

**CBSE**  
**Class X Science**  
**Sample Paper 6**

**Time: 3 hrs**

**Total Marks: 80**

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**General Instructions:**

- (i) The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
  - (ii) Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
  - (iii) Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should be in the range of 30 to 50 words.
  - (iv) Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should be in the range of 50 to 80 words.
  - (v) Section–D – question no. - 34 to 36 are long answer type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.
  - (vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
  - (vii) Wherever necessary, neat and properly labeled diagrams should be drawn.
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**SECTION A**

1. What is the effect of DNA copying which is not perfectly accurate in the reproductive process? (1)

**OR**

Which artificial propagation method is used to propagate roses?

2. If salivary amylase is lacking in the saliva, which event in the mouth cavity will be affected? (1)
3. In which of the following vertebrate groups, heart does not pump oxygenated to different parts of the body? (1)
- (a) Pisces and amphibians
  - (b) Amphibians and reptiles
  - (c) Amphibians only
  - (d) Pisces only
4. What do you understand by the strength of acid? On which factors does the strength of an acid depend? (1)



5. What are the two properties of carbon which lead to the formation of a large number of carbon compounds? (1)

6. What is aqua-regia? Name two special metals which are insoluble in common reagents but dissolve in aqua-regia. (1)

**OR**

A copper coin is kept immersed in a solution of silver nitrate for some time. What will happen to the coin and the colour of the solution?

7. Name the gas evolved when dilute HCl reacts with sodium hydro-carbonate. How is it recognized? (1)

8. Write the balanced chemical equation for the following reaction, and add the state symbols:

Magnesium carbonate reacts with hydrochloric acid to produce magnesium chloride, carbon dioxide and water. (1)

9. Why should curd and other sour food stuffs (like lemon, juice, etc.) not be kept in metal containers (such as copper and brass vessels)? (1)

**OR**

If someone is suffering from the problem of acidity after overeating, which of the following would suggest as remedy?

Lemon juice, Vinegar, Baking soda solution? Give reason for your choice.

10. Which device is used to measure potential difference? (1)

11. A converging lens has a focal length of 20 cm. What is the power of the lens? (1)

**OR**

For what position of an object, a concave mirror forms a real image equal in size to the object?

12. In which direction does conventional current flow around a circuit? (1)

**OR**

How many milliamperes are there in 1 ampere?

13. State the SI unit of resistivity (1)

**For question numbers 14, 15 and 16, two statements are given—one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.**

- a) Both A and R are true, and R is the correct explanation of the assertion.
- b) Both A and R are true, but R is not the correct explanation of the assertion.
- c) A is true, but R is false.

d) A is false, but R is true.

**14. Assertion:** Phloem tissue transports the food from the leaves to the other parts of the plant. (1)

**Reason:** The movement of food in phloem takes place by diffusion.

**15. Assertion:** When objects are observed through hot air, they appear to be moving slightly.

**Reason:** The hotter air is optically denser and the colder air is optically rarer. (1)

**16. Assertion:** The resistivity of conductor increases with the increasing temperature.

**Reason:** The resistivity is the reciprocal of the conductivity. (1)

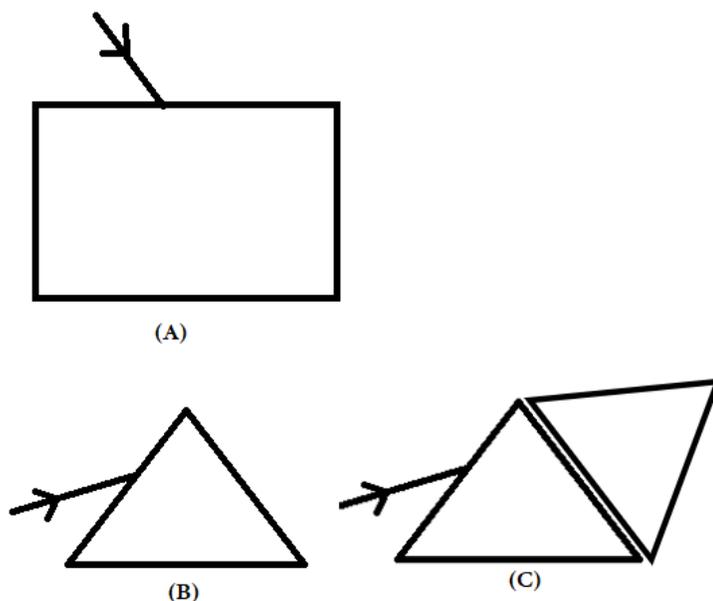
**Answer Q. No 17 - 20 contain five sub-parts each. You are expected to answer any four subparts in these questions.**

**17. Read the following and answer any four questions from 17 (i) to 17 (v)** (1 × 4)

Study the given diagram and answer the following.

A very thin and narrow beam of white light is made incident on the glass objects shown below. Comment on the nature and behaviour of the emergent beam in all the three cases.

(Given:  $\sin 45^\circ = 1/\sqrt{2}$ ,  $\sin 30^\circ = 1/2$ )



(i) There is a similarity between two of the emergent beams. Identify the two.

a) (A) and (B)

b) (A) and (C)

c) (B) and (C)

d) Insufficient data given to identify the similarity

(ii) When light enters from air to glass, the angles of the incidence and refraction in air and glass are  $45^\circ$  and  $30^\circ$  respectively. The refractive index of the glass is



- a)  $\sqrt{2}$
  - b)  $1/2$
  - c) 1
  - d)  $1/\sqrt{2}$
- (iii) The phenomena which takes place when the light rays emerges out in case (B)
- a) reflection
  - b) refraction
  - c) dispersion
  - d) scattering
- (iv) What is the unit of refractive index?
- a) °A
  - b) cm
  - c) degree
  - d) no unit
- (v) The ratio of sine of angle of incidence and sine of angle of refraction for particular pair of media is
- a) Zero
  - b) Unity
  - c) Constant
  - d) None of these

**18.** Read the following and answer any four questions from 18 (i) to 18 (v). (1×4)

We eat various types of food which has to pass through the same digestive tract. Naturally the food has to be processed to generate particles which are small and of the same texture. The process of digestion of food in humans involves the alimentary canal and associated digestive glands.

- (i) Which of the following helps in the breakdown of starch?
- a) Salivary amylase
  - b) Trypsin
  - c) Peptidase
  - d) Chyme
- (ii) What is the role of the mucus?
- a) Creates alkaline medium for digestion
  - b) Movement of food along the digestive tract
  - c) Protect the inner lining of the stomach from the action of the acid
  - d) Breakdown of starch into sugar
- (iii) Which of the following will have a longer small intestine?
- a) Deer
  - b) Lion
  - c) Tiger
  - d) Fox

- (iv) Which of the following processes would have been obstructed in the absence of villi?
- a) Digestion of fats
  - b) Breakdown of lipids
  - c) Absorption of food
  - d) Removal of undigested food
- (v) Which of the following is not processed in the small intestine?
- a) Pancreatic juice
  - b) Bile
  - c) Saliva
  - d) Intestinal juice

**19.** Read the following and answer any four questions from 19 (i) to 19 (v) (1×4)

It is an allotrope of carbon containing clusters of 60 carbon atoms joined together to form spherical molecules. There are 60 carbon atoms in a molecule of buckminsterfullerene, so its formula is  $C_{60}$ . The allotrope was named buckminsterfullerene after the American architect Buckminster Fuller.

- (i) How many hexagons of carbon atoms are present in one molecule of buckminster fullerene?
- a) 20
  - b) 15
  - c) 30
  - d) 18
- (ii) How many pentagons of carbon atoms are present in one molecule of Buckminster fullerene?
- a) 10
  - b) 12
  - c) 15
  - d) 20
- (iii) Which of the following molecule is called buckminsterfullerene?
- a)  $C_{90}$
  - b)  $C_{60}$
  - c)  $C_{70}$
  - d)  $C_{120}$
- (iv) Which allotrope of carbon exists as spherical molecules?
- a) Diamond
  - b) Coke
  - c) Graphite
  - d) Fullerene
- (v) Which of the following is true about  $C_{60}$ ?
- a) Each carbon bonded covalently to 3 other carbon atoms in a hexagonal ball like structure.
  - b) Each carbon bonded covalently to 4 other carbon atoms in layers



- c) A giant lattice structure
- d) Pentagonal in shape

20. Read the following and answer any four questions from 20 (i) to 20 (v) (1×4)

Metal A burns in air, on heating, to form an oxide  $A_2O_3$  whereas another metal B burns in air only on strong heating to form an oxide  $BO$ . The two oxides  $A_2O_3$  and  $BO$  can react with hydrochloric acid as well as sodium hydroxide solution to form the corresponding salts and water. And element E forms an oxide  $E_2O$ . An aqueous solution of  $E_2O$  turns red litmus paper blue.

- (i) What is the nature of oxide  $A_2O_3$ ?
  - a) Acidic oxide
  - b) Basic oxide
  - c) Amphoteric oxide
  - d) Neutral oxide
- (ii) What is the nature of oxide  $BO$ ?
  - a) Acidic oxide
  - b) Basic oxide
  - c) Amphoteric oxide
  - d) Neutral oxide
- (iii) Name one metal like A.
  - a) Sulphur
  - b) Gold
  - c) Aluminium
  - d) Iron
- (iv) Name one metal like B.
  - a) Sulphur
  - b) Gold
  - c) Zinc
  - d) Iron
- (v) State the nature of oxide element E.
  - a) Acidic
  - b) Basic
  - c) Amphoteric
  - d) Neutral

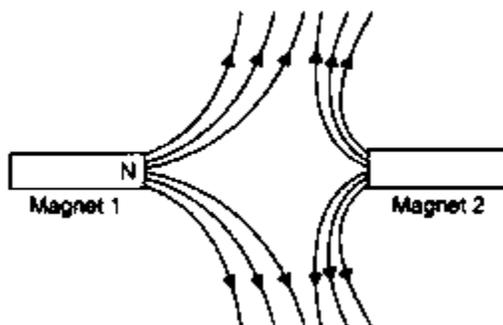


## SECTION B

21. What is a magnetic field? How can the direction of magnetic field lines at a place be determined? (2)

OR

The figure given below shows the magnetic field between two magnets:

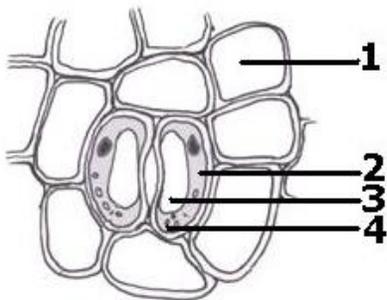


- (i) Copy the diagram and label the other poles of the magnets.  
(ii) Which is the weaker magnet?
22. (a) Which gas is filled in an electric bulb and why?  
(b) State Ohm's law. (2)
23. Write correct sequence of the steps of method for the preparation of temporary mount of a stained leaf peel. (2)

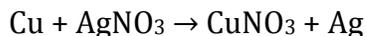
OR

What would be the consequences of deficiency of haemoglobin in your body?

24. Study the diagram given below and answer the following questions (2)



- (a) Name the parts labelled 1, 2, 3, 4.  
(b) State the function of (2).
25. What change will you observe in the colour of red litmus paper when it is dipped into a solution of sodium sulphate? Give reason to explain your observation. (2)
26.  $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$   
 $\text{Zn} + \text{FeSO}_4 \rightarrow \text{ZnSO}_4 + \text{Fe}$



From the above information, arrange the given metals in the increasing order of reactivity. Give reason for your choice. (2)

### SECTION C

27. What do you mean by ozone depletion? Mention the cause of ozone depletion in brief.

OR

What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem? Where will the magnification be maximum? (3)

28. State the signs (positive or negative) and give reasons which can be given to the following:

(a) Object distance (u) for a concave mirror or convex mirror

(b) Image distances (v) for a concave mirror

(c) Image distances (v) for a convex mirror (3)

29. A person got his eyes tested by an optician. The prescription for the spectacle lenses to be made reads: (3)

Left eye: + 2.50 D; Right eye: + 2.00 D

(a) State whether these lenses are thicker in the middle or at the edges.

(b) Which lens bends the light rays more strongly?

(c) State whether these spectacles lenses will converge light rays or diverge light rays.

30. A blue-flowered plant denoted by BB is crossbred with a white-flowered plant denoted by bb. (3)

(a) State the colour of the flowers you would expect in the F<sub>1</sub> generation plants.

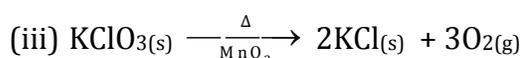
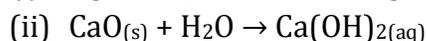
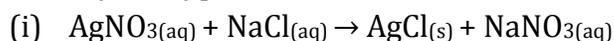
(b) What must be the percentage of white-flowered plants in the F<sub>2</sub> generation if flowers of F<sub>1</sub> plants are self-pollinated?

(c) State the expected ratio of the genotypes BB and Bb in the F<sub>2</sub> progeny.

31. What are the probable damages due to ozone layer depletion? (3)

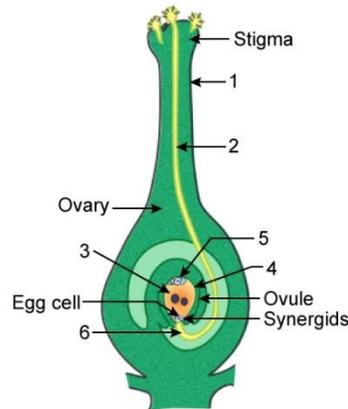
32. List three characteristics of lungs which make it an efficient respiratory surface. (3)

33. Identify the types of reactions. (3)



## SECTION D

34. Study this diagrammatic representation of the process of fertilisation, and answer the questions which follow: (5)



- Name the parts labelled 1, 2, 3, 4, 5 and 6.
- What happens to the ovary and the ovule after fertilisation?
- What is the function of the synergids?
- What part does the stigma play in the process of fertilisation?

**OR**

- What is placenta? Mention its role during pregnancy?
- What would be the ratio of chromosome number between an egg and its zygote? How is the sperm genetically different from the egg?

35. (5)

- Define magnetic field lines and write their characteristics.
- State the direction of magnetic field lines with a neat labelled diagram.
- Is the magnetic field same all around a bar magnet? Explain with reasons.

36. A quiz contest was being held in the school for chemistry students. The quiz-master said: (5)

An element has the electronic configuration 2, 8, 2.

- What is the atomic number of this element?
- Is it a metal, non-metal or metalloid?
- Which of the elements Mg, O, P or Ar shows similarity with this element?
- We use a compound of this element in our food. Identify that compound.
- A compound of this element causes hardness of water. Identify that compound.

**OR**

- State the Modern Periodic Law. How have the elements been arranged in the modern periodic table? Why is the position of hydrogen in the periodic table considered anomalous?
- An element X (2, 8, 2) combines separately with  $\text{NO}_3^-$  and  $(\text{PO}_4)^{3-}$  radicals. Write the formulae of the compounds so formed. To which group of the periodic table does the element 'X' belong? Will it form covalent or ionic compounds with these radicals? How?

**CBSE**  
**Class X Science**  
**Sample Paper 6 – Solution**

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**SECTION A**

1. The DNA copying which is not perfectly accurate in the reproductive process results in variations in populations for better survival of the species.

**OR**

Grafting is the artificial propagation method used to propagate roses.

2. If salivary amylase is lacking in the saliva, then the event of breakdown of starch into sugars in the mouth cavity will be affected.
3. (b) Transpiration, photosynthesis and respiration  
Exchange of gases and water occurs through the stomata in plants. If stomata are blocked, exchange will not occur and processes of transpiration, photosynthesis and respiration will also not occur.
4. The strength of an acid is the extent to which the acid ionizes or dissociates in water. The strength of an acid depends on the degree of ionization and concentration of hydronium ions  $[H_3O^+]$  produced by that acid in aqueous solution.
5. Catenation (Self linking of carbon atoms to form long chains) and Tetravalency.
6. Aqua-regia is a freshly prepared mixture of one part of concentrated nitric acid and three parts of concentrated hydrochloric acid. Gold and platinum dissolve in aqua-regia.

**OR**

Copper coin will get a shining greyish white coating of silver metal. The color of the solution will turn blue.

7. Carbon dioxide ( $CO_2$ ) gas is evolved during the reaction. We pass this gas through lime water which turns milky because of the  $CO_2$  passing through it. If we keep on passing the gas through the milky lime water, it would become clear again.
8.  $MgCO_3 (s) + 2HCl (aq) \rightarrow MgCl_2 (aq) + CO_2 (g) + H_2O (l)$
9. Curd and other sour substances contains acids which can react with the metals of brass and copper vessels to form toxic (poisonous) metal compounds which can cause food poisoning and damage our health.

**OR**

Baking soda solution. Being basic in nature, it neutralises excess acid in the stomach.



10. Voltmeter

11. As the lens is converging, the focal length is positive.

We know,

$$P = \frac{1}{f(\text{in metre})} = \frac{1}{+0.2 \text{ m}} = +5 \text{ D}$$

**OR**

At the centre of curvature

12. Conventional current flows from positive terminal of a battery to the negative terminal, through the outer circuit.

**OR**

$$1 \text{ A} = 10^3 \text{ mA}$$

13. SI unit of resistivity is ohm – metre ( $\Omega \text{ m}$ )

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

Phloem tissue transports food from the leaves to the other parts of the plant. But the movement of food in phloem does not take place by diffusion. This process takes place by utilising energy. This happens as the sugar made in the leaves is loaded into the sieve tubes of phloem by using ATP energy.

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

When the objects are observed through hot air, the objects appear to be moving slightly as the light refracts due to atmospheric refraction. This refraction occurs because hotter air is optically rarer and colder air is optically denser.

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

The resistivity of conductors is directly proportional to the temperature.

## SECTION B

17.

(i) b) (A) and (C)

In (A) the emergent beam is white and laterally displaced. In case of (B) emergent beam is a spectrum of seven colours bent at different angles.

In case (C), emergent beam from the second prism is white only.

Thus, (A) and (B) gives similar emergent rays which are white in colour.

(ii) a)  $\sqrt{2}$

$${}^a\mu_g = \frac{\sin i}{\sin r} = \frac{\sin 45^\circ}{\sin 30^\circ} = \frac{1/\sqrt{2}}{1/2} = \sqrt{2}$$

- (iii) c) dispersion  
The splitting of white light into a spectrum of seven colours on passing through prism is known as dispersion.
- (iv) d) no unit  
As the refractive index is the ratio of two same quantities it do not have unit.
- (v) c) constant  
The ratio of sine of angle of incidence and sine of angle of refraction for particular pair of media is constant. This constant is refractive index. This law is called Snell's law.

**18.**

- (i) a) The saliva contains an enzyme called salivary amylase that breaks down starch which is a complex molecule to give simple sugar.
- (ii) c) The mucus protects the inner lining of the stomach from the action of the acid under normal conditions.
- (iii) a) Herbivores eating grass need a longer small intestine to allow the cellulose to be digested.
- (iv) c) The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body, where it is utilised for obtaining energy, building up new tissues and the repair of old tissues.
- (v) c) Saliva is processed in the mouth.

**19.**

- (i) (a) There are 20 hexagons of carbon atoms are present in one molecule of Buckminster fullerene.
- (ii) (b) There are 12 pentagons of carbon atoms are present in one molecule of Buckminster fullerene.
- (iii) (b)  $C_{60}$  molecule is called buckminsterfullerene.
- (iv) (d) Fullerene exists as spherical molecules.
- (v) (a) Each carbon bonded covalently to 3 other carbon atoms in a hexagonal ball like structure.

**20.**

- (i) (c) The nature of oxide  $A_2O_3$  is amphoteric.
- (ii) (c) The nature of oxide  $BO$  is amphoteric.
- (iii) (c) Metal A is aluminium.
- (iv) (c) Metal B is zinc.
- (v) (b) The nature of  $E_2O$  is basic.



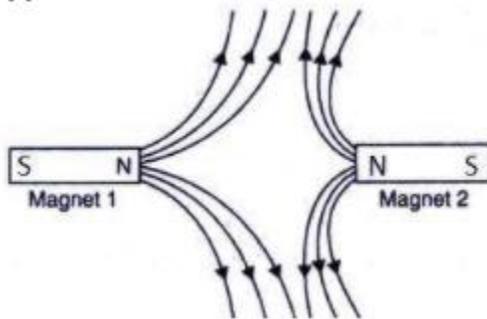
## SECTION B

21. The space surrounding a magnet in which magnetic force is exerted, is called a magnetic field. The direction of magnetic field lines at a place can be determined by using a compass needle.

A compass needle placed near a magnet gets deflected due to the magnetic force exerted by the magnet. The north end of the needle of the compass indicates the direction of magnetic field at the point where it is placed.

OR

i)



ii) Magnet 2 is weaker.

22. (a) Argon or neon gas is filled in electric bulbs.

These gases are used because they are inactive or inert. This prolongs the life of the filament.

(b) Ohm's law: At a constant temperature, the current flowing through a conductor is directly proportional to the potential difference across its ends.

23. Steps for the preparation of temporary mount of a stained leaf peel:

- Take a healthy leaf from a potted plant.
- Remove a part of the peel from the lower surface of the leaf. You can do this by folding the leaf over and gently pulling the peel apart using forceps.
- Keep the peel in a watch glass containing water.
- Put a few drops of safranin stain in a watch glass.
- After 2-3 minutes take out the peel and place it on a clean glass slide.
- Put a drop of glycerine over the peel and place a clean coverslip gently over it with the help of a needle.
- Remove the excess stain and glycerine with the help of a blotting paper.
- Observe the slide under magnification of the compound microscope.

OR

The deficiency of haemoglobin in our body is called anaemia. In anaemia, the blood is unable to carry sufficient amount of oxygen required by the body. So, respiration would be less and less energy will be available to the body. The haemoglobin

deficient person will feel weak, pale, lethargic and will be unable to perform heavy physical work.

24.

(a) 1- Epidermal cell, 2 – guard cells, 3- stoma, 4 - chlorophyll.

(b) Guard cells help in the opening and closing of stomata.

25. It will not undergo any colour change because the solution of  $\text{Na}_2\text{SO}_4$  (sodium sulphate) in water is almost neutral.

26. Because zinc displaces iron, it is more reactive than iron. However, iron displaces copper, so iron comes above copper in the reactivity series. Similarly, copper displaces silver, i.e. silver is the least reactive.

$\text{Ag} < \text{Cu} < \text{Fe} < \text{Zn}$

### SECTION C

27. Ozone depletion generally refers to the process in which the ozone layer undergoes thinning continuously over a period of time.

The major cause of depletion of the ozone layer is the release of harmful chlorofluorocarbons such as methane and oxides of nitrogen into the atmosphere. These particles are released from vehicles, air conditioners etc. and produce active chlorine in the presence of UV rays. These rays destroy the ozone and thus cause ozone depletion.

OR

The accumulation or increasing concentration of a substance such as a toxic chemical in the body of living organisms at different trophic levels in a food chain is called biological magnification.

Yes, the concentration of these harmful chemicals will be different at different levels of the ecosystem. It will be maximum at the last trophic level which is mostly occupied by the top carnivores (quaternary consumers).

28. (a) Object distance ( $u$ ) for a concave mirror or convex mirror is always negative because an object is always placed to the left side of the mirror and the distances towards the left of the mirror are always negative.

(b) In case of a concave mirror, if the image is formed on the left side of the mirror, then the image distance ( $v$ ) will be negative and if the image is formed on the right side of the mirror, then the image distance ( $v$ ) will be positive. This is because distances measured to the left of the mirror are negative and to the right of the mirror is positive.

(c) Image distances ( $v$ ) for a convex mirror is always positive because the image is always formed behind the mirror.



29. (a) These lenses have positive powers and hence positive focal lengths, so they are convex lenses.  
Convex lenses are thicker in the middle.  
(b) Lens of greater power bends light rays more quickly.  
So, +2.50 D lens bends light rays more quickly.  
(c) These spectacle lenses will converge the light rays because these are convex lenses.
30. The cross between blue-flowered plant (BB) and white-flowered plant (bb) is a monohybrid cross which involves a single trait, i.e. colour of the flower under study.  
(a) All the F<sub>1</sub> generation plants would be blue.  
(b) If flowers of F<sub>1</sub> plants are self-pollinated, then we would have 75% plants with blue flowers and 25% plants with white flowers in the F<sub>2</sub> generation.  
(c) The expected ratio of the genotypes BB and Bb in the F<sub>2</sub> progeny is 1:2.
31. Due to ozone layer depletion, ultraviolet rays reach the Earth and cause certain ill-effects which are harmful for us as well as for crops. Some damages caused by ozone layer depletion are as follows:
- Exposure to UV rays can lead to greater incidence of skin cancer, cataracts or other damages to the eye and immune deficiency.
  - An excess of ultraviolet light decreases crop yield and reduces the population of phytoplankton, zooplankton and certain fish larvae which are important constituents of aquatic food chains.
  - It may also disturb global rainfall, cause ecological imbalance and bring about reduction in global food supplies.
32. Following features particularly make our lungs efficient for gas exchange:
1. **Thin:** The air sac walls are very thin so that gases can quickly diffuse through them. Oxygen is absorbed in to the blood and carbon dioxide is given out in to the lungs to be exhaled out.
  2. **Moist:** The air sacs are moist with mucus so that gases can dissolve before diffusing.
  3. **Large surface area:** The surface area for gases to diffuse through in human lungs is roughly the same as a tennis court. The alveoli help to increase the surface area for absorption of oxygen.
  4. **Good blood supply:** The air sacs or the alveoli have a large capillary network so that large volumes of gases can be exchanged. More the flow of blood more exchange.
- 33.
- (i) Double displacement reaction
  - (ii) Combination reaction
  - (iii) Decomposition reaction



## SECTION D

34.

(a) 1 → Style; 2 → Pollen tube; 3 → Polar nuclei; 4 → Embryo sac; 5 → Antipodal cells; 6 → Micropyle

(b) After fertilisation:

- The ovary enlarges to form the fruit and the ovarian wall forms the fruit wall.
- The ovule becomes the seed.

(c) Synergids help in nourishing the egg cell, guiding the pollen tube towards the egg, proper functioning of the pollen tube and releasing of sperm nuclei.

(d) Pollen grain is transferred to the stigma during pollination. Germination of pollen grain takes place only if it falls on the stigma. After germination, the pollen tube grows through the stigma and reaches the ovary for the fertilisation of the egg cell.

OR

(a) Placenta is a special tissue that develops between the uterine wall and the embryo (foetus).

The role of placenta during pregnancy is as follows:

- It attaches the foetus to the uterine wall.
- It possesses villi that increases the surface area for fixation and absorption.
- It facilitates the passage of nutrition and oxygen to embryo from mother through blood.
- Waste substances produced by embryo (foetus) are removed through placenta into mother's blood.

(b) The ratio of chromosome number between an egg and its zygote is 1: 2. Sperm is genetically different from the egg in the way that it contains either X or Y chromosome whereas, an egg always contains an X chromosome.

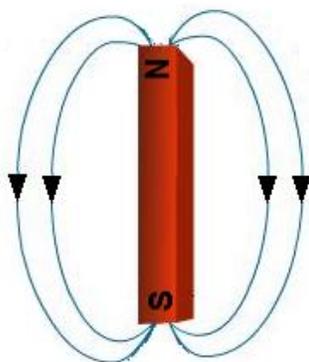
35.

(a) The space around a magnet in which the force of attraction and repulsion due to the magnet can be detected is called the magnetic field. The direction of the magnetic field is taken to be the direction in which a North Pole of the compass needle moves inside it.

- (i) Field lines originate from the North Pole and end at the South Pole.
- (ii) Magnetic field lines come closer to one another near the poles of a magnet, but they are widely separated at other places.
- (iii) Field lines do not intersect each other.

(b) Magnetic field lines





Magnetic field lines arise from the North Pole and complete a closed curved path at the South Pole.

- (c) No, magnetic field strength varies at every point around it.  
Magnetic field strength depends on the number of field lines per unit area.  
If the field lines per area is more, then the magnetic strength in that area is strong, and if the field lines per area is less, then the magnetic strength is weak.  
As the magnetic field lines per unit area is maximum at the poles, the magnetic strength is also maximum in that region.

36. From the electronic configuration, it is clear that the compound is calcium (Ca).  
(a) Atomic number: 12  
(b) Sodium is a metal.  
(c) Mg, as it belongs to the same group as the element calcium.  
(d) The compound is sodium chloride  $\text{Ca}(\text{HCO}_3)_2$  which is also known as baking soda or baking powder.  
(e) The compounds are calcium bicarbonate  $\text{Ca}(\text{HCO}_3)_2$ , which causes temporary hardness of water, and calcium sulphate  $\text{CaSO}_4$ , which causes permanent hardness of water.

**OR**

- (a) The modern periodic law states that the properties of elements are periodic functions of their atomic numbers.  
The arrangement of elements in the modern periodic table is based on their electronic configuration. The elements are arranged in the order of increasing atomic numbers.  
In increasing order of atomic number, hydrogen can be placed in Group 1 with alkali metals as well as with halogens in Group 17. Hence, its position is anomalous.
- (b) Two compounds formed:  
 $\text{X}(\text{NO}_3)_2$ ,  $\text{X}_3(\text{PO}_4)_2$   
X belongs to Group 2.  
X will form ionic compounds because it is a metal, and the radicals are of non-metals.

