

# UNIQUE **STUDY** POINT

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## **Class 10 - Science** **Sample Paper - 04 (2022-23)**

**Maximum Marks: 80**

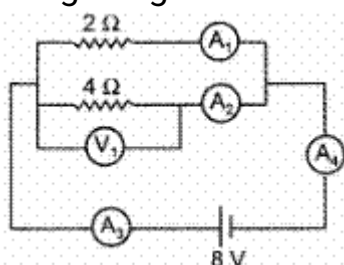
**Time Allowed: : 3 hours**

### **General Instructions:**

- This question paper consists of 39 questions in 5 sections.
- 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 consists of 20 objective type questions carrying 1 mark each.
- Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
- Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
- Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
- Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts

### **Section A**

- Using the given circuit with ammeter and voltmeter answer the question.



The current indicated by  $A_3$  is :

- 6A
  - 2A
  - 1A
  - 4A
- A cross between a tall plant (TT) and short pea plant (tt) resulted in progeny that were all tall plants because
    - height of pea plant is not governed by gene 'T' or 't'
    - tallness is the recessive trait

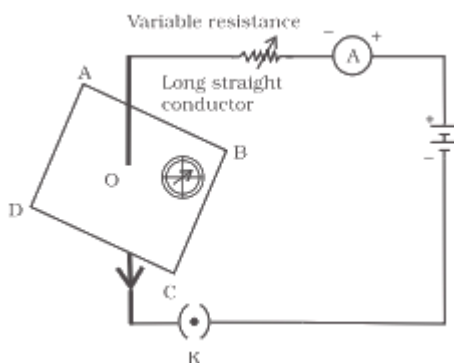
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- c) shortness is the dominant trait  
d) tallness is the dominant trait
3. Which part of alimentary canal receives bile from the liver?  
a) Stomach  
b) Small intestine  
c) Large intestine  
d) Oesophagus
4. If the key in the arrangement (Figure) is taken out (the circuit is made open) and magnetic field lines are drawn over the horizontal plane ABCD, the lines are



- a) concentric circles near the point O but of elliptical shapes as we go away from it  
b) straight lines parallel to each other  
c) concentric circles  
d) elliptical in shape
5. Galvanisation process involves elements of zinc and iron. Which of the two metals is sacrificing its life to save the life of the other?  
a) None of these  
b) Both sacrifice each other's life  
c) Zn  
d) Fe
6. The first member of alkyne homologous series is  
a) ethene  
b) ethyne  
c) propyne  
d) methane
7. Which among the following is not a base?  
a) NaOH  
b) C<sub>2</sub>H<sub>5</sub> OH  
c) KOH  
d) NH<sub>4</sub>OH
8. Length of pollen tube depends on the distance between  
a) pollen grain and upper surface of stigma  
b) upper surface of stigma and lower part of style  
c) pollen grain in anther and upper surface of stigma  
d) pollen grain on upper surface of stigma and ovule

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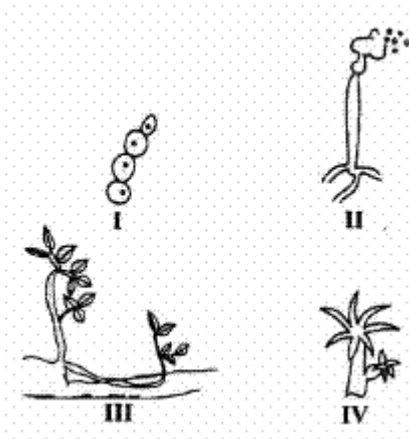
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9. A student was given three samples containing ethanoic acid, sodium bicarbonate solution and water in test tubes I, II and III, respectively. On dipping a pH paper in them, he observed that the colour turned orange in I, blue in II and green in III. If arranged in increasing order of their pH, the sequence of these bottles would be
- I, III, II
  - I, II, III
  - III, I, II
  - II, III, I

10. Two of the following four figures that illustrate budding are



- I and III
  - II and IV
  - I and IV
  - I and II
11. In human males, all the chromosomes are paired perfectly except one. This/these unpaired chromosome is/are
- large chromosome
  - small chromosome
  - Y-chromosome
  - X-chromosome
- (iii) and (iv)
  - (i) and (ii)
  - (ii) and (iv)
  - (iii) only
12. When more than one resistors are in series, the quantity that remains same in them is
- Potential difference
  - Ammeter
  - Resistance
  - Current

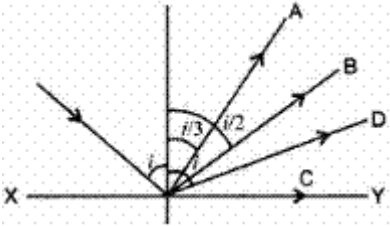
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13. On regular reflection from the surface XY, the reflected ray will go along:



- a) A  
b) D  
c) B  
d) C
14. The ability of metals to be drawn into thin wire is known as  
a) conductivity  
b) malleability  
c) ductility  
d) sonorosity
15. Name the passage that leads bile from the liver into the gall bladder.  
a) Colon  
b) Cystic duct  
c) Caecum  
d) Rectum
16. In Amoeba, binary fission takes place by the following steps. The correct sequence is:
- A. The cellular constriction increases and divides the whole body into equal halves and form two daughter Amoeba.  
B. A constriction appears in the cell membrane and nuclear membrane.  
C. Each daughter Amoeba contains a nucleus surrounded by cytoplasm and cell membrane.  
D. Nuclear constriction increases and divides the nucleus into two daughter nuclei.
- a) B, D, A, C  
b) D, A, B, C  
c) C, D, A, B  
d) A, B, C, D
17. **Assertion (A):** On changing the direction of flow of current through a straight conductor, the direction of a magnetic field around the conductor is reversed.  
**Reason (R):** The direction of magnetic field around a conductor can be given in accordance with left-hand thumb rule.
- 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.

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18. **Assertion (A):** Sodium hydroxide reacts with zinc to produce hydrogen gas.  
**Reason (R):** Acids react with active metals to produce hydrogen gas.
- Both A and R are true and R is the correct explanation of A.
  - Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.
19. **Assertion (A):** Males have more stature than females during puberty.  
**Reason (R):** This is because of presence of thyroxin in the blood of females.
- Both A and R are true and R is the correct explanation of A.
  - Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.
20. **Assertion (A):** A network of food chains existing together in an ecosystem is known as food web.  
**Reason (R):** An animal like a kite cannot be a part of a food web.
- Both A and R are true and R is the correct explanation of A.
  - Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.

### Section B

21. Ethyl ethanoate smells like pears and is used for flavouring sweets.
- Write the chemical formula of ethyl ethanoate.
  - Write the chemical reaction between ethanoic acid and ethanol in the presence of concentrated sulphuric acid.
  - Suggest the function of concentrated sulphuric acid in the reaction.

OR

Hydrocarbons X and Y have melting points  $-190^{\circ}\text{C}$  and  $-90^{\circ}\text{C}$ , respectively. Which one of these has minimum carbon in the molecule and why?

22. List the function of testosterone and estrogen. Where are they secreted?
23. State 10% law. Explain with an example how energy flows through different trophic levels.
24. Consider the following food chains-
- Plants  $\rightarrow$  Mice  $\rightarrow$  Snakes  $\rightarrow$  Hawks
  - Plants  $\rightarrow$  Mice  $\rightarrow$  Hawks

If energy available at the producer level in both the food chains is 100J. In which case will hawks get more energy and how much & Why?

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25. A concave mirror produces three times magnified real image of an object placed at 10 cm in front of it. Where is the image located ?

**OR**

A spherical mirror produces an image of magnification -1 on a screen placed at a distance of 50 cm from the mirror.

- i. Write the type of mirror.
  - ii. Find the distance of the image from the object.
  - iii. What is the focal length of the mirror?
  - iv. Draw the ray diagram to show the image formation in this case.
26. Somya and her younger sister were playing while their mother was washing clothes. Somya a grade 7 student saw her mother scrubbing the clothes with a brush and sometimes beating it with the paddle, she was a bit worried that her clothes will be damaged and will not look good, she tried to stop her mother, but her mother explained her that beating of clothes cleaned them properly, as all the dirt are removed. She smiled as now she understood that her mother cares for her.
- i. According to you, why usually after adding the soaps, people 'beat' the clothes with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?
  - ii. What kind of values does Somya's mother possess?

### Section C

27. A student adds water to a substance X taken in beaker. He feels the beaker turning hot and a hissing sound is produced. Why does this happen? Write a chemical equation for the reaction. State the type of this reaction.
28. "A concave mirror of focal length  $f$  can form a magnified, erect as well as an inverted image of an object placed in front of it." Justify this statement stating the position of object with respect to the mirror in each case for obtaining these images.
29. It is a well-known fact that pregnant woman's health is the backbone of every family and society.

Read the given passage and answer the following questions:

1. Which tissue is responsible for providing nutrition from mother to growing embryo?
2. According to you, what can be the likely measures to maintain a woman's health during pregnancy?
3. What value will the learners infer from this passage?

**OR**

DNA copies generated during reproduction will be similar but may not be identical to the original. justify this statement.

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30. Why do different rays deviate differently in the prism?
31. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.
32.
  - i. Who provided the evidence of DNA as genetic material?
  - ii. Why DNA is called polynucleotide?
  - iii. List three important features of double helical model of DNA.

**OR**

A study found that children with light-coloured eyes are likely to have parents with light coloured eyes. On this basis, can we say anything about whether the light eye colour trait is dominant or recessive? Why or why not?

33. A student sitting at the back of the classroom cannot read clearly the letters written on the backboard. What advice will a doctor give to her?

### **Section D**

34.
  - i. How is the method of extraction of metals high up in the reactivity series different from that for metals in the middle? Why cannot the same process be applied for them Name and explain the process of extraction of sodium?
  - ii. Draw a labelled diagram of electrolytic refining of copper.

**OR**

- i. List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal.
  - ii. Give reasons for the following:
    - a. Most metals conduct electricity well.
    - b. The reaction of iron (III) oxide [ $\text{Fe}_2\text{O}_3$ ] with heated aluminum is used to join cracked machine parts.
35.
    - i. Why is nutrition necessary for the human body?
    - ii. What causes the movement of food inside the alimentary canal?
    - iii. Why is the small intestine in herbivores longer than in carnivores?
    - iv. What will happen if the mucus is not secreted by the gastric glands?

**OR**

- a. Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

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- b. Draw a diagram of human respiratory system and label - pharynx, trachea, lungs, diaphragm and alveolar sac on it.

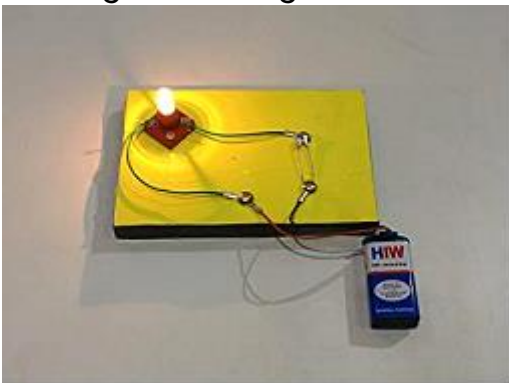
36.

- i. State Fleming's Left-hand rule.
- ii. List three characteristic features of the electric current used in our homes.
- iii. What is a fuse? Why is it called a safety device?
- iv. Why is it necessary to earth metallic electric appliances?

### Section E

37. **Read the text carefully and answer the questions:**

How do we express electric current? Electric current is defined by the amount of charge flowing through a particular area in unit time. In other words, it is the rate of flow of electric charges. In circuits using metallic wires, electrons constitute the flow of charges. However, electrons were not known at the time when the phenomenon of electricity was first observed. So, electric current was considered to be the flow of positive charges and the direction of flow of positive charges was taken to be the direction of electric current. Conventionally, in an electric circuit, the direction of electric current is taken as opposite to the direction of the flow of electrons, which are negative charges.



- i. If a net charge  $Q$ , flows across any cross-section of a conductor in time  $t$ , then the current  $I$ , through the cross-section is given by which formula?
- ii. What is the SI unit of electric charge? It is equivalent to how many numbers of electrons?

**OR**

The electric current is expressed in which unit? Define the unit used to measure electric current.

38. **Read the text carefully and answer the questions:**

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chhui-mui (the 'sensitive' or



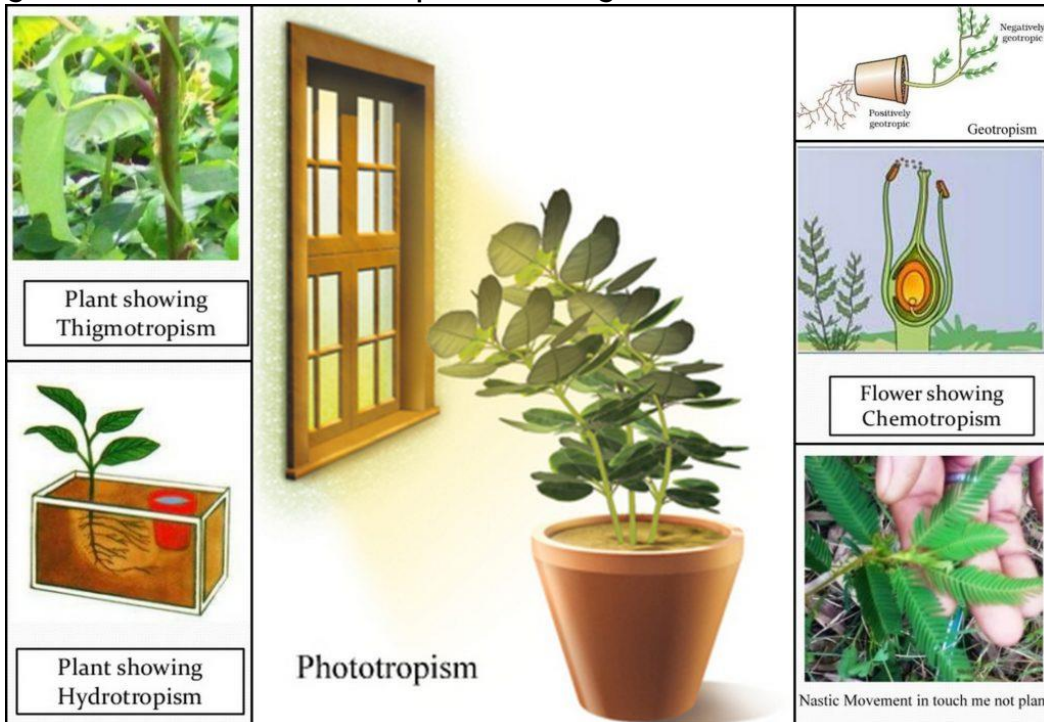
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'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch. There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement. So plants show two different types of movement - one dependent on growth and the other independent of growth.



- Plants neither have nervous system nor muscles, then how does chemical coordination occur in plants?
- Why *Mimosa pudica* leaves drop down when we touched? Write its another name also.
- What is turgor movement?

OR

What is a tropic movement? Explain with an example

39. **Read the text carefully and answer the questions:**

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water

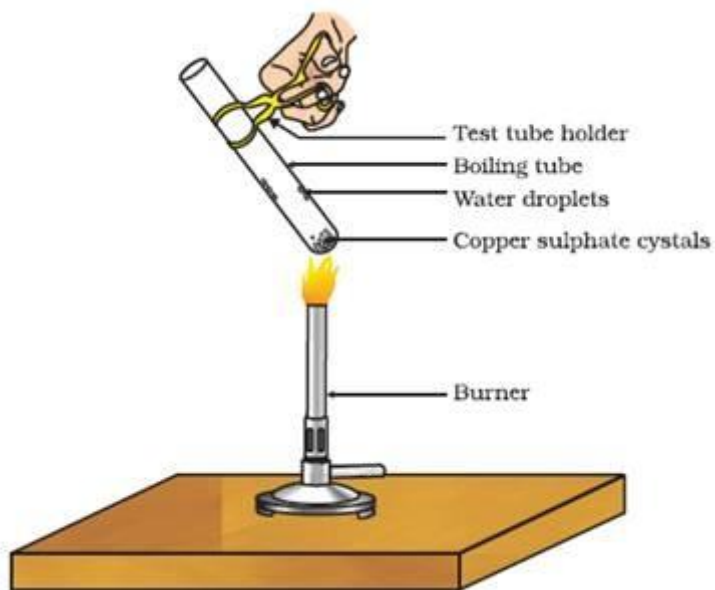
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molecules and became calcium sulphate hemihydrate.



- If the crystal is moistened with water, then which colour of the crystal reappears?
- What is the commercial name of calcium sulphate hemihydrate?
- How many water molecules are present in one formula unit of copper sulphate?

OR

What is obtained when gypsum is heated at 373K?

**Class 10 - Science**  
**Sample Paper - 04 (2022-23)**

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### Solution

#### Section A

1. (a) 6A

**Explanation:**  $I = \frac{V}{R_{eq}} = \frac{8}{(4/3)} = 6 \text{ A}$

2. (d) tallness is the dominant trait

**Explanation:** According to the law of dominance, the character that is expressed in the  $F_1$  generation is called the dominant trait whereas character that is not expressed in  $F_1$  generation is known as recessive trait. Thus, tallness is the dominant trait.

3. (b) Small intestine

**Explanation:** Bile ducts carry bile from the liver and gallbladder through the pancreas. A huge amount of the bile is then released into the **small intestine** duodenum. The remaining bile is stored in the gallbladder. After food consumption, the bile in the

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gallbladder is released to help with digestion and fat absorption.

4. (c) concentric circles

**Explanation:** When the above circuit is open and the magnetic field lines are drawn over the horizontal plane ABCD, then the magnetic field lines will be in the form of concentric circles with center at the axis of the conductor because the circuit is open, there will be no flow of current and therefore there will be no magnetic field due to the conductor. So, at the point, O. Only Earth's magnetic field will be present so the magnetic field lines will be in the form of concentric circles.

5. (c) Zn

**Explanation:**

**Galvanization** is the process of applying a protective coating of zinc to iron to prevent the rusting of iron. The most common method is hot-dip galvanizing, in which steel sections are submerged in a bath of molten zinc.

6. (b) ethyne

**Explanation:** The general formula of alkyne  $C_nH_{2n-2}$  where, n is the number of carbon atoms. The first member of alkyne homologous series is ethyne  $C_2H_2$ .

7. (b)  $C_2H_5OH$

**Explanation:**  $C_2H_5OH$  is not a base it is an alcohol.

8. (d) pollen grain on upper surface of stigma and ovule

**Explanation:** The **length of the pollen tube depends on the distance between the upper surface of the stigma and the ovule.**

9. (b) I, II, III

**Explanation:** Ethanoic acid has the lowest pH and  $NaHCO_3$  has the highest and the pH of water is in between the two. Acids have  $pH < 7$ , Neutral  $pH = 7$ , Basic have  $pH > 7$ .

10. (c) I and IV

**Explanation:** Yeast and Hydra reproduced by budding. A younger growth on the parent organism is seen.

11. (a) (iii) and (iv)

**Explanation:** In human beings, there are 23 pairs of the chromosome, out of which one pair is sex chromosome. In males, there are two types of sex chromosomes-X and Y. In males, all chromosomes are paired except sex chromosomes. Hence, normal-sized X chromosomes and small-sized Y chromosomes are unpaired.

12. (d) Current

**Explanation:** Resistors in series have same current.

13. (b) D

**Explanation:** On regular reflection  $\angle r = \angle i$ .

14. (c) ductility

**Explanation:** The ability of metals to be drawn into the thin wire is called ductility. It is one such property of metals that are used to make wires from metals. Due to high ductility, copper can be drawn into long and thin wires without breaking.

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15. (b) Cystic duct

**Explanation:** Cystic duct leads bile from the liver into the gall bladder.

16. (a) B, D, A, C

**Explanation:** The correct sequence is B, D, A, C.

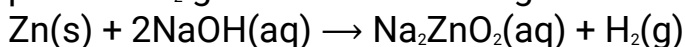
Amoeba is a unicellular organism. They reproduce by fission asexually, different from the human's method. It has a porous cell membrane that encloses the cell organelles and cytoplasm. After replicating its genetic material through mitotic (equal) division, the cell divides into two equal-sized daughter cells. The genetic material is also equally partitioned; therefore the daughter cells are genetically identical to each other and the parent cell. In this process, the nucleus of the Amoeba first divides to form two daughter nuclei by the process of Karyokinesis (a division of cell nucleus). After the nucleus has divided into two, the process of Cytokinesis (a division of the cytoplasm) takes place in which the cytoplasm in the mother cell divides into two daughter cells. This leads to the formation of the two daughter Amoebae cell having a nucleus and its own cell organelles.

17. (c) A is true but R is false.

**Explanation:** A is true but R is false.

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

**Explanation:** Sodium hydroxide is a strong base, reacts with active metal (zinc) to produce H<sub>2</sub> gas. The reaction is given as follows:



19. (c) A is true but R is false.

**Explanation:** Males has more stature than females because of action of male sex hormone called testosterone, which is secreted by testis in males. Testosterone controls the development of secondary sexual characters in males. Thyroxin increases the metabolic rate of the body and maintains BMR.

20. (c) A is true but R is false.

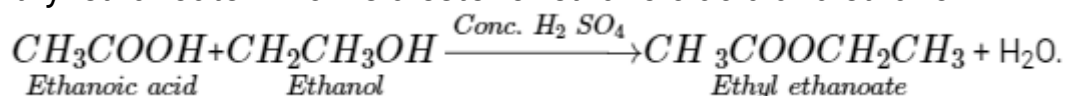
**Explanation:** In the food web different food chains are interconnected. Each chain consists of different trophic levels i.e., producers, consumers and detritivores. So, kite can also be a part of food web.

### Section B

21.

i. CH<sub>3</sub>COOCH<sub>2</sub>CH<sub>3</sub>

ii. Ethyl ethanoate which is a ester of ethanoic acid and ethanol.



The process is called esterification.

iii. Sulphuric acid acts as dehydrating agent, i.e. it removes water formed, otherwise ester formed will get hydrolysed and get converted into acid.

OR

Given, Hydrocarbons X and Y have melting points -190°C and - 90°C, respectively.

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4. We know that, more the number of carbon atoms in hydrocarbon, higher is the melting point.
  5. If there are more number of C-atoms, forces of attraction between molecules increases.
  6. The hydrocarbon X having melting point  $-190^{\circ}\text{C}$  has less number of C-atoms than the hydrocarbon Y having melting point  $-90^{\circ}\text{C}$ .
22. Testosterone is secreted by testis in males - It is responsible for development of male sex organs and secondary sex characteristics like moustache, beard & voice. Estrogen is secreted by ovary in females - it is responsible for development of female sex organs and secondary sex characteristics like mammary gland and uterine growth.
23. Only 10% of the energy entering a particular trophic level of organisms is available for transfer to the next higher trophic level is termed as 10% law. This flow of energy is unidirectional. Green plants capture 1% of energy of the sunlight available to them as food energy by the process of photosynthesis. When taken up by primary consumers, a great deal of energy is lost as heat to the environment and only about 10% of food eaten is turned into its own body and made available next level of consumers. Thus only 10% can be taken as the amount of organic matter present at each step and reaches the next level of consumers.
24. Hawk gets more energy in food chain having three trophic levels.

Plants→	Mice→	Hawks
100j	10j	1j

Plants → Mice → Snakes → Hawks

100 J → 10 J → 1 J → 0.1 J

Energy available to hawk is 1J in the food chain with three trophic levels, but it is 0.1 J in the food chain with four trophic levels. This is due to 10% energy law which states that only 10% energy is available at the next trophic level from the previous level.

25.  $u = -10 \text{ cm}$ . [u is always negative]  
 $v = ?$ ;  $m = -2$  [Real image]

$$m = \frac{-v}{u} \text{ or } -3 = \frac{-v}{10}$$

$$V = -30 \text{ cm}$$

Image will be formed at 30 cm from the mirror on the side of the object.

**OR**

- i. The mirror is concave.
- ii. Given,  $m = -1$ ,  $v = -50\text{cm}$   
 $\therefore$  Magnification,  $m = -v/u$

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$$\Rightarrow -1 = -(-50)/u$$

$$\Rightarrow u = -50\text{cm}$$

So, the distance of image from the object is zero.

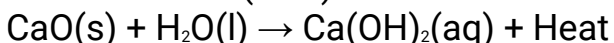
- iii. Here, the image formed is at the centre of curvature and the focus is half the distance of the centre of curvature, therefore,  
 $2f = -50\text{cm} \Rightarrow f = -50/2 \Rightarrow f = -25\text{cm}$
- iv. Object distance = image distance =  $-50\text{cm}$  (minus sign indicates object and image both are in front of mirror)

26.

- i. When a soap solution is made and dirty clothes are soaked in it then micelles formation occurs. This results in the formation of an emulsion (a stable suspension of small droplets of one liquid in another with which it is immiscible). A soap molecule has two parts namely hydrophobic and hydrophilic. With the help of these, it attaches to the grease or dirt particle and forms a cluster called micelle. These micelles remain suspended as a colloid. To remove these micelles (entrapping the dirt), it is either scrubbed mechanically or beaten or agitated in the washing machine.
- ii.
  - a. Caring mother
  - b. Responsible
  - c. Knowledgeable

### Section C

27. Calcium oxide reacts with water to form calcium hydroxide, liberating a large amount of heat. This makes the beaker warm. The substance, X, is therefore, Calcium oxide (CaO).



This is a type of a Combination reaction.

28. When an object is placed between Focus and Pole of concave mirror, the image formed is virtual, magnified, erect and behind the mirror. When an object is placed between Curvature and Focus of concave mirror, the image formed is real, magnified, inverted at the same side of mirror.

29.

1. Placenta is the tissue which provides nutrition from mother to the child. It is the structural and functional unit between developing embryo and the maternal body.
2. The measures to be taken during pregnancy are:
  - i. Regularly visit the doctor.
  - ii. Include seafood, fish, eggs etc. in your diet.
  - iii. Avoid alcohol, drugs and medication.
  - iv. Do light exercises prescribed by a specialist.
3. The value that the learners infer from this passage is that during pregnancy special care has to be taken as it is a sensitive period of time.



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**OR**

DNA copies generated will be similar, but may not be identical to the original as some variations are so drastic that new DNA copy cannot work with the cellular apparatus it inherits. Such a newborn cell will simply die. Therefore, there could be many other variations in the DNA copies that would not lead to such a drastic outcome. Thus, the surviving cells are similar but slightly different from each other. This tendency of variation during reproduction is the basis for evolution.

30. Different wavelengths deviate differently in the prism because the angle of refraction for different colours having different wavelengths is different while passing through the glass prism (medium). A light ray is refracted when it passes from one medium to another at an angle and its speed changes. At the interface, it is bent in one direction if the material it enters is denser (when light slows down) and in the other direction if the material is less dense (when light speeds up). Because different wavelengths (colours) of light travel through a medium at different speeds, the amount of bending is different for different wavelengths. Violet is bent the most and red the least because violet light has a shorter wavelength, and short wavelengths travel more slowly through a medium than longer ones do.

31. In a decomposition reaction, a single substance breaks down into two or more substances while in a combination reaction, two or more substances react to produce one substance. Therefore, decomposition reactions are called opposite of combination reactions.

Example of decomposition reaction:  $\text{NH}_4\text{Cl}(s) \rightarrow \text{HCl}(g) + \text{NH}_3(g)$

Example of combination reaction:  $\text{HCl}(g) + \text{NH}_3(g) \rightarrow \text{NH}_4\text{Cl}(s)$

32.

- a. Mendel.
- b. DNA is made up many units of nucleotides.
- c. Important features-
  - i. Both the chains in helix runs anti-parallel.
  - ii. There are two types of nitrogenous bases Purine (A, G) and pyrimidine (T, C).
  - iii. A always pairs with T and C always pairs with G.

**OR**

On this basis we cannot say that light eye colour is dominant or recessive until a cross is made between parent having light eye colour and another with dark eye colour is made. Only then it will be possible to predict the dominant or recessive nature of gene.

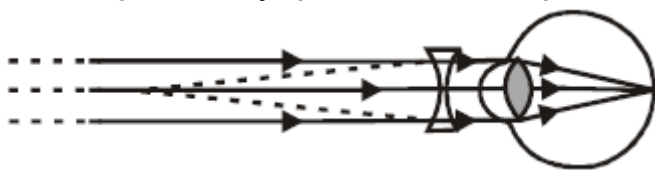
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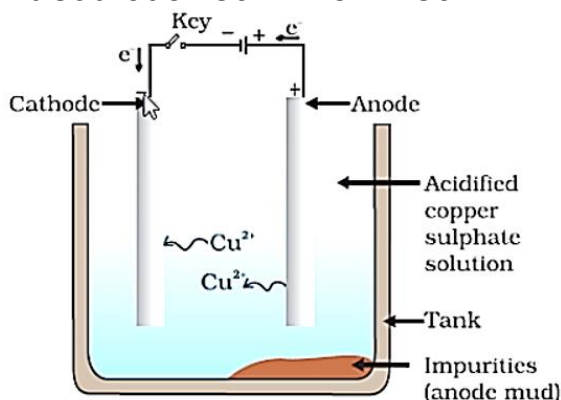
33. This student is unable to see far off objects. This means that the student is suffering from myopia. Doctor will prescribe a concave lens of a suitable focal length.



Correction for myopia

### Section D

- 34.
- Metals placed high in the reactivity series are extracted by electrolytic reduction.  
While those in the middle are extracted first by converting into oxide and then reducing by carbon. The same method cannot be used because metals have more affinity for oxygen than carbon.  
Molten sodium chloride is taken for electrolytic reduction. The metals are deposited at the cathode and chlorine is liberated at the anode.  
At cathode :  $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$   
At anode :  $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$
  - In the electrolytic refining of metal following reactions take place at the anode and cathode  
At Anode :  $\text{Cu} \rightarrow \text{Cu}^{+2} + 2\text{e}^-$   
At Cathode :  $\text{Cu}^{+2} + 2\text{e}^- \rightarrow \text{Cu}$



OR

- Difference between Metals and Non-metals:

Metals	Non-metals
They react with oxygen to form basic oxide. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ <i>Magnesium</i> <i>Magnesium oxide</i>	They react with oxygen to form neutral or acidic oxide. $4\text{C}(s) + \text{O}_2(g) \rightarrow \text{CO}_2(s)$ <i>Carbon</i> <i>Carbon dioxide</i>
They react with water to produce metal hydroxide and hydrogen gas. $\text{Mg} + 2\text{H}_2\text{O} \rightarrow \text{Mg}(\text{OH})_2 + \text{H}_2$	They do not react with water,



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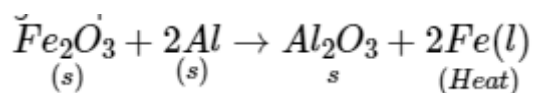
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Metals	Non-metals
Generally, they do not combine with hydrogen except sodium, potassium, and calcium which form ionic hydrides.	They react with hydrogen to form covalent hydrides.

ii.

- a. Metals for example Na have an electronic configuration of 2, 8, 1 i.e. It has one free electron. This electron moves through the metal and conducts an electric current due to the presence of a free electron. So, metals conduct electricity because they readily give up their valence electron.

b.



It is a thermite reaction.

This reaction is an exothermic reaction the reaction produces a large amount of heat due to which iron metal is produced in molten form and use to join the tracks.

35.

- i. A healthy diet throughout life promotes healthy pregnancy outcomes, supports normal growth, development, and aging, helps to maintain healthy body weight, and reduces the risk of chronic disease leading to overall health and well-being of human beings.
- ii. Peristalsis mainly causes the movement of food inside the alimentary canal.
- iii. Digestion of cellulose takes a longer time. Hence, herbivores need a longer small intestine to allow the complete digestion of cellulose. Carnivorous animals cannot digest cellulose, hence they have a shorter intestine.
- iv. Mucus is the inner lining of the digestive system which helps in the movement of food through the digestive system. Moreover, mucus in the stomach protects the inner lining from damage by hydrochloric acid which is secreted by oxyntic cells of the gastric gland to make the environment acidic for pepsin to function. So, the lack of mucus will damage the inner lining of the stomach by acid activity. It may result in gastric ulcers.

OR

- i. Aquatic animals take in the oxygen dissolved in water. The amount of dissolved oxygen in water is fairly low compared to the amount of oxygen in the air. Therefore, the rate of breathing in aquatic organisms is much faster than in terrestrial organisms because the amount of dissolved oxygen in the water is much less than the amount on land, So they have to breathe more in order to get more oxygen.

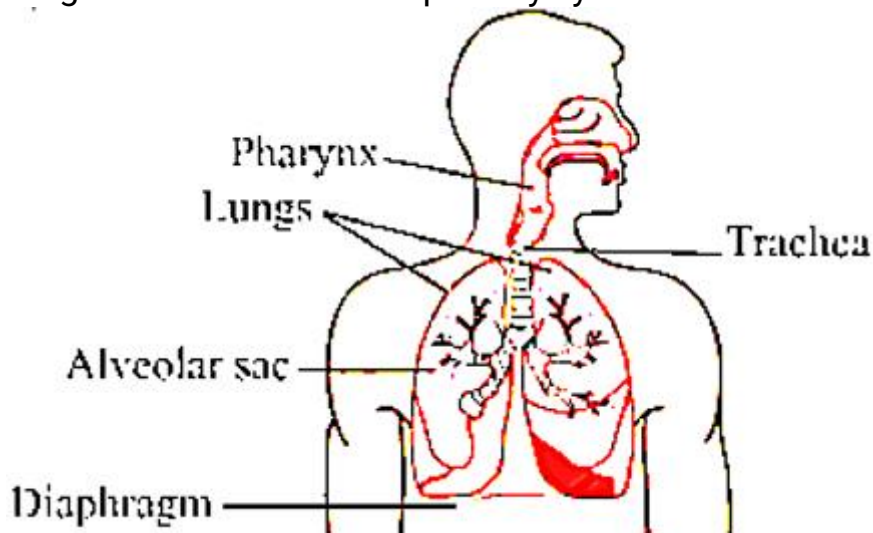
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- ii. Diagram of the human respiratory system



36.

- i. According to this rule, stretch the thumb, forefinger and middle finger of left hand such that they are mutually perpendicular. If the middle finger points in the direction of the magnetic field, the fore finger points in the direction of the flow of current, then the thumb points in the direction of motion.
- ii. Three characteristics of electric current use in our home are as follows:
  - a. the current supplied in our homes is alternating current.
  - b. the current supplied in our homes is at 220 V.
  - c. the neutral wire and the live wire carry the current in our homes.
- iii. Fuse is a safety device used in a circuit to prevent damage due to overloading/short-circuiting. It protects the circuit by stopping the flow of any unduly high electric current. If current larger than the specified value flows through the circuit, due to Joule's heating effect the fuse wire melts and breaks the circuit.
- iv. When live wire touches the metallic appliance then electric current flows through the casing to the earth instead of the human body and thus we prevent ourselves from getting shocked. It is necessary to earth metallic casing of the appliance because it saves electrical appliance from burning and electric shock.

### Section E

37.

- i. If a net charge  $Q$ , flows across any cross-section of a conductor in time ' $t$ ', then the current ' $I$ ', through the cross-section is given by  $I = Q/T$
- ii. The SI unit of electric charge is the coulomb (C), which is equivalent to the charge contained in nearly  $6 \times 10^{18}$  electrons.

OR

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The electric current is expressed by a unit called ampere (A). One ampere is constituted by the flow of one coulomb of charge per second.

- 38.
- i. In plants, **chemical coordination** occurs with the help of plant hormones (Phytohormones).
  - ii. *Mimosa pudica*'s leaves drop down when we touch it. It is due to the turgor pressure difference between the upper and lower halves of the base of the petiole. Its other name is "touch-me-not" or "chui-mui".
  - iii. Turgor movement is the movement due to the difference in turgidity of the cells in the lower half and the upper half of pulvinus (petiole of a leaf).

**OR**

The movements which are in a particular direction in relation to the stimulus are called tropic movements. Tropic movements happen as a result of the growth of a plant part in a particular direction. For example; the shoot usually grows in the direction of sunlight. This is called positive phototropic movement.

- 39.
- i. If the crystal is moistened with water, then the blue colour of the crystal reappears.
  - ii. The commercial name of calcium sulphate hemihydrate is Plaster of Paris.
  - iii. Five water molecules are present in one formula unit of copper sulphate.

**OR**

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  is obtained when gypsum is heated at 373K. Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.