# CBSE EXAMINATION PAPER-2024

## SCIENCE

### (Solved)

Time allowed : 3 hours | Maximum Marks : 88

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**General Instructions :**

Read the following instructions carefully and follow them :

i. This question paper contains **45 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 3** are case based questions

iv. **Section B** – questions number **4 to 23** are multiple choice questions

v. **Section C** – questions number **24 to 31** are very short answer

vi. **Section D** – questions number **32 to 40** are short answer

vii. **Section E** – questions number **41 to 45** are long answer

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

## Section A

**Question 1.** Salts play a very important role in our daily life. Sodium chloride which is known as common salt is used almost in every kitchen. Baking soda is also a salt used in faster cooking as well as in baking industry. The family of salts is classified on the basis of cations and anions present in them.

**(1) Find the cation and the anion present in Calcium sulphate.**

[1 Marks]

**(2) Identify the acid and base from which Sodium chloride is formed.**

[1 Marks]

**(3) Sodium chloride and washing soda both belong to the same family of salts. Justify this statement.**

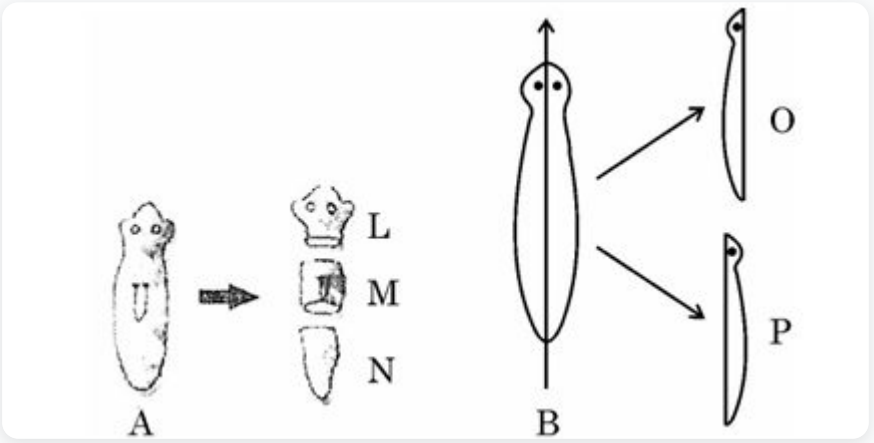
[2 Marks]

**(4)**

**Define the term pH scale. Name the salt obtained by the reaction of Potassium hydroxide and Sulphuric acid and give the pH value of its aqueous solution.**

[2 Marks]

**Question 2.** Asexual reproduction involves a single parent to produce offsprings without the formation of gametes. It occurs by the following ways: Fission, Budding, Fragmentation, Spore formation and Regeneration. In one of the methods like regeneration, Planaria A is cut horizontally into three pieces — L, M and N and Planaria B is cut vertically into two equal halves — O and P.




**(1) Which of the cut pieces of the two Planaria could regenerate to form a complete organism?**

[1 Marks]

**(2) Give an example of another organism which follows the same mode of reproduction as Planaria.**

[1 Marks]

**(3) What is the meaning of 'development' in regeneration?**

[2 Marks]

**(4)**

**Differentiate between regeneration and fragmentation.**

[2 Marks]

**Question 3.**

When electric current flows in a purely resistive circuit, electrical energy gets fully converted into heat energy. The amount of heat produced (H) in the circuit is found to be directly proportional to (i) the square of current ($I^2$), (ii) the resistance (R) of the conductor, and (iii) the time (t) for which current flows. In other words, $H = I^2Rt$. Electrical devices such as an electric fuse, electric heater, electric iron, etc. are all based on this effect called heating effect of electric current.

**(1) List two properties of electric fuse.**

[1 Marks]

**(2) List two properties of heating elements.**

[1 Marks]

**(3) Name the principle on which an electric fuse works and explain how a fuse wire is capable of saving electrical appliances from getting damaged due to accidentally produced high currents.**

[2 Marks]

**(4)**

**The power of an electric heater is 1100 W. If the potential difference between the two terminals of the heater is 220 V, find the current flowing in the circuit. What will happen to an electric fuse of rating 5 A connected in this circuit?**

[2 Marks]

## Section B

**Question 4.** Solid Calcium oxide reacts vigorously with water to form Calcium hydroxide accompanied by the liberation of heat. From the information given above it may be concluded that this reaction is:

[1 Marks]

(A) is endothermic and pH of the solution formed is more than 7.

(B) is exothermic and pH of the solution formed is 7.

(C) is endothermic and pH of the solution formed is 7.

(D) is exothermic and pH of the solution formed is more than 7.

**Question 5.** Juice of tamarind turns blue litmus to red. It is because of the presence of an acid called:

[1 Marks]

(A) methanoic acid

(B) acetic acid

(C) tartaric acid

(D) oxalic acid

**Question 6.**

Select from the following a process in which a combination reaction is involved:

[1 Marks]

(A) Black and White photography

(B) Burning of methane

(C) Burning of coal

(D) Digestion of food

**Question 7.**

The oxide which can react with HCl as well as KOH to give corresponding salt and water is:

[1 Marks]

(A) $Al_2O_3$

(B) $Na_2O$

(C) CuO

(D) $K_2O$

**Question 8.**

Consider the following cases:

(a) $CaSO_4 + Al \rightarrow$

(b) $CuSO_4 + Ca \rightarrow$

(c) $FeSO_4 + Cu \rightarrow$

(d) $ZnSO_4 + Mg \rightarrow$

The cases in which new products will form are:

[1 Marks]

(A) (a) and (b)

(B) (c) and (d)

(C) (b) and (c)

(D) (b) and (d)

**Question 9.**

Identify the correct statement about the following reaction

$2H_2S + SO_2 \rightarrow 2H_2O + S$:

[1 Marks]

(A) $SO_2$ is oxidized to sulfur.

(B) $H_2S$ is reduced to sulfur.

(C) $SO_2$ is the oxidizing agent and $H_2$ is the reducing agent.

(D) $H_2S$ is the oxidizing agent and $O_2$is the reducing agent.

**Question 10.**

Consider the following statements about homologous series of carbon compounds:

All succeeding members differ by a $CH_2$ unit.

Melting point and boiling point increase with increasing molecular weight.

The difference in molecular masses between two successive members is 16u.

$C_2H_2$ and $C_3H_4$ are NOT the successive members of alkene series.

[1 Marks]

(A) (a) and (b)

(B) (a) and (c)

(C) (c) and (d)

(D) (b) and (c)

**Question 11.**

Which of the following statement(s) is (are) true about the human heart?

(a)Right atrium receives oxygenated blood from lungs through pulmonary artery.

(b)Left atrium transfers oxygenated blood to left ventricle which sends it to various parts of the body.

(c)Right atrium receives deoxygenated blood through vena cava from upper and lower body.

(d)Left atrium transfers oxygenated blood to aorta which sends it to different parts of the body.

[1 Marks]

(A) (b) and (d)

(B) (a) and (d)

(C) (b) and (c)

(D) (a)

**Question 12.** Select out of the following a gland which does NOT occur as a pair in the human body:

[1 Marks]

(A) Pituitary

(B) Ovary

(C) Testis

(D) Adrenal

**Question 13.** In the human respiratory system, when a person breathes in, the position of ribs and diaphragm will be:

[1 Marks]

(A) lifted ribs and curve/dome shaped diaphragm.

(B) lifted ribs and flattened diaphragm.

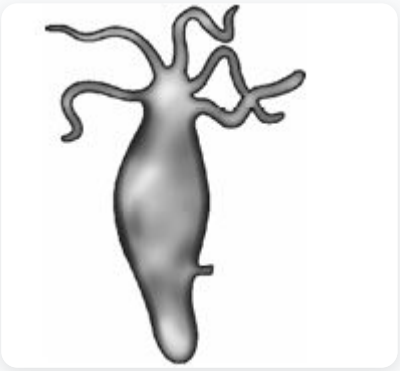
(C) relaxed ribs and flattened diaphragm.

(D) relaxed ribs and curved dome shaped diaphragm.

**Question 14.**

Identify the mode of asexual reproduction in the following organism:

[1 Marks]



(A) Budding

(B) Binary fission

(C) Multiple fission

(D) Fragmentation

**Question 15.**

A cross made between two pea plants produces 50% tall and 50% short pea plants. The gene combination of the parental pea plants must be:

[1 Marks]

(A) Tt and Tt

(B) TT and tt

(C) Tt and tt

(D) TT and Tt

**Question 16.**

Consider the following statements in the context of the human eye:

(a)The diameter of the eyeball is about 2.3 cm.

(b)Iris is a dark muscular diaphragm that controls the size of the pupil.

(c)Most of the refraction for the light rays entering the eye occurs at the crystalline lens.

(d)While focusing on the objects at different distances the distance between the crystalline lens and the retina is adjusted by ciliary muscles.

[1 Marks]

(A) (a), (b) and (c)

(B) (b), (c) and (d)

(C) (a), (c) and (d)

(D) (a) and (b)

**Question 17.**

The maximum resistance of a network of five identical resistors of 1/5 Ω each can be:-

[1 Marks]

(A) 0.5Ω

(B) 0.25 Ω

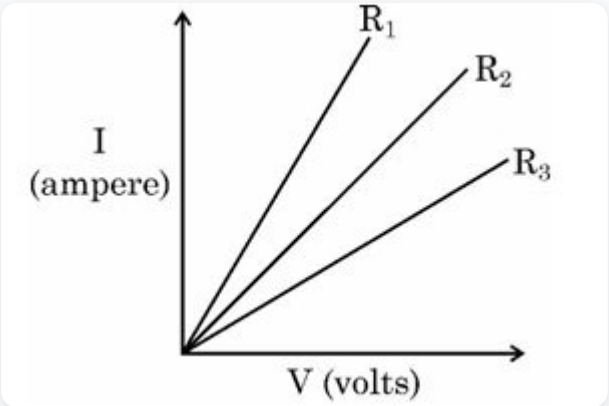
(C) 0.1 Ω

(D) 1Ω

**Question 18.**

Study the I-V graph for three resistors of resistances $R_1$, $R_2$, and $R_3$ and select the correct statement from the following:

[1 Marks]




(A) $R_2 > R_3 > R_1$

(B) $R_3 > R_2 > R_1$

(C) $R_1 = R_2 > R_3$

(D) $R_1 = R_2 = R_3$

**Question 19.** Strength of magnetic field produced by a current carrying solenoid does NOT depend upon:

[1 Marks]

(A) number of turns in the solenoid

(B) radius of solenoid

(C) direction of the current flowing through it

(D) material of the core of the solenoid

**Question 20.**

Assertion (A): Different metals have different reactivities with water and dilute acids.

Reason (R): Extraction of a metal from its ore depends on its position in the reactivity series.

[1 Marks]

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

(B) (A) is true, but (R) is false.

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

(D) (A) is false, but (R) is true.

**Question 21.**

Assertion (A): Human females have a perfect pair of sex chromosomes.

Reason (R): The sex chromosome contributed by the human male in the zygote decides the sex of a child.

[1 Marks]

(A) (A) is false, but (R) is true.

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

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

(D) (A) is true, but (R) is false.

**Question 22.**

Assertion (A): Myopic eyes cannot see distant objects distinctly.

Reason (R): For the correction of myopia, converging lenses of appropriate power are prescribed by eye surgeons.

[1 Marks]

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

(B) (A) is true, but (R) is false.

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

(D) (A) is false, but (R) is true.

**Question 23.**

Assertion (A): The deflection of a compass needle placed near a current carrying wire decreases when the magnitude of an electric current in the wire is increased.

Reason (R): The strength of the magnetic field at a point due to a current carrying conductor increases on increasing the current in the conductor.

[1 Marks]

(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 false, but (R) is true.

(D) (A) is true, but (R) is false.

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## Section C

**Question 24.** “No precipitation reaction can occur without exchange of ions between the two reactants.” Justify this statement giving a balanced chemical equation for the reaction.

[2 Marks]

**Question 25.** Giving one example of each, differentiate between a displacement reaction and a double displacement reaction.

[2 Marks]

**Question 26.** Photosynthesis takes place in the leaves and the food prepared by it reaches other parts of the plants. Name the process involved and explain it.

[2 Marks]

**Question 27.** “Stability of DNA in a species is ensured during sexual reproduction.” Justify the statement.

[2 Marks]

**Question 28.** State two laws of refraction of light.

[2 Marks]

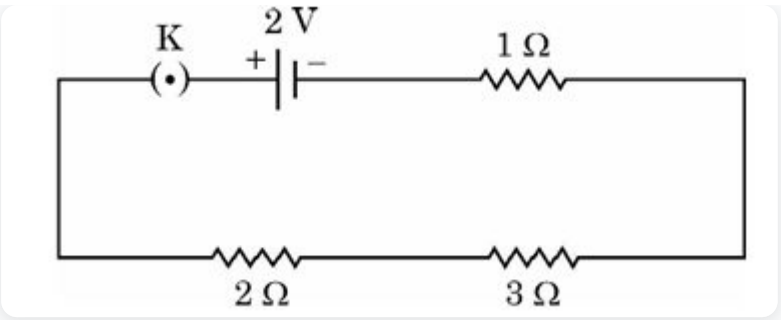
**Question 29.**

Define the term absolute refractive index of a medium. A ray of light enters from vacuum to glass of absolute refractive index 1.5. Find the speed of light in glass. The speed of light in vacuum is $3\times10^{8}$ m/s.

[2 Marks]

**Question 30.** Use Ohm's law to determine the potential difference across the 3 Ω resistor in the circuit shown in the following diagram when key is closed.

[2 Marks]




**Question 31.** Name the term used for the materials which cannot be broken down by biological processes. Give two ways by which they harm various components of an ecosystem.

[2 Marks]

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## Section D

**Question 32.** It is observed that Calcium on reaction with water floats on its surface. Explain why it happens. Also write a balanced chemical equation for the reaction that occurs. What happens when the aqueous solution of the product of this reaction reacts with Carbon dioxide gas? Write a balanced chemical equation for the reaction.

[3 Marks]

**Question 33.** Draw a labelled diagram to show electrolytic refining of copper. State what happens when electric current is passed through the electrolyte taken in this case.

[3 Marks]

**Question 34.**

(a) Give reasons for the following:

(i) Alveoli in lungs are richly supplied with blood capillaries.

(ii) Respiratory pigment in blood takes up oxygen and not carbon dioxide.

(iii) During anaerobic respiration, a 3-carbon molecule is formed as an end product instead of $CO_2$ in human beings.

[3 Marks]

**Question 35.** Explain the events that take place once a sperm reaches the oviduct till it becomes a foetus. Write the role of placenta in pregnancy.

[3 Marks]

**Question 36.**

(1) Define the term power of accommodation of the human eye. Write the name of the part of the eye which plays a major role in the process of accommodation and explain what happens when the

human eye focuses (i) on nearby objects and (ii) distant objects.

[3 Marks]

**Question 37.**

Draw a diagram to show the pattern of magnetic field lines on a horizontal sheet of paper due to a straight conductor passing through its center and carrying current vertically upwards. Mark on it

(i) the direction of current in the conductor and

(ii) the corresponding magnetic field lines. State the right-hand thumb rule and check whether the directions marked by you are in accordance with this rule or not.

[3 Marks]

**Question 38.** Use of pesticides to protect our crops affect organisms at various trophic levels especially human beings. Name the phenomenon involved and explain how this happens.

[3 Marks]

**Question 39.**

(i)Name the movements that occur all along the gut in the human digestive system. How do they help in digestion?

(ii) Where is bile juice stored in the human body? List two roles of bile juice.

[3 Marks]

**Question 40.**

Draw a ray diagram to show the formation of a rainbow in the sky. On this diagram, mark A – where dispersion of light occurs, B – where internal reflection of light occurs and C – where refraction of light occurs. List two necessary conditions to observe a rainbow.

[3 Marks]

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## Section E

**Question 41.**

(a) Upper half of a convex lens is covered with black paper. Draw a ray diagram to show the formation of the image of an object placed at a distance of 2F from such a lens. Mention the position and nature of the image formed. State the observable difference in the image obtained if the lens is uncovered. Give reason to justify your answer.

(a) An object is placed at a distance of 30 cm from the optical centre of a concave lens of focal length 15 cm. Use lens formula to determine the distance of the image from the optical centre of the lens.

[5 Marks]

**Question 42.**

(i)Give reason why carbon can neither form $C^{4+}$cations nor $C^{4-}$anions but form covalent compounds.
(ii)What is homologous series of carbon compound? Write the molecular formula of any two consecutive members of the homologous series of aldehydes.

(iii) Draw the structure of the molecule of cyclohexane ($C_6H_{12}$).

[5 Marks]

**Question 43.**

(i) Name a commercially important carbon compound having functional group -OH and write its molecular formula.
(ii) Write chemical equation to show its reaction with
(1) Sodium metal
(2) Excess conc. sulphuric acid
(3) Ethanoic acid in the presence of an acid catalyst
(4) Acidified potassium dichromate
Also write the name of the product formed in each case.

[5 Marks]

**Question 44.**

(i)Distinguish between hormonal coordination in plants and animals.

(ii) Which part of the brain is responsible for —

(1) intelligence

(2) riding a bicycle

(3) vomiting

(4) controlling hunger?

(iii) How is brain and spinal-cord protected against mechanical injuries?

[5 Marks]

**Question 45.**

(i) What are tropic movements? Give an example of a plant hormone which (1) inhibits growth and (2) promotes cell division.

(ii) Explain directional movement of a tendril in pea plant in response to touch. Name the hormone responsible for this movement

[5 Marks]