

MOTION

2X Learning Experience

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CLASS X
SAMPLE PAPER - 2
SCIENCE



MOTION

Class X Session 2025-26 Subject - Science Sample Question Paper - 02

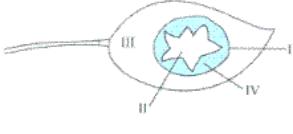
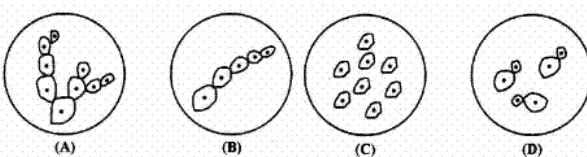
Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

Section A

1. Sex determination depends upon the environment in [1]
 - a) Reptiles
 - b) Birds
 - c) Amphibians
 - d) Fishes
2. The genotype for the height of an organism is Tt . What conclusion may be drawn from this? [1]
 - a) There is one allele for height with two different forms.
 - b) There are at least two different alleles for the gene for height.
 - c) There are two different genes for height, each having a single allele.
 - d) The allele for height has at least two different genes.
3. A star-shaped black paper was used to cover a leaf in a destarched plant as shown below. The plant was left in sunlight for four hours and then the leaf was plucked, black paper removed and tested for the presence of starch. The areas which turned blue-black when iodine solution was added were [1]
 - a) only II
 - b) I, II, III, IV
 - c) I, III, IV
 - d) only IV
4. The following are the sketches made by some students. The sketch not illustrative of budding in yeast is : [1]
 - a) C
 - b) B
 - c) A
 - d) D
5. Use of high temperature for waste disposal is called _____. [1]
 - a) Composting
 - b) Incineration

c) Landfilling

d) Recycling

6. Which of the following is incorrect about self-pollination: [1]

- A. The genetic drifts of the breed can be removed
- B. New varieties cannot be obtained by self-pollination
- C. Repeated self-pollination leads to loss of vigour and vitality of species
- D. It helps to preserve the parental characters

a) (B)

b) (A)

c) (C)

d) (D)

7. Spinal cord originates from: [1]

a) cerebellum

b) pons

c) medulla

d) cerebrum

8. **Assertion (A):** When pea plants (pureline) having round yellow seeds are crossed with pureline plants having wrinkled green seeds, then all pea plants obtained in F₁ generation bear wrinkled green seeds. [1]

Reason (R): Round and yellow seeds are dominant to wrinkled and green seeds.

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 true but R is false.

d) A is false but R is true.

9. **Assertion (A):** Our body maintains blood sugar levels. [1]

Reason (R): Pancreas secretes insulin which helps to regulate blood sugar levels in the body.

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 true but R is false.

d) A is false but R is true.

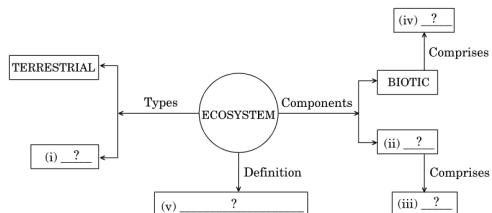
10. i. Why does a kitchen garden called an artificial ecosystem while a forest is considered to be a natural ecosystem? [2]

ii. While designing an artificial ecosystem at home, write any two things to be kept in mind to convert it into a self-sustaining system. Give reason to justify your answer.

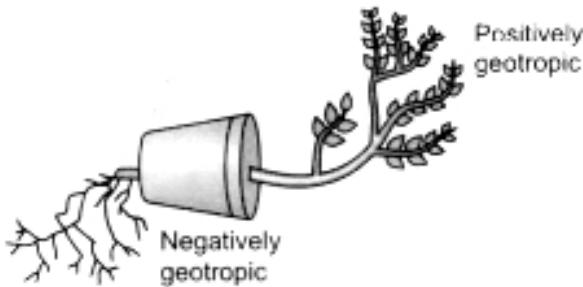
11. Why is damage to the ozone layer a cause for concern? What steps are being taken to limit this damage? [2]

OR

Complete the following flow chart based on ecosystem and its components.



12. Modify the diagram below by changing the wrong words. [2]



13. Differentiate between binary fission and multiple fission giving one example for each. [3]

14. A portion of destarched leaf of a potted plant was covered with a black strip of paper. The plant was exposed to sunlight for six hours and then tested for starch. What will be the observation? [3]

15. **Read the following text carefully and answer the questions that follow:** [4]

Nutrition is the process of taking food by an organism and the utilization of food for energy. This is a vital process that helps living beings obtain their energy from various sources.

Nutrients are substances that provide nutrition.

The mode of nutrition varies from one species to another. Plants do photosynthesis to prepare their own food.

Animals depend on plants for food.



- What do you understand by nutrition? (1)
- Mention how organisms like bread moulds and mushrooms obtain their food. (1)
- What do you understand by autotrophic nutrition? (2)

OR

What is common for Cuscuta, ticks, and leeches? (2)

16. Mita observed that her grandmother was preparing a family tree. On enquiring why it was done, she explained that it was necessary to know our roots as we have inherited many traits from our ancestors. She also mentioned that now everybody wants to live in a nuclear family and joint families have disappeared. Read the given passage and answer the following questions: [5]

- Name the mammal with whom human shows maximum similarity in terms of evolutionary?
- Mita has hazel colored eyes which match with her mother's eyes. Suggest a reason for this similarity in eye color between Mita and her mother.
- What values do you think children would learn in a joint family?

OR

- Name the disorder which a person is likely to suffer from due to the following:

- Over-secretion of growth hormone
- Deficiency of oestrogen in females
- Less secretion of thyroxine

Also name the gland that secretes each of the hormones mentioned above.

- How is the timing and amount of hormone released regulated? Explain with the help of an example.

Section B

17. Which of the following statements are correct?

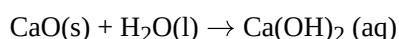
[1]

- A. Chemical name of bleaching powder is calcium oxychloride.
- B. Bleaching powder is used for sterilization of drinking water.
- C. Bleaching powder is alkaline in nature hence it is used as antacid.
- D. Bleaching powder is manufactured by Hasen Clever process.

- a) All of these
- b) A, B and D
- c) A and C
- d) B and C

18. Calcium oxide reacts vigorously with water to produce slaked lime.

[1]



This reaction can be classified as :

- A. Combination reaction
- B. Exothermic reaction
- C. Endothermic reaction
- D. Oxidation reaction

Which of the following is the correct option?

- a) C and D
- b) A, C and D
- c) A and C
- d) A and B

19. The name and formula of third member of homologous series of alkyne is:

[1]

- a) Butyne C_4H_8
- b) Propyne C_3H_6
- c) Butyne C_4H_6
- d) Propyne C_3H_4

20. Match the following with the correct response:

[1]

(1) Soap	(A) Sodium salts of long-chain of sulphonic acids
(2) Detergents	(B) Esterification
(3) The reaction of CH_3COOH with metal hydroxides	(C) Neutralization
(4) The reaction of CH_3COOH with alcohols	(D) Sodium salts of long-chain fatty acids

- a) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
- b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
- c) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
- d) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

21. Which element is stored in water and which element is stored in kerosene?

[1]

- a) Calcium and phosphorus respectively
- b) Sodium and phosphorus respectively
- c) Phosphorus and sodium respectively
- d) Magnesium and sodium respectively

22. Which of the following statements are correct regarding isomers?

[1]

- I. Isomers have same structural formula.
- II. Isomers have same molecular formula.
- III. Isomers have same chemical properties.
- IV. The compound C_3H_8 has no isomers.

- a) II and IV only
- b) I, III and IV only

and reduce

Section C

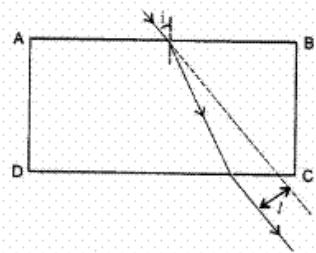
circuit and a voltmeter is connected in line

circuit and a voltmeter is connected in parallel

c) An ammeter has a high resistance

d) A voltage has a low resistance

31. A student traces the path of a ray of light passing through a rectangular glass slab for three different values of angle of incidence (i) namely 30° , 45° , 60° . He produces the incident ray and measures the perpendicular distance, l , between the produced incident ray and the emergent ray. [1]



He will observe that

- a) 'l' keeps on decreasing with increase in angle of incidence.
- b) 'l' is maximum for $\angle i = 45^\circ$ and is less than this value both for $\angle i = 30^\circ$ and for $\angle i = 60^\circ$.
- c) 'l' remains the same for all three angles of incidence.
- d) 'l' keeps on increasing with increase in angle of incidence.

32. **Assertion (A):** The human eye is one of the most valuable and sensitive sense organs. [1]
Reason (R): Eye enables us to see the wonderful world and the colours around us.

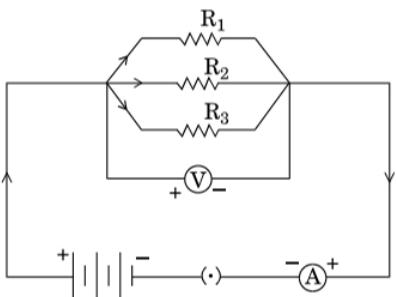
- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.

33. A student wound an insulated copper wire around a soft iron rod. He then connected one end to the rheostat and the other free end to the battery via a key. He closed the key and observes the deflection in the magnetic needle placed nearby. Now he altered the current using by reversing the connections of the battery and again noted the change in the deflection of the needle.

- i. Why do the student performed this activity?
- ii. What did the student observe?
- iii. Comment on the statement **a material in the middle of a current carrying coil gets magnetised.**

34. In the circuit given below, the resistors R_1 , R_2 and R_3 have the values $10\ \Omega$, $20\ \Omega$ and $30\ \Omega$ respectively, which have been connected to a battery of 12 V . Calculate [2]

- a. the current through each resistor,
- b. the total circuit resistance, and
- c. the total current in the circuit.



OR

The rest position of the needles in a milliammeter and voltmeter, not in use, are as shown in Figure A. When a student uses these instruments in his experiment, the readings of the needles are in the positions shown in Figure B. Determine the correct values of current and voltage the student should use in his calculations.

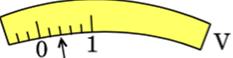
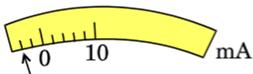


Figure A

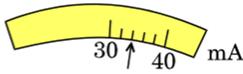


Figure B

35. Find the focal length of a lens of power -2.0 D . What type of lens is this? [3]

36. 1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. [3]
 2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye.
 A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact.
 If you are asked to participate in this mission how would you contribute in this noble cause?
 1. State the objective of organising such campaigns.
 2. List two arguments which you would give to motivate the people to donate their eyes after death.
 3. List two values which are developed in the persons who actively participate and contribute in such programme.

37. One-half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? [3]
 Verify your answer experimentally. Explain your observations.

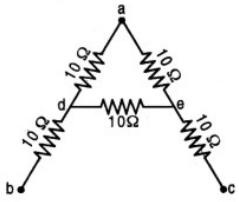
38. **Read the following text carefully and answer the questions that follow:** [4]
 A student fixes a sheet of white paper on a drawing board using some adhesive materials. She places a bar magnet in the centre of it and sprinkles some iron filings uniformly around the bar magnet using a salt sprinkler. On tapping the board gently, she observes that the iron filings have arranged themselves in a particular pattern.
 i. What makes iron filings arrange in a definite pattern?
 ii. Draw a diagram to show this pattern of iron filings.
 iii. How is the direction of magnetic field at a point determined using the field lines? Why do two magnetic field lines not cross each other?

OR

How are the magnetic field lines of a bar magnet drawn using a small compass needle? Draw one magnetic field line each on both sides of the magnet.

39. A letter 'A' consists of a uniform wire of resistance 1 ohm cm^{-1} . The side of the letter are each 20 cm long and the cross-piece in the middle is 10 cm long while apex angle is 60° . Find the resistance of the letter between the [5]

two ends of the legs.



OR

- a. Define Power and state its SI unit.
- b. A torch bulb is rated 5 V and 500 mA. Calculate its
 - i. Power
 - ii. Resistances
 - iii. Energy consumed when it is lighted for $2\frac{1}{2}$ hours.



Solution

Section A

1. (a) Reptiles

Explanation:

Reptiles

2.

(b) There are at least two different alleles for the gene for height.

Explanation:

Genotype is the genetic composition of an organism, i.e., the combination of alleles it possesses. Every character in an organism is controlled by a gene that has at least two alleles that lie on the two homologous chromosomes at the same locus. These alleles may represent the same (homozygous, e.g., TT for height) or alternate expressions (heterozygous, e.g., Tt) of the same character. Thus, if genotype for the height of an organism is Tt, this means there are at least two different alleles for the gene for height, one is T and the other is t.

3.

(c) I, III, IV

Explanation:

Photosynthesis takes place in the uncovered part which turns blue black when tested with iodine.

4. (a) C

Explanation:

Buds appear as protuberance. In C all the cells are separate and single.

5.

(b) Incineration

Explanation:

Incineration is the process of burning substances under aerobic conditions at high temperature (usually more than 1000°C) in a closed unit called incinerator.

6.

(b) (A)

Explanation:

Genetic drift cannot be removed by self pollination.

7.

(c) medulla

Explanation:

The brain is divided into three regions (i) Forebrain (ii) Midbrain and (iii) Hindbrain. The forebrain is the largest part of the brain. It is the main thinking region. It is made up of cerebrum, hypothalamus, and thalamus. The midbrain does not have any further divisions. The hindbrain consists of the cerebellum, pons, and medulla. The spinal cord is a cylindrical structure that begins in continuation with the medulla and extends downwards within the vertebral column from the medulla oblongata to the number region.

8.

(d) A is false but R is true.

Explanation:

When pureline pea plants having round yellow seeds are crossed with that of wrinkled green seeds then plant obtained in F₁ are all with round yellow seeds as round yellow seeds are dominant to wrinkled green seeds.

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

Explanation:

The pancreas secretes insulin which helps to regulate blood sugar levels in the body. If the sugar level in the blood rises, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

10. i. The kitchen garden is known as an artificial ecosystem because they are manmade where specific biotic and abiotic elements are utilized. A kitchen garden is an ecosystem where the plants such as rice, wheat, vegetables, etc. are cultivated. Farmers operate the relationship between the abiotic factors and producers
 ii. When designing an artificial ecosystem at home, there are two important things that need to be kept in mind to convert it into a self-sustaining system: Balance between biotic and abiotic factors and Recycling of nutrients and waste.

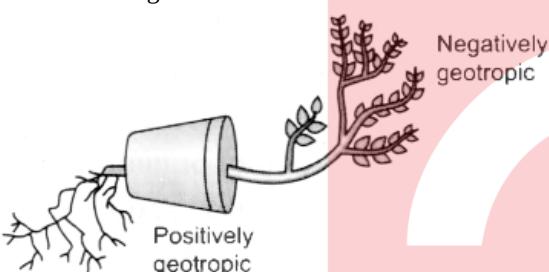
11. Ozone layer acts as a protective shield against the harmful Ultraviolet rays of the sun. Depletion of ozone layer leads to exposure to Ultraviolet rays & due to this the incidences of cancer, cataract are on rise. Also the uv rays damage the immune system of human beings.

In 1987, United Nations Environment Programme (UNEP) succeeded in forging an agreement between nations to freeze chlorofluorocarbons (CFCs) production to 1986 levels. CFCs are the main cause of ozone layer depletion.

OR

- i. aquatic
- ii. abiotic
- iii. non living organisms
- iv. living organisms
- v. Ecosystem is a system, or a group of interconnected elements, formed by the interaction of a community of organisms with their environment.

12. The correct diagram is shown below:



13.	Binary fission	Multiple fission
	A parent cell is present which on cytokinesis forms 2 daughter cells.	A parent cell is present which forms multiple daughter cells.
	It undergoes cytokinesis.	It undergoes multiple divisions to form many daughter cells.
	Occurs during favorable conditions.	Occurs during unfavorable conditions.
	most common form of reproduction in prokaryotes.	most common form of reproduction in Protists and parasitic species.
	both cytoplasm and nucleus divide together	the nucleus divides first and is surrounded by cytoplasm whose division occurs in the later stage.
	Example: Bacteria, Amoeba, etc.	Example: Plasmodium, Algae, etc.

14. The leaf turns blue-black except in the covered region. As this covered region did not receive light, photosynthesis did not occur. Hence no starch was formed there. The uncovered region received light and starch was formed there due to photosynthesis.

15. i. **Nutrition** is the process of taking food by an organism and the utilization of food for energy.
 ii. Organisms like bread moulds and mushrooms break down the food materials outside the body and then absorb them.
 Mushroom has a **saprophytic** mode of nutrition.
 iii. Plants are autotrophs and they have an autotrophic mode of nutrition. They perform photosynthesis to prepare their own food.
 Animals depend on plants for food.

OR

The Cuscuta, ticks, and leeches all are Parasites. A parasite receives its food from the host but gives no benefit to the host in return. The host may be a plant or animal.

16. i. Chimpanzee is the mammal which shows maximum similarity with the human.
- ii. The reason for the same eye color of Mita and her mother is the gene for hazel eye color which inherited to Mita from her mother.
- iii. Sharing and caring, respect for elders and concern for others are the values learned in a joint family.

OR

- i. I. Over-secretion of growth hormone - gigantism and growth hormones is secreted by anterior pituitary gland.
II. Deficiency of estrogen in females caused female hypogonadism. It is secreted from ovaries.
III. Less secretion of thyroxine caused hypothyroidism. It is secreted thyroid gland.
- ii. In humans, the timing and amount of hormone secretion are regulated by the feedback mechanism by the end product. For example, the pancreas is triggered to release the insulin when the positive feedback is given by the increase of sugar level in blood.

Section B

17. **(b)** A, B and D

Explanation:
Formula for bleaching powder is CaOCl_2 . It has chlorine available which acts as a disinfectant. It cannot be used as an antacid because it is non-edible. Hans Clever is the most economical method of manufacturing bleaching powder.

18. **(d)** A and B

Explanation:
 $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2 \text{ (aq)}$
A combination reaction is a reaction where two or more elements or compounds combine to form a single compound. Calcium oxide combines with water to form calcium hydroxide. Hence, it is a combination reaction.
It is an exothermic reaction as a lot of heat liberate with hissing sound during the reaction.

19. **(c)** Butyne C_4H_6

Explanation:
Butyne C_4H_6

20. **(a)** (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

Explanation:

- Soaps are sodium or potassium salts of long-chain fatty acids.
- Detergents are sodium salts of a long chain of sulphonic acids.
- The reaction of acetic acid with metal hydroxides is a neutralization reaction.
$$\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$$
- The reaction in which a carboxylic acid combines with an alcohol to form an ester is called esterification. When acetic acid CH_3COOH reacts with alcohol, an ester is formed along with water.
$$\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$$

21. **(c)** Phosphorus and sodium respectively

Explanation:
Phosphorus and sodium are highly reactive at room temperature. Phosphorus is stored underwater. Sodium reacts with water, hence it is stored under kerosene.

22. **(a)** II and IV only

Explanation:

Isomers have same molecular formula but different structural formulae. Isomers have different physical and chemical properties.

23. (a) orange, blue

Explanation:

The colour of pH paper is orange in acidic medium, i.e. in oxalic acid while it is blue in basic medium, i.e. in sodium carbonate solution.

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

Explanation:

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

25. By cleaning the mouth after eating food. Using toothpastes, which are generally basic because they can neutralize the excess of acid and prevent tooth decay.

26. i. Covalent bond: The bond formed by equal contribution and mutual sharing of electrons between two atoms so that both the atoms acquire the stable nearest noble gas configuration i.e. get their octet complete is called covalent bond.

The mutually shared electrons become the common property of both the bonded atoms.

The number of electrons contributed by an atom of the element for mutual sharing during the formation of a covalent bond is called its covalency.

Each pair of shared electrons is represented by putting a single line (—) between two atoms.

In the example given below :

Element	At no.	Electronic configuration
H	1	1
C	6	2,4
O	8	2, 6
N	7	2, 5

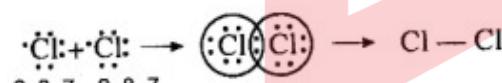
Examples,

a. Formation of a hydrogen molecule(H_2): At no. of hydrogen = 1. It has one electron in the first orbit. When two hydrogen atoms approach each other they share their single electron present in their first orbits. Each hydrogen atom can now be thought of as having noble gas configuration of helium. It may be represented as:



Formation of H_2 molecule

b. Formation of chlorine molecule. Two chlorine atoms combine with each other to form a molecule of chlorine. In this case, both the atoms have seven electrons in their outermost shell and they contribute one electron each to form a covalent bond. Thus, both the chlorine atoms acquire noble gas configuration of argon. This may be depicted as:



Formation of Cl_2 molecule

c. Formation of HCl molecule. A covalent bond is formed not only between similar atoms but it may be formed between dissimilar atoms also. For example, hydrogen and chlorine form a covalent bond between their atoms. Hydrogen atom has only one electron and chlorine atom has seven electrons in its valence shell. Therefore, by mutual sharing of electron pair between a hydrogen and a chlorine atom both the atoms acquire nearest noble gas configuration. Hydrogen atom acquires electronic configuration of helium whereas chlorine atom gets electronic configuration of argon.

ii. **The important characteristics of covalent compounds are as follows :**

a. Covalent compounds consist of molecules. Covalent compounds do not have any ions. Therefore, they consist of molecules. For example, H_2 , Cl_2 , H_2O , NH_3 etc.

b. Covalent compounds are liquids or gases in nature. We have studied that the ionic compounds are crystalline solids. But only a few covalent compounds are solids (e.g. sugar, glucose, iodine). These are mostly liquids (water, ethyl alcohol) or gases (oxygen, hydrogen, ammonia) at room temperature. Actually, the attractive forces in covalent molecules are weak and these molecules are not as close to one another as the ionic solids.

- c. Covalent compounds have low melting and boiling points. As covalent molecules do not have ions, the attractive forces among them are weak. Therefore, the covalent molecules can be easily separated from each other. In other words, they have low melting and boiling points.
- d. Covalent compounds do not conduct electricity. Covalent compounds normally do not conduct electricity. Some of them are poor conductors of electricity. The current is carried by the ions. As covalent compounds do not have ions, these are poor conductors of electricity.
- e. Covalent compounds are insoluble in water. Covalent compounds generally do not dissolve in water. They are soluble in alcohol, ether, benzene etc. which are called organic solvents. However some of them such as ammonia and ethyl alcohol are water soluble.

OR

- i. The carbon compounds are being increasingly used as a source of energy, as medicines, colours, textiles, plastics, food preservatives etc. Wood contains carbon in the form of cellulose. Plastic contains carbon in long chains called polymers. Steel contains carbon sandwiched between Iron molecules. Graphite is pure carbon. Diamonds are pure carbon (in a different crystalline structure than graphite).
- ii. $\text{:O:: C :: O:} [\text{CO}_2]$

The carbon and oxygen atoms are linked by two covalent bonds.

27. Aluminium develops a thin oxide layer when exposed to air. This aluminium oxide coat makes it resistant to further corrosion. The resistance can be improved further by making the oxide layer thicker. This process is called anodising.

During anodising, a clean aluminium article is made the anode and is electrolysed with dilute sulphuric acid. The oxygen gas evolved at the anode reacts with aluminium to make a thicker protective oxide layer. This oxide layer can be dyed easily to give aluminium articles an attractive finish.

28. a. Acid - HCl, Base - NaOH

b. Cation Ca^{2+} Anion SO_4^{2-} ,

c. Salts having same cations but different anions belong to the same family of salts. e.g. sodium chloride (NaCl) and Washing Soda/sodium carbonate (Na_2CO_3) both have Na^+ as cation.

OR

A scale for measuring hydrogen ion (H^+) concentration in a solution is called pH scale.

Potassium Sulphate/ K_2SO_4

$\text{pH} = 7$

29. i. A reactant breaks down to give two or more products. A reaction which requires energy to split a compound or reactant in two or more simple substances.

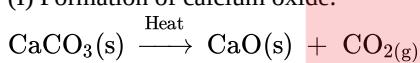
(I) Water splits into hydrogen gas and oxygen gas.

Electrical energy

(II) Silver bromide decomposes into silver and bromine

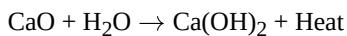
Light energy

ii. (I) Formation of calcium oxide:



It is an endothermic reaction/decomposition reaction.

(II) Formation of calcium hydroxide:

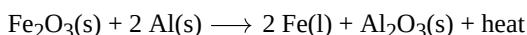


It is exothermic/combination reaction

OR

a. The thermite process, also known as the thermite reaction or thermit process, is a type of exothermic reaction in which a metal oxide reacts with a more reactive metal to produce molten metal and a metal oxide as the byproduct. This reaction is highly exothermic and is often used for welding or in pyrotechnic displays. In thermite reaction, iron oxide reacts with aluminium to produce molten iron.

The following reaction of iron oxide with aluminium as:



This is used to join railway tracks or cracked machine parts because the amount of heat evolved is so large that the metal is produced in the molten state.

b. The reactivity series of metals as: K > Na > Ca > Mg > Al > C > Zn > Fe > Sn > Pb

As aluminium is more reactive than iron so it is placed above iron in the reactivity series.

c. In this process, aluminium is getting oxidised to aluminium oxide and iron oxide is getting reduced to iron.

Section C

30.

(b) An ammeter is connected in series in a circuit and a voltmeter is connected in parallel

Explanation:

An ammeter is connected in series in a circuit and a voltmeter is connected in parallel

31.

(d) 'l' keeps on increasing with increase in angle of incidence.

Explanation:

$l \propto \sin(i - r)$ where r is the angle of refraction.

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

Explanation:

We know that human eye is the most valuable sense organ because it enables us to see this colourful world. Thus, the given reason is correct explanation of the assertion.

33. i. The student conducted this activity to make an electromagnet.

ii. The electrical current flowing through a coil will create a uniform magnetic field. This magnetic field causes the needle to turn. Reversing, the connections to the battery, reverses the direction of the current flow and the needle will point in the opposite direction.

iii. When an iron rod is placed along the axis of a current carrying coil, it gets magnetised under the influence of the magnetic field produced by the coil through induction. But this magnetism lasts as long as the current supply is not withdrawn.

34. Given: $R_1 = 10 \Omega$; $R_2 = 20 \Omega$; $R_3 = 30 \Omega$

According to Ohm's law,

$$V = IR$$

Given $V = 12 \text{ V}$

a. Current through resistor R_1 :

$$I_1 = \frac{V}{R_1} = \frac{12}{10} = 1.2 \text{ A}$$

Current through resistor R_2 :

$$I_2 = \frac{V}{R_2} = \frac{12}{20} = 0.6 \text{ A}$$

Current through resistor R_3 :

$$I_3 = \frac{V}{R_3} = \frac{12}{30} = 0.4 \text{ A}$$

b. Total circuit resistance, R

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R} = \frac{1}{10} + \frac{1}{20} + \frac{1}{30}$$

$$\frac{1}{R} = \frac{11}{60}$$

$$R = \frac{60}{11} = 5.45 \Omega$$

c. The total current in the circuit is $I = I_1 + I_2 + I_3$

$$= 1.2 + 0.6 + 0.4 = 2.2 \text{ A}$$

OR

The correct values of current and voltage the student should use in his calculations are 38 mA, 3.2 V

35.

$$f = \frac{1}{P} = \frac{1}{-2} = -0.5 \text{ m}$$

$$f = -0.5 \text{ m} = -50 \text{ cm}$$

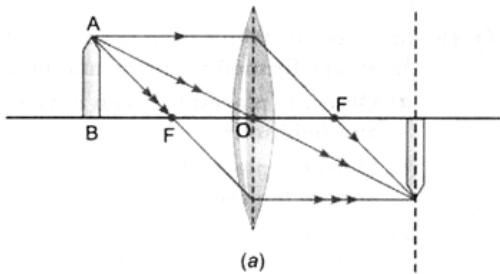
Lens is divergent or say concave.

36. 1. Functions of following parts of human eye are given below :

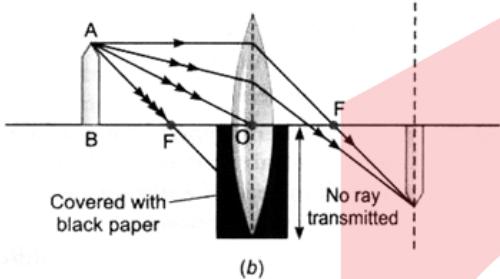
1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.

2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
3. Crystalline lens - It helps to focus light on retina for image formation.
4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.

2. 1. The objective of organising such campaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.
2. 1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.
2. As eye is one of the most valuable sense organs through which an individual can achieve so many things in his/her life, so try to realise the situation that these people are suffering from.
3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.



37.



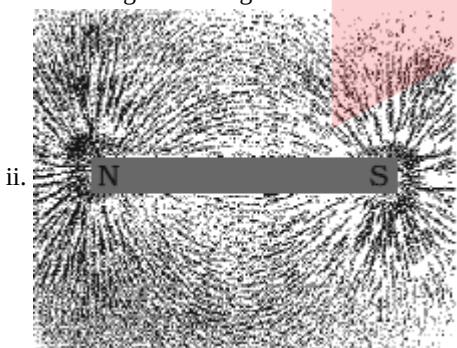
Yes, even when one-half of a convex lens is covered with a black paper, the lens will produce a complete image.

Take a live candle, keep it in front of a convex lens mounted on an optical bench.

Move the candle along the axis of bench and take its full image on a screen. Now cover the lower half of lens with a black paper without changing the positions of candle, lens and screen.

You will observe that full image of candle is still seen on the screen, but the intensity of image is reduced. The reason is that a large number of rays incident on the lens are blocked. In the case of covered lower half of lens with black paper, the rays that are emerging from candle and incident on lens are refracted from upper part only and form the full image.

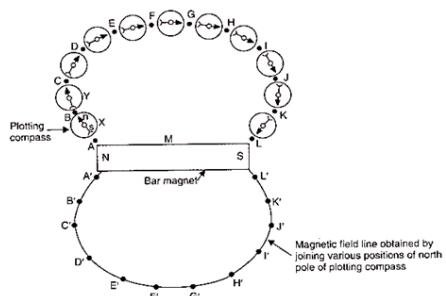
38. i. The bar magnet kept at the centre of board has its magnetic field around it. The iron filings sprinkled on the board experience a force on them due to the magnetic field of bar magnet. So, when the student taps the board the iron filings align themselves according to the magnetic field lines of the bar magnet.



- ii. iii. The direction of a magnetic field at a point is determined by placing a small compass needle. The N - pole of compass indicates the direction of magnetic field at that point.

Two magnetic field lines do not intersect each other because if there was point of intersection, The compass needle would point towards 2 directions.

OR



39. The arrangement of resistance is shown in fig. (a) and its equivalent circuit is shown in fig (b).

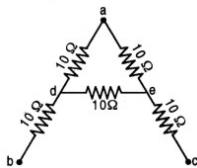


Fig. (a)

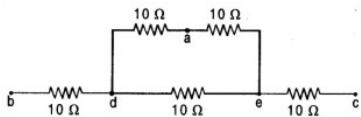


Fig. (b)

Since the wire has a resistance of $1\Omega\text{cm}^{-1}$, the resistance of cross-piece de is 10Ω . Since apex angle is 60° and the cross-piece is 10 cm. long, the ends d and e of the cross-piece must be the mid-point of the legs ab and ac so that ade becomes an equilateral triangle.

As it is clear from the fig. da and ae are in series. Therefore, resistance of the combination of da and ae $= 10 + 10 = 20\Omega$. This 20Ω resistance is parallel to de.

\therefore Effective resistance r of the portion daed is given by

$$\frac{1}{r} = \frac{1}{10} + \frac{1}{20} = \frac{2+1}{20} = \frac{3}{20} \text{ or } r = \frac{20}{3}$$

Now bd and ec are in series with the resistance of portion daed.

$$\therefore \text{Resistance between } b \text{ and } c = 10 + \frac{20}{3} + 10 = \frac{80}{3} = 26.67\Omega$$

OR

a. Power is defined as rate of doing work/ rate at which energy is consumed/ rate at which electric energy is dissipated in an electric circuit. In simpler terms, it measures how quickly energy is converted from one form to another or how quickly work is done.

S.I unit of Power is watt

$$\begin{aligned} \text{i. } P &= VI \\ &= 5 \text{ volt} \times 500 \text{ mA} \\ &= 5 \text{ volt} \times \frac{500}{1000} \text{ A} \\ &= 2.5 \text{ watt} \end{aligned}$$

$$\begin{aligned} \text{ii. } P &= \frac{V^2}{R} \\ \text{or } R &= \frac{5 \text{ volt} \times 5 \text{ volt}}{2.5 \text{ watt}} \\ R &= \frac{250}{25} = 10\Omega \end{aligned}$$

iii. Energy Consumed = Power \times Time

$$\begin{aligned} &= 2.5 \text{ W} \times 2.5 \text{ h} \\ &= 6.25 \text{ Wh} \end{aligned}$$

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