



# HERITAGE XPERIENTIAL LEARNING SCHOOL

Heritage Xperiential Learning School, Gurgaon

HERITAGE XPERIENTIAL LEARNING SCHOOL, GURGAON

HALF YEARLY EXAMINATION

SESSION- 2023-24

Subject: SCIENCE	Class: X	Date: 11.09.2023
Time Allotted: 3 Hours	Maximum Marks: 80	SET: Set 1

### General Instructions:

1. There are a total of 39 questions in 5 sections. All questions are compulsory.
2. Section A consists of 20 objective type questions carrying one-mark each. These are to be answered as per instructions.
3. Section B consists of 6 two-mark questions. These are to be answered in about 30 to 50 words each.
4. Section C consists of 7 three-mark questions. These are to be answered in about 50 to 80 words each.
5. Section D consists of 3 five-mark questions. These are to be answered as per individual instructions.
6. Section E consists of 3 source-based/case study-based questions 4 marks each.
7. Diagrams should be drawn with pencil and should be neatly labeled.
8. Internal choices are given in the question paper.

### Section 'A'

Select and write one most appropriate option out of four options given for each of the questions 1 – 20.

Q.No.	QUESTIONS	Marks
Q1.	In torches, searchlights and headlights of vehicles, the bulb is placed a) between pole and focus of the reflector b) very near to the focus of the reflector c) between focus and centre of curvature of the reflector d) at the centre of curvature of the reflector	1
Q2.	Blue colour of the sky is due to the phenomenon of: a) Reflection of Light b) Refraction of light c) Dispersion of light d) Scattering of light	1

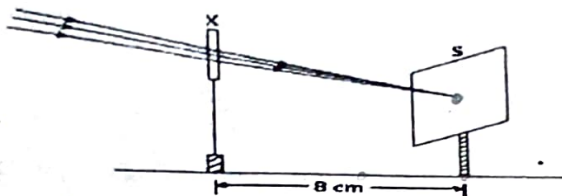


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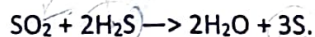
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- Q3. Which of these is not a possible combination of charge on an object 1
- a)  $3.2 \times 10^{-18} \text{ C}$
  - b)  $2.4 \times 10^{-19} \text{ C}$
  - c)  $1.6 \times 10^{-19} \text{ C}$
  - d)  $2.4 \times 10^{-18} \text{ C}$

- Q4. A student used a device (X) to obtain/focus the image of a well illuminated distant building on a screen (S) as shown in the diagram. Select the correct statement about the device (X). 1



- Q5. When the gases sulphur dioxide and hydrogen sulphide mix in the presence of water, the reaction is: 1



Here  $\text{H}_2\text{S}$  is acting as:

- a) An oxidising agent
  - b) A reducing agent
  - c) Species that is reduced
  - d) A catalyst
- Q6. Which one of the following statements is TRUE? 1
- a) Dilution of acids does not change the pH.
  - b) Dissociation in strong acids is more than weak acids.
  - c) All acids are slippery to touch.
  - d) Acids turn red litmus into blue in colour.

Q7. Which of the following is a physical change? 1

- a) Burning of Mg ribbon.
- b) Rusting of Iron.
- c) Dissociation of Acid/base in aqueous solution.
- d) Preparation of salt from acid and base.

Q8. A solution shows dark red colour with pH paper. The possible solution is 1

- a) Calcium hydroxide
- b) Carbonic acid
- c) Hydrochloric acid
- d) Tap water

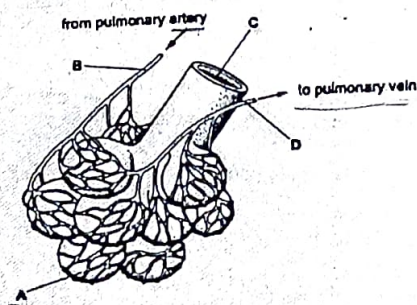
Q9. Which of the following solutions can be used for identifying an acidic solution? 1

- a) NaCl
- b) KNO<sub>3</sub>
- c) Na<sub>2</sub>CO<sub>3</sub>
- d) K<sub>2</sub>SO<sub>4</sub>

Q10. In which mode of nutrition an organism derives its food from the body of another living organism without killing it? 1

- a) Saprotrophic nutrition
- b) Parasitic nutrition
- c) Holozoic nutrition
- d) Autotrophic nutrition

Q11. The diagram shows some of the structures in a human lung 1



Where is the carbon dioxide concentration highest in blood?

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



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Q12. Bile secreted by the liver helps in:

- a) Emulsification of fats
- b) Breakdown of protein
- c) Digestion of carbohydrates
- d) Absorption of digested food

1

Q13. The diagram shows a section of a blood vessel in the leg.

Which type of blood vessel is shown, and in which direction does the blood flow? Select the correct option from the table given below.



1

	Type of blood vessels	Direction of blood flow
A	Artery	Towards the heart
B	Vein	Away from the heart
C	Capillaries	Away from the heart
D	Vein	Towards the heart

Q14. The blood that enters the kidney is rich in glucose, large proteins and salts. Which substances will be present in the collecting duct of mammals? Select the most appropriate option from the table given below.

1

	Glucose	Protein	Salts
(a)	✓	✓	×
(b)	×	✓	✓
(c)	✓	×	✓
(d)	×	×	✓

Key ✓ = present, × = absent





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- Q17. **Assertion:** Light bends towards the normal when coming from denser medium to rarer. 1  
**Reason:** Light speeds up as it comes into a rarer medium.
- Q18. **Assertion:** Alkali metals which are more reactive than zinc react readily with water. 1  
**Reason:** Sodium reacts with nitric acid to produce sodium nitrate and hydrogen bubbles.
- Q19. **Assertion:** Transpiration is a necessary evil. 1  
**Reason:** It causes water loss but leads to absorption and upward movement of water in plants.
- Q20. **Assertion:** Lungs always contain a residual volume of air. 1  
**Reason:** It provides sufficient amount of air to prevent the lungs from collapsing.

## Section- B

Q no. 21 to 26 are very short answer questions

- Q21. An object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. Find 2  
a) The position  
b) The nature of the image formed.

OR

An object 2 cm high is held 12 cm away from a concave mirror of focal length 4 cm.  
- Draw the ray diagram as per given scale and mark the height of image and image distance.

- Q22. Shahin carried out three reactions separately, as follows: 2
- I. Ammonia + water  $\rightarrow$  Ammonium hydroxide
  - II. Carbon dioxide + water  $\rightarrow$  Carbonic acid
  - III. Sodium + water  $\rightarrow$  Sodium hydroxide + Hydrogen
- a) Arrange the products of the reactions in order of increasing hydrogen ion concentration.
  - b) Which product will have maximum pH?
  - c) Which product will give red colour on treatment with methyl orange?

- Q23. Write the balanced chemical reactions when: 2
- Carbon monoxide combines with Hydrogen gas
  - Zinc forms a protective layer on heating in the presence of air.

OR

Balance the following chemical reaction. Also define the type of reaction.



- Q24. a) Which tissue is helpful in the transport of food in plants? In which chemical form is the food transported inside the plant? 2
- b) Why is transport of food considered both an active and passive mechanism?

- Q25. Define geotropism. Design an activity to demonstrate geotropism in plants. Support your answer with a diagram. 2

- Q26. An enzyme A is produced in the mouth. Starch, a polysaccharide, is hydrolysed into the disaccharide maltose by Enzyme A. 2
- Identify the enzyme A.
  - Where does carbohydrate digestion get completed in the human alimentary canal? Name the enzyme responsible for completely digesting carbohydrates.
  - The pH in the small intestine is slightly alkaline. How is this pH maintained?

### SECTION C

Q no. 27 to 33 are short answer type questions

- Q27. Lewis filled a beaker with 2 immiscible liquids of given optical density. He then held 3

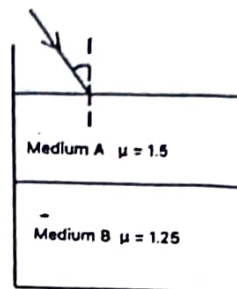


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a torch at an angle to the normal above the beaker as shown in the figure.

- Trace the path of light as it reaches the bottom of the beaker.
- Calculate the speed of light in medium B if the speed of light in vacuum is  $3 \times 10^8$  m/s.
- Find the refractive index of medium B with respect to medium A.



Q28.

- Define dispersion.
- Show what would happen when white light is made to pass through a glass prism is again made to pass through an inverted glass prism.

3

OR

- What is atmospheric refraction?
- Is the position of a star as seen by us its true position? Explain and justify your answer with a diagram.

Q29.

The magnification of an image for a mirror is +2.

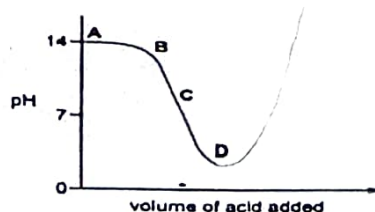
- Identify the type of mirror and between which points has the object been kept?
- What can be said about the nature and size of the image formed in this case?
- If the focal length of the mirror is 10 cm, at what distance should an object be kept to form an inverted image of same size ( $h_i = h_o$ )?

3

Q30.

A student took a small amount of copper oxide in a conical flask and added dilute hydrochloric acid to it with constant stirring. He observed a change in colour of the solution.

- Write the name of the compound and its colour.
- Write a balanced chemical equation for the reaction involved.



3

c) The following graph shows the effect of pH when acid is added to a flask containing a strong base.

What will be the changes in the graph when excess base is added to the solution after point D?

Q31. An element  ${}^{27}_{13}\text{X}$  on burning strongly, in presence of air produce a compound Y.  
a) Identify X and Y.  
b) With the help of chemical equations, explain the nature of compound Y.

3

Q32. a) Ribs and diaphragm play an important role in the process of breathing in humans. Explain the breathing mechanism.  
b) In what forms are the two gaseous substances, Carbon Dioxide and Oxygen transported in the body?

3

Q33. Animals and humans deal with a range of stress situations. These situations need a great deal of energy to overcome.  
Which hormone is responsible for dealing with stress situations in humans? Explain the mechanism of working of the hormone.

3

OR

John, an old-man, was cooking dinner in his kitchen when he accidentally touched a hot stove burner. His immediate response was to withdraw his hand quickly from the stove.

- a) What type of action was shown by John? Diagrammatically trace the pathway of the events happening in this situation.  
b) Suggest any other real- life scenario where these actions play a crucial role and explain how they provide an advantage in the situation.

**SECTION – D**

Q no. 34 to 36 are long answer type questions

Q34. a) Calculate the potential difference between the two terminals of a battery if 200 J of work is required to transfer 40 C of charge from one terminal of the battery to another.  
b) Define Current. How much is 1 A of current?

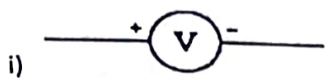
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- c) Identify the circuit elements mentioned below and write their function in the circuit.

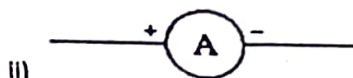


OR

- a) What would be the current passing through a conductor if 300 C of charge has passed through it in 2 minutes.

- b) Define electric potential. How much is 1 V potential difference?

- c) Identify the circuit elements mentioned below and write their function in the circuit.



- a) Write the preparation and uses (2 points) of washing soda.  
b) Dilute HCl is added dropwise to anhydrous washing soda.

- i) Write the balanced chemical equation involved.

- ii) How will you test the gas evolved in the reaction?

- c) An aqueous solution of sodium chloride is neutral but an aqueous solution of sodium carbonate is basic. Why?

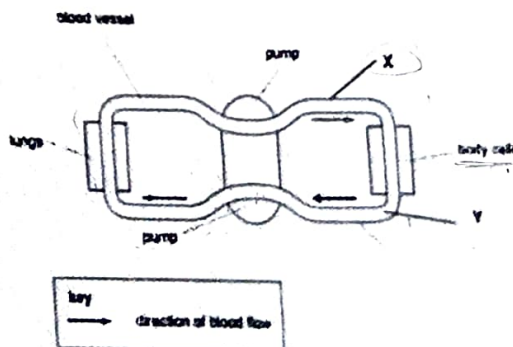
OR

What is "water of crystallisation"? Give one example.

Q36.

Look at the diagram. It represents the human circulatory system.

- a) Identify the blood vessels X and Y.  
b) Which chambers of heart have the thickest walls and why?  
c) Describe how the diagram shows that humans have a double circulatory system.



**Section E**

Q no. 37 to 39 are case-based/data-based questions with 2 to 3 sub-parts. Internal choice is provided in one of these sub-parts

4

Q37. Eye defects are very common across human population and can vary as per severity and symptoms. Also some defects might be more common in certain age groups. Some people suffer from near sightedness, some from far sightedness and a very small percentage may have both the defects. Near/Far sightedness can be corrected using a lens of appropriate type and power. A person cannot read a newspaper placed nearer than 50 cm from his eyes.

- Name the defect of vision he is suffering from and what type of lens is used to correct this defect.
  - What are the 2 possible causes for the defect indicated in a) above.
  - Draw a ray diagram to show how this defect may be corrected using a appropriate lens.
- OR (only for part c)
- Find the power and focal length of the lens required to correct the defect indicated in a) above.

4

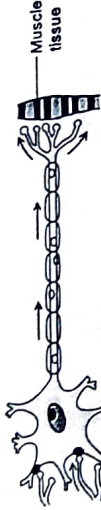
Q38. A solution X also known as slaked lime produced by a reaction is used for white washing walls. It reacts slowly with the carbon dioxide in air to form a thin layer of Y on the walls which gives a shiny finish to the walls. It is interesting to note that Y is also found in marble and egg shells.

- Identify the formula of X and Y
  - Write the balanced chemical reaction occurring between X and Carbon dioxide.
  - What will happen if excess  $\text{CO}_2$  is passed through an aqueous solution of Y.
  - Give another example of daily life where this type of reaction occurs.
- OR
- Define the type of reaction involved.



Q39. Observe the given diagram and answer the questions that follow:

Neuron A



a) With the help of a diagram for neuro- muscular junction, explain how the impulses are transferred to the effector cells?

b) Observe Neuron A given above, which type of neuron is neuron A ? Justify your answer.

OR (only for part b)

b) Name the receptors for smell and taste.