of carbohydrates in the mouth.

---

73. Out of a combination of resistors, one resistor is removed and it is found that the net resistance has increased. The resistor was connected in

(A) Parallel

(B) Series

(C) Cannot be said

(D) None of these

Correct Answer: (A) Parallel

Solution: When a parallel resistor is removed, the overall resistance increases because parallel resistors provide alternative paths for current flow, reducing net resistance.

Quick Tip

In a parallel circuit, removing a resistor increases total resistance, whereas in a series circuit, removing a resistor breaks the circuit.

---

74. Two appliances rated as (60 W, 200 V) and (40 W, 200 V) are connected across a 100 V supply in a room. The total power consumed is

(A) 25 W

(B) 10 W

(C) 15 W

(D) None of these

Correct Answer: (A) 25 W

Solution: The power consumption at a different voltage can be calculated using:

$$P = \frac{V^2}{R}$$

For the first appliance, the resistance $R = \frac{200^2}{60} \approx 666.67\,\Omega$ and for the second appliance $R = \frac{200^2}{40} = 1000\,\Omega$. Calculating the power at 100V for both:

$$P_1 = \frac{100^2}{666.67} \approx 15\,W \quad \text{and} \quad P_2 = \frac{100^2}{1000} = 10\,W$$

Total Power = $15\,W + 10\,W = 25\,W$.

Quick Tip

When voltage is different from the rated voltage, use $P = \frac{V^2}{R}$ to calculate actual power consumption.

75. Which of the following expressions represent(s) electric power in the circuit?

(A) I^2R

(B) $\frac{V^2}{R}$

(C) VI

(D) All of these

Correct Answer: (D) All of these

Solution: All three formulas correctly represent electrical power:

$$P = I^2R, \quad P = \frac{V^2}{R}, \quad P = VI$$

Quick Tip

Different power formulas are derived using Ohm's Law ($V = IR$) and are interchangeable based on given circuit parameters.

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76. The maximum value of magnification in a convex mirror is

(A) 2

(B) 1

(C) $\frac{1}{2}$

(D) Infinite

Correct Answer: (B) 1

Solution: For a convex mirror, magnification is always less than 1 and positive. The maximum magnification occurs when the object is at infinity, and the image is at the focus with a magnification of 1.

Quick Tip

A convex mirror always forms a virtual, erect, and diminished image, so magnification is always $m < 1$.

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77. Potential difference is measured by

(A) Ammeter

(B) Voltmeter

(C) Voltammeter

(D) All of these

Correct Answer: (B) Voltmeter

Solution: A voltmeter is specifically designed to measure potential difference between two points in an electrical circuit.

Quick Tip

A voltmeter is connected in parallel across components to measure voltage accurately.

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78. Which of the following statements is true?

(A) Volt = Ampere ÷ Ohm

(B) Volt = Ohm ÷ Ampere

(C) Ampere = Volt ÷ Ohm

(D) Ampere = Ohm ÷ Volt

Correct Answer: (C) Ampere = Volt ÷ Ohm

Solution: Ohm's Law states:

$$V = IR \quad \Rightarrow \quad I = \frac{V}{R}$$

Thus, current (I) is equal to voltage (V) divided by resistance (R).

Quick Tip

Remember Ohm's Law:

$$V = IR, \quad I = \frac{V}{R}, \quad R = \frac{V}{I}$$

---

79. Which of the following substances is a conductor?

(A) Mica

(B) Glass

(C) Aluminium

(D) Porcelain

Correct Answer: (C) Aluminium

Solution: Aluminium is a good conductor of electricity because it has free electrons that allow electric current to flow easily.

Quick Tip

Metals like Aluminium, Copper, and Silver are excellent conductors of electricity, whereas mica, glass, and porcelain are insulators.

---

80. Which of the following is necessary to obtain nuclear energy?

(A) Helium

(B) Uranium

(C) Aluminium

(D) Chromium

Correct Answer: (B) Uranium

Solution: Uranium is a fissile material used in nuclear reactors and weapons to produce nuclear energy through fission reactions.

Quick Tip

Uranium-235 is the most commonly used fuel in nuclear power plants due to its ability to sustain a chain reaction.
