CBSE EXAMINATION PAPER-2023

SCIENCE

(Solved)

Time allowed : 3 hours | Maximum Marks : 88

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.

On the basis of reactivity metals are grouped into three categories -

(i) Metals of low reactivity

(ii) Metals of medium reactivity

(iii) Metals of high reactivity

Therefore metals are extracted in pure form from their ores on the basis of their chemical properties.

Metals of high reactivity are extracted from their ores by electrolysis of the molten ore.

Metals of low reactivity are extracted from their sulphide ores, which are converted into their oxides. The oxides of these metals are reduced to metals by simple heating.

(1)

Name the process of reduction used for a metal that gives vigorous reaction with air and water both.

[1 Marks]

(2)

Carbon cannot be used as a reducing agent to obtain aluminium from its oxide? Why?

[2 Marks]

(3)

Describe briefly the method to obtain mercury from cinnabar. Write the chemical equation for the reactions involved in the process.

[2 Marks]

(4)

Differentiate between roasting and calcination giving chemical equation for each.

[2 Marks]

Question 2.

All human chromosomes are not paired. Most human chromosomes have a maternal and a paternal copy, and we have 22 such pairs. But one pair called the sex chromosomes, is odd in not always being a perfect pair. Women have a perfect pair of sex chromosomes. But men have a mismatched pair in which one is normal sized while the other is a short one.

(1)

In humans, how many chromosomes are present in a Zygote and in each gamete?

[1 Marks]

(2)

A few reptiles rely entirely on environmental cues for sex determination. Comment.

[1 Marks]

(3)

"The sex of a child is a matter of chance and none of the parents are considered to be responsible for it." Justify it through flow chart only.

[2 Marks]

(4)

Why do all the gametes formed in human females have an X chromosome?

[2 Marks]

Question 3.

A student took three concave mirrors of different focal lengths and performed the experiment to see the image formation by placing an object at different distances with these mirrors as shown in the following table.

Case No.	Object-distance	Focal length
I	45 cm	20 cm
II	30 cm	15 cm
III	20 cm	30 cm

(1)

List two properties of the image formed in Case I.

[1 Marks]

(2)

In which one of the cases given in the table, the mirror will form real image of same size and why?

[1 Marks]

(3)

Name the type of mirror used by dentists. Give reason why do they use such type of mirrors.

[2 Marks]

(4)

Look at the table and identify the situation (object distance and focal length) which resembles the situation in which concave mirrors are used as shaving mirrors? Draw a ray diagram to show the image formation in this case.

[2 Marks]

Section B

Question 4.

Metal oxides generally react with acids, but few oxides of metal also react with bases. Such metallic oxides are :

I. MgO

II. ZnO

III. Al_2O_3

IV. CaO

[1 Marks]

(A) I and II

(B) I and IV

(C) III and IV

(D) II and III

Question 5.

Few drops of aqueous solution of ammonium chloride are put on a universal indicator paper. The paper turns pink.

study the following table and choose the correct option.

[1 Marks]

	Nature	Ammonium chloride is a salt of	Range of pH
(a)	acidic	weak acid and strong base	less than 7
(b)	basic	weak acid and strong base	more than 7
(c)	acidic	strong acid and weak base	less than 7
(d)	basic	strong acid and strong base	7

(A) D

(B) B

(C) A

(D) C

Question 6.

Select the appropriate state symbols of the products given as X and Y in the following chemical equation by choosing the correct option from table given below:

[1 Marks]

$$Zn_{(s)} + H_2SO_{4(l)} \longrightarrow ZnSO_{4(X)} + H_{2(Y)}$$

	(X)	(Y)
(a)	(s)	(*l*)
(b)	(aq)	(g)
(c)	(aq)	(s)
(d)	(g)	(aq)

(A) D

(B) A

(C) C

(D) B

Question 7.

Two salts X and Y are dissolved in water separately. When phenolphthalein is added to these two solutions, the solution 'X' turns pink and the solution Y does not show any change in colour, therefore 'X' and 'Y' are

[1 Marks]

	(X)	(Y)
(a)	Na_2CO_3	NH_4Cl
(b)	Na_2SO_4	$NaHCO_3$
(c)	NH_4Cl	Na_2SO_4
(d)	$NaNO_3$	Na_2SO_4

(A) A

(B) C

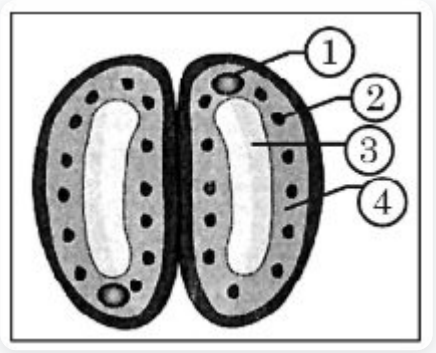
(C) B

(D) D

Question 8.

In the given diagram of a closed stomata (1), (2), (3) and (4) respectively are

[1 Marks]



(A) nucleus, chloroplast, guard cell, vacuole

(B) vacuole, guard cell, nucleus, chloroplast

(C) nucleus, chloroplast,, vacuole, guard cell

(D) chloroplast, nucleus, vacuole, guard cell

Question 9.

Walking in a straight line and riding a bicycle are the activities which are possible due to a part of the brain. Choose the correct location and name of this part from the given table:

[1 Marks]

	Part of the Brain	Name
(a)	Fore brain	Cerebrum
(b)	Mid brain	Hypothalamus
(c)	Hind brain	Cerebellum
(d)	Hind brain	Medulla

(A) A

(B) D

(C) B

(D) C

Question 10.

A student wants to obtain an erect image of an object using a concave mirror of 10 cm focal length. What will be the distance of the object from mirror?

[1 Marks]

(A) Less than 10 cm

(B) 10 cm

(C) between 10 cm and 20 cm

(D) more than 20 cm

Question 11.

Bronze is an alloy of

[1 Marks]

(A) Copper and Zinc

(B) Copper, Tin and Zinc

(C) Aluminium and Tin

(D) Copper and Tin

Question 12.

In an experiment with pea plants, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plants to pure short plants in F_2 generation will be —

[1 Marks]

(A) 1:3

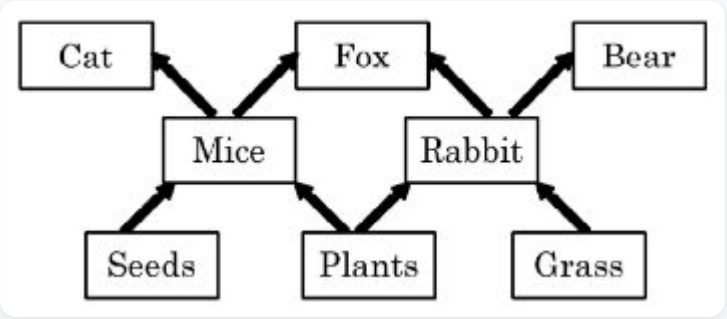
(B) 3:1

(C) 1:1

(D) 2:1

Question 13. Study the given figure of a Food web and identify the primary consumer in the food web:

[1 Marks]



(A) Mice and Bear

(B) Mice and Rabbit

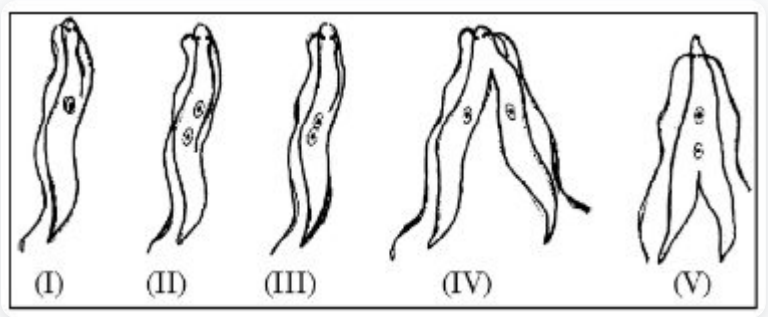
(C) Rabbit and Fox

(D) Rabbit and Cat

Question 14.

Choose the correct order of the stages of binary fission in Leishmania.

[1 Marks]



(A) I, III, II, V, IV

(B) I, III, V, II, IV

(C) I, II, III, V, IV

(D) I, II, III, IV, V

Question 15.

Consider the following chemical equation I and II

I. $Mg + 2HCl \longrightarrow MgCl_2 + H_2$

II. $NaOH + HCl \longrightarrow NaCl + H_2O$

The correct statement about these equations is -

[1 Marks]

(A) Both 'I' and 'II' are displacement reactions.

(B) I is a displacement reaction and II' is double displacement reaction.

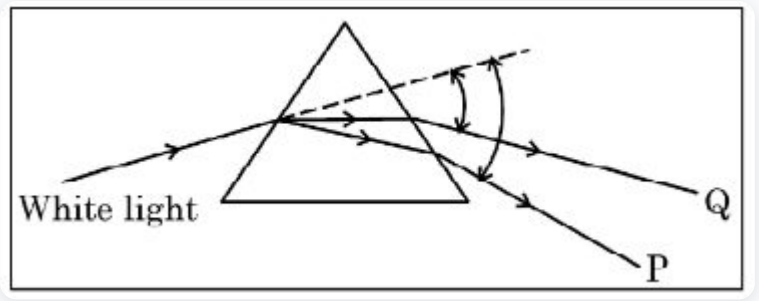
(C) Both 'I' and 'IT' are double-displacement reactions.

(D) I is a displacement reaction and II' is a decomposition reaction.

Question 16.

In the following diagram showing dispersion of white light by a glass prism, the colours 'P' and 'Q' respectively are -

[1 Marks]



(A) Red and Blue

(B) Red and Violet

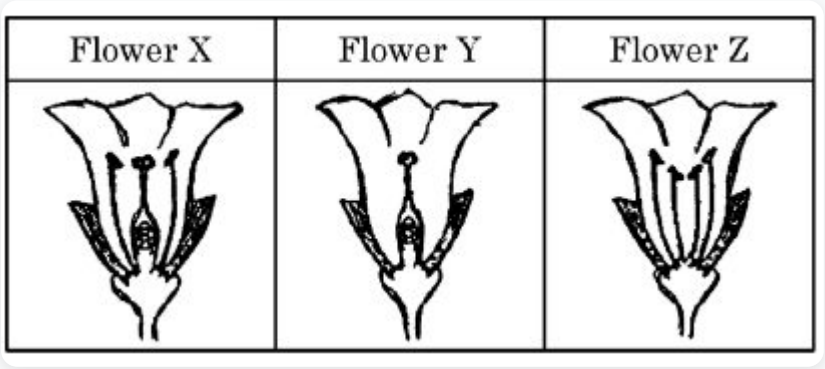
(C) Orange and Green

(D) Violet and Red

Question 17.

Consider the following three flowers namely X, Y and Z. Which flower(s) would develop into a fruit?

[1 Marks]



(A) 'Z 'only

(B) 'Y' and 'Z'

(C) 'X' only

(D) 'X' and 'Y' only

Question 18. The magnetic field inside a long straight current carrying solenoid:

[1 Marks]

(A) is zero.

(B) increases as we move towards its end.

(C) decreases as we move towards its end.

(D) is same at all points.

Question 19. In human eye the part which allows light to enter into the eye is -

[1 Marks]

(A) Retina

(B) Pupil

(C) Cornea

(D) Eye lens

Question 20. Assertion (A): It is advised that while diluting an acid one should add water to acid and not acid to water keeping the solution continuously stirred. Reason (R): The process of dissolving an acid into water is highly exothermic.

[1 Marks]

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

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

(C) Assertion (A) is true, but Reason (R) is false.

(D) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of (A).

Question 21. Assertion (A): The energy which passes to the herbivores does not come back to autotrophs. Reason (R): The flow of energy in a food chain is unidirectional.

[1 Marks]

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

(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of (A).

(C) Assertion (A) is true, but Reason (R) is false.

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

Question 22. Assertion (A): Amoeba takes in food using finger like extensions of the cell surface. Reason (R) In all unicellular organisms, the food is taken in by the entire cell surface.

[1 Marks]

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

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

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

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

Question 23. Assertion (A): Melting point and boiling point of ethanol are lower than that of sodium chloride. Reason (R) The forces of attraction between the molecules of ionic compoünds are very strong.

[1 Marks]

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

(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of (A).

(C) Assertion (A) is true, but Reason (R) is false.

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

Section C

Question 24.

State whether the given chemical reaction is a redox reaction or not. Justify your answer.

$MnO_2 + 4\ HCl \rightarrow MnCl_2 + 2\ H_2O + Cl_2$

[2 Marks]

Question 25.

List two differences between the movement of leaves of a sensitive plant and the movement of a shoot towards light.

[2 Marks]

Question 26.

What happens at synapse between two neurons? State briefly.

[2 Marks]

Question 27.

1. Give the name of the enzyme present in the fluid in our mouth cavity. State the gland which produces it. What would happen to the digestion process if this gland stops secreting this enzyme?

[2 Marks]

Question 28.

1. Let the resistance of an electrical device remain constant, while the potential difference across its two ends decreases to one fourth of its initial value. What change will occur in the current through it? State the law which helps us in solving the above stated question.

[2 Marks]

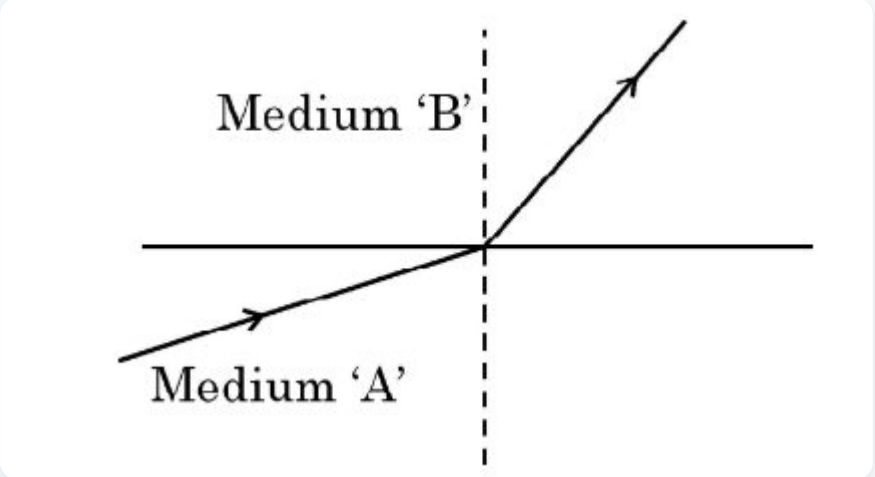
Question 29.

A light ray enters from medium A to medium B as shown in the figure.

(a) Which one of the two media is denser w.r.t. other medium? Justify your answer.

(b) If the speed of light in medium A is v_a and in medium B is v_β, what is the refractive index of B with respect to A?

[2 Marks]



Question 30.

(a) A ray of light starting from diamond is incident on the interface separating diamond and water. Draw a labelled ray diagram to show the refraction of light in this case.

(b) Absolute refractive indices of diamond and water are 2.42 and 1.33 respectively. Find the value of refractive index of water w.r.t. diamond.

[2 Marks]

Question 31.

State the rule to determine the direction of a (a) magnetic field produced around a straight conductor carrying current and (b) force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it.

[2 Marks]

Section D

Question 32.

Explain the process of transport of oxygenated and deoxygenated blood in a human body.

[3 Marks]

Question 33.

A substance 'X' is used as a building material and is insoluble in water. When it reacts with dilute HCl, it produces a gas which turns lime water milky.

(i) Write the chemical name and formula of 'X'.

(ii) Write chemical equations for the chemical reactions involved in the above statements.

[3 Marks]

Question 34.

A metal 'M' on reacting with dilute acid liberates a gas 'G'. The same metal also liberates gas 'G' when reacts with a base.

(i) Write the name of gas 'G'.

(ii) How will you test the presence of this gas?

(iii) Write chemical equations for the reactions of the metal with

(1) an acid and (2) a base.

[3 Marks]

Question 35.

Name the gland and the hormone secreted by it in scary situations in human beings. List any two responses shown by our body when this hormone is secreted into the blood.

[3 Marks]

Question 36.

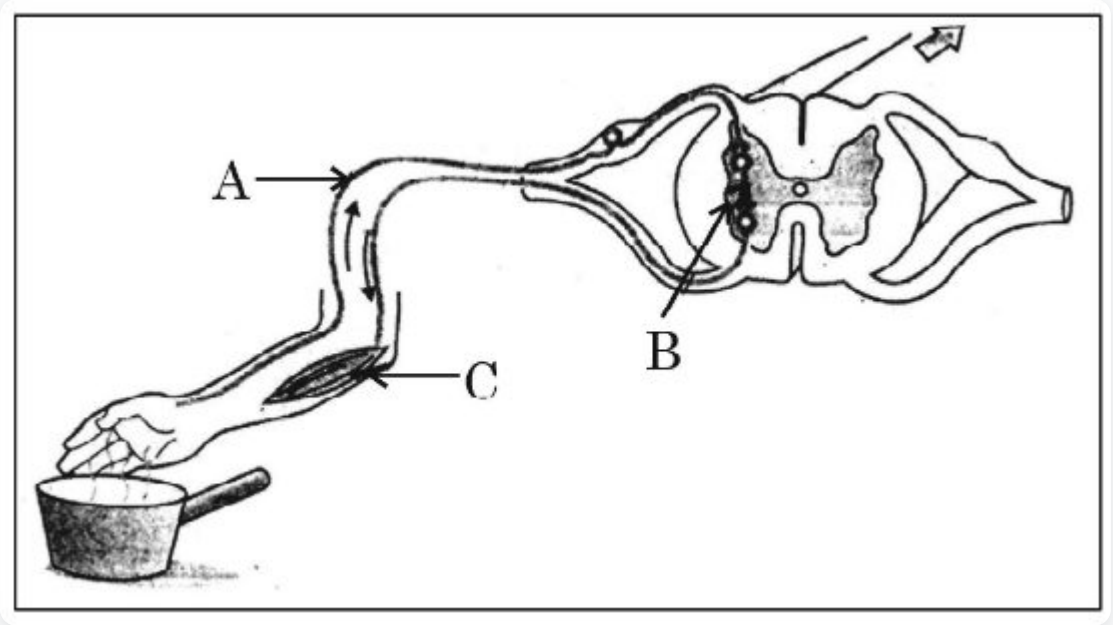
In the given diagram

(1) Name the parts labelled A, B, and C.

(ii) Write the functions of A and C.

(iii) Reflex arcs have evolved in animals? Why?

[3 Marks]



Question 37.

With the help of an appropriate example, justify that some of the chemical reactions are determined by

(a) Change in temperature,

(b) Evolution of a gas, and

(c) Change in colour

Give chemical equation for the reaction involved in each case.

[3 Marks]

Question 38.

State reasons for Myopia. With the help of ray diagrams, show the

(a) image formation by a myopic eye, and

(b) correction of myopia using an appropriate lens.

[3 Marks]

Question 39.

(a) Write the percentage of (i) solar energy captured by the autotrophs and (ii) energy transferred from autotrophs to the next level in a food chain.

(b) What are trophic levels? Why do different food chains in an ecosystem not have more than four to five trophic levels? Give reason.

[3 Marks]

Question 40.

What is a solenoid? When does a solenoid behave as a magnet? Draw the pattern of the magnetic field produced inside it showing the directions of the magnetic field lines.

[3 Marks]

Section E

Question 41.

(i) A compound 'A' with a molecular formula of $C_2H_4O_2$ reacts with a base to give salt and water. Identify 'A', state its nature and the name of the functional group it possesses. Write the chemical equation for the reaction involved.

(ii) When the above stated compound 'A' reacts with another compound 'B' having molecular formula C_2H_6O in the presence of an acid, a sweet-smelling compound 'C' is formed.

(1) Identify 'B' and 'C'.

(2) State the role of acid in this reaction.

(3) Write the chemical equation for the reaction involved.

[5 Marks]

Question 42.

(i) Name the compound formed when ethanol is heated at 443 K in the presence of conc. H_2SO_4 and draw its electron-dot structure. State the role of conc. H_2SO_4 in this reaction.

(ii) What is hydrogenation? Explain it with the help of a chemical equation. State the role of this reaction in industry.

[5 Marks]

Question 43.

Give Reason for the following :
(a) During reproduction inheritance of different proteins will lead to altered body designs.
(b) Fertilization cannot take place in flowers if pollination does not occur.

(c) All multicellular organisms cannot give rise to new individuals through fragmentation or regeneration.

(d) Vegetative propagation is practised for growing only some type of plants.

(e) The parents and off-springs of organisms reproducing sexually have the same number of chromosomes.

[5 Marks]

Question 44.

(i) What is meant by resistance of a conductor? Define its SI unit.

(ii) List two factors on which the resistance of a rectangular conductor depends.

(iii) How will the resistance of a wire be affected if its

(1) length is doubled, and

(2) radius is also doubled?

Give justification for your answer.

[5 Marks]

Question 45.

In an electric circuit three bulbs of 100 W each are connected in series to a source. In another circuit set of three bulbs of the same wattage are connected in parallel to the same source.

(i) Will the bulb in the two circuits glow with the same brightness? Justify your answer.

(ii) Now, let one bulb in both the circuits get fused. Will the rest of the bulbs continue to glow in each circuit? Give reason for your answer.

[5 Marks]