



Do not mutilate, fold or put any mark over the barcode

Supervising Examiner / Invigilator's Initial

INDEX NUMBER :

STUDENT NAME :

SCHOOL NAME :

**FOR OFFICIAL USE ONLY**

**SCIENCE**

Reading Time: 15 Minutes

Writing Time: 2 Hours

Full Marks: 80

Year: 2022

Administrative No.

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**For teacher's use only**

Question	Q1	Q2	Q3	Q4	Q5					Q6				Q7				
					a.i	a.ii	b	c	d	a	b	c	d	a	b	c.i	c.ii	d.i
Mark	10	7	6	7	1	1	3	3	2	2	3	3	2	2	1	1	1	1
Mark scored																		
Total Score																		

Question	Q7				Q8								Q9						
	d.ii	e	f	g	a.i	a.ii	b	c	d	e	F	g	a	b.i	b.ii	c.i	c.ii	d	
Mark	1	1	1	1	1	1	1	2	1	2	1	1	2	2	1	2	1	2	
Mark scored																			
Total Score																			
Final Score:																			

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY:**

1. In this booklet you will find **NINE** questions. You must answer **ALL** the questions.
2. Answers to all the questions must be written neatly in the spaces provided.
3. Do not write during the first fifteen minutes. This time is to be spent on reading the questions.
4. You will have **TWO** hours to answer all the questions.
5. You will **NOT** be allowed to leave the examination room until the completion of the stipulated time.

**SECTION A (30 Marks)**

**Question 1**

**[10]**

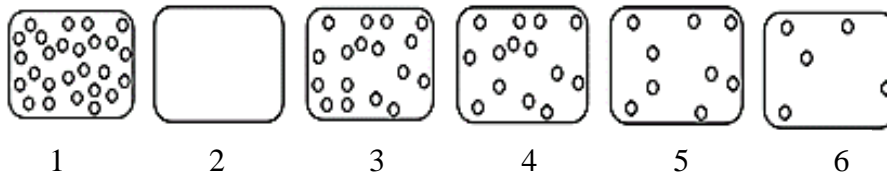
**Direction: For each question, there are four alternatives: A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one choice circled, NO score will be awarded.**

- i. Proteins are responsible for nearly every task of cellular life. The cell organelle that synthesizes protein is
- A ribosome.
  - B chloroplast.
  - C golgi bodies.
  - D mitochondrion.
- ii. The digested food is burnt in the presence of oxygen to release energy. This is enabled by
- A nervous system.
  - B digestive system.
  - C respiratory system.
  - D circulatory system.
- iii. Read the following statements.
- I. Only solvent molecules move.
  - II. Only solute particles move.
  - III. A semi-permeable is present.
  - IV. Solutions have different concentrations.

Statements that relate to osmosis are

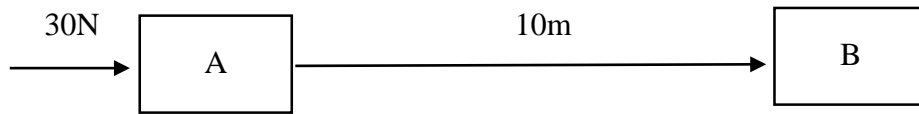
- A I, III and IV.
- B II, III and IV.
- C I, II and IV.
- D I, II and III.

- iv. In the following food chain, dots in the boxes represent the number of organisms. What would be the probable number of organisms at trophic level 2?



- A 15  
B 17  
C 22  
D 30
- v. If 'X' is the symbol of an element, which of the following are the isotopes of the element?
- A  ${}_8\text{X}^{15}$   ${}_9\text{X}^{17}$   
B  ${}_8\text{X}^{15}$   ${}_9\text{X}^{14}$   
C  ${}_8\text{X}^{15}$   ${}_8\text{X}^{17}$   
D  ${}_8\text{X}^{15}$   ${}_9\text{X}^{15}$
- vi. What kind of chemical reaction is shown by the following equation?
- $$\text{AB} \longrightarrow \text{A} + \text{B}$$
- A synthesis  
B substitution  
C displacement  
D decomposition
- vii. Generally, heavy trucks have large and broad tyres to
- A increase speed.  
B reduce pressure.  
C carry heavy load.  
D increase pressure.

viii. A boy pushes a box to a distance of 10m with a force of 30N in 10s.



The power in this activity is

- A 20W.
  - B 30W.
  - C 40W.
  - D 50W.
- ix. In relation to Ohm's law, which of the following statement is **TRUE**?
- A Current is equal to voltage.
  - B Current is less when voltage is less.
  - C Current is more when voltage is less.
  - D Current is less when voltage is more.
- x. Karma was surprised to notice his legs appear shorter while crossing a river. Upon investigation, he found out that it was due to the phenomenon called
- A reflection.
  - B diffraction.
  - C dispersion.
  - D refraction.

## Question 2

[7]

**Direction: Fill in the blanks with appropriate words.**

- i. A bucket tied to a rope is swung in a circular motion. The force produced in the rope is \_\_\_\_\_.
- ii. Stars produce their own heat and light. Therefore, they are called \_\_\_\_\_ objects.
- iii. Biceps contract and triceps relax while lifting the weight. Such muscles are called \_\_\_\_\_.
- iv. A farmer would like to propagate sugarcane. The most suitable artificial method for the propagation would be \_\_\_\_\_.
- v. In an ecosystem, a variety of plant and animal species live in harmony. This variety of life forms is called \_\_\_\_\_.
- vi. These days, florescent bulbs are used at homes as they are more \_\_\_\_\_ than the incandescent bulbs.
- vii. The siren of an ambulance is very shrill in nature. This quality of sound is determined by its \_\_\_\_\_.

### Question 3

**Direction: Match each item in column I against the most appropriate item in column II. Write the letter against the number in Column III.**

Column I	Column II	Column III
i Reaction between an acid and a base	a acceleration	i.
ii Separation of colors in a mixture	b atomic number	ii.
iii Number of protons in an atom	c dissipation of energy	iii.
iv Rate of change of velocity	d neutralization	iv.
v Overcoming friction between parts of a machine	e chromatography	v.
vi Long-term solution to environmental issues	f mass number	vi.
	g sustainable development	
	h distillation	

### Question 4

[7]

**Direction: Write TRUE or FALSE against each statement in the space provided.**

- i. Cones are photoreceptor cells which are responsible for vision in a dim room.  
(\_\_\_\_\_)
- ii. Maize, beans and pumpkins are mostly grown together in the same field in the same season. Such practice is called mixed-cropping. (\_\_\_\_\_)
- iii. A light ray bends towards normal when it travels from air to glass.  
(\_\_\_\_\_)

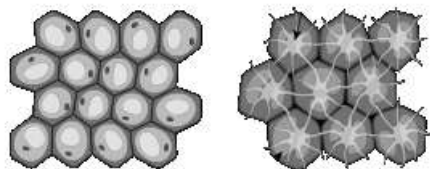
- iv. For an electric fuse to work, its current rating must be equal to the current rating of the electrical appliance. (\_\_\_\_\_)
- v. The strength of an electromagnet is directly proportional to the number of the turns of coil. (\_\_\_\_\_)
- vi. Corona virus is an example of a multicellular organism. (\_\_\_\_\_)
- vii. The movement of minerals from soil into the roots of plants using energy is an example of osmosis. (\_\_\_\_\_)

**Section B (50 Marks)**

**Direction: Answer the following questions in the spaces provided. The marks for each question are given in the brackets [ ].**

**Question 5 [10]**

- a. Observe the tissues, A and B given below and answer the questions that follow.



A

B

- i. Identify tissues A and B.

[1]


- ii. Mention **ONE** function of each tissue.

[1]

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- b. 'Our lifestyle greatly influences our health'. Explain the statement with the help of any **THREE** unhealthy habits and their effects on our health in the table given below. [3]

Unhealthy Habit	Effect
1.	
2.	
3.	

- c. To minimize the use of harmful chemical substances, the Ministry of Agriculture encourages farmers to practise organic farming. Design a poster showing any **THREE** methods of organic farming in the country. [3]

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- d. A student investigates endothermic and exothermic reactions. He mixes different chemicals together and records the temperature change. Based on the result mentioned below, identify the exothermic reaction and give **ONE** reason. [2]

Chemicals mixed	Temperature at Start (°C)	Temperature at the end (°C)	Change in temperature (°C)
Ethanoic acid + Sodium carbonate	19	15	-4
Hydrochloric acid + Sodium Carbonate	19	23	+4


**Question 6 [10]**

- a. There is a lot of stigma and superstitions surrounding menstruation in Bhutan and also in some cultures around the world. Share your views on this matter. [2]


b. Study the properties of various elements shown below.

[3]

Element	Lustrous	Brittle	Rust resistant	Malleable
A	✓	✓	✗	✗
B	✗	✓	✗	✗
C	✓	✗	✓	✓

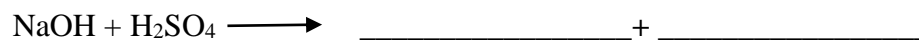
Which would be the most suitable element to make jewellery? Justify with **TWO** points.


c. Using the knowledge of separating techniques, illustrate waste water treatment process with a diagram showing at least **TWO** separating methods used.

[3]


d. Complete and balance the following chemical equation.

[2]



**Question 7 [10]**

- a. Upon heating calcium carbonate, a student observed the formation of calcium oxide and carbon dioxide. Represent the chemical reaction in the form of a chemical equation and identify the type of chemical reaction. [2]


- b. In hospitals, kidney patients are treated with dialysis. Mention the separating technique used in the dialysis machine. [1]


- c. Read the following information and answer the questions that follow.

‘Rainfall with a pH level of 2-3 can have negative effect on aquatic and terrestrial ecosystems has been reported in widely separated areas of the earth in recent years.’

*-The New York Times*

- i. What phenomenon is described in the above information? [1]


ii. Explain one cause and one preventive measure for the phenomenon.


[1]


d. Study the data given below and answer the questions that follow.

<b>Location</b>	<b>A (starting point)</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Displacement (m)</b>	0	5	15	20
<b>Time (s)</b>	0	2	6	9

i. Plot a displacement-time graph using the data.

[1]

	
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ii. Calculate the velocity of the object between points B and C.

[1]

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e. Which one would you prefer to use, rechargeable or non-rechargeable batteries?

[1]

Justify your preference.


f. Mention a natural phenomenon where dispersion of light occurs.

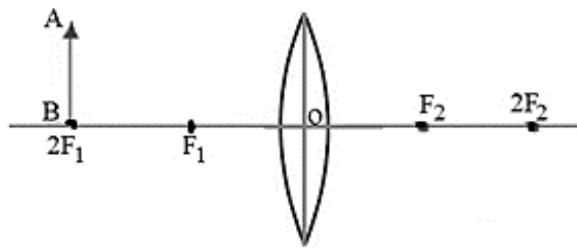
[1]


g. Increasing human population is the biggest threat to biodiversity. Justify the statement.

[1]


**Question 8 [10]**

a. Study the diagram given below and answer the following questions.



i. Complete the ray diagram using two rays starting from the tip of the object AB. [1]

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ii. Explain the type of image formed when the object is kept between optical centre and the focus ( $F_1$ ). [1]


b. A painter has all the colours except black. As a science student, how would you help the painter to produce this missing colour? [1]


- c. Draw a labelled diagram to show an example of centripetal and centrifugal force. [2]

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- d. Arrange the following items in the order of element, compound, simple radical and compound radical. [1]






- e. The picture shown below is an electric stove used for cooking. Calculate the current flowing through the electric stove using the given values. [2]



Resistance:  $11 \Omega$   
Voltage:  $220 \text{ V}$

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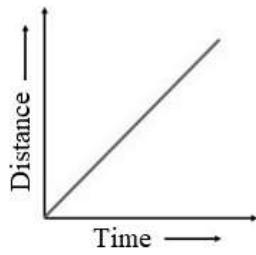
- f. Explain any **TWO** reasons for using pool acids in swimming pools. [1]


- g. A mirror can be compared to the moon. Explain in terms of luminosity. [1]

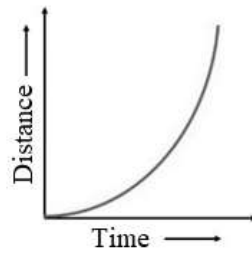

**Question 9 [10]**

a. Identify the type of speed shown in graph A and B. Give reason.

[2]



A



B


b. i. From the two activities given below, identify and explain in which the work is done.

[2]

1. A girl swimming in a pond
2. A runner completing a circular track


- ii. A weight lifter lifts an object weighing 100kg to a height of 2m by exerting a force of 1000N, What is the work done? [1]

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- c. i. Table below shows a part of periodic table. State what happens to the electronegativity and atomic radius of elements as one moves from left to right. [2]

Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl


ii. How does ionisation potential vary in groups and periods?

[1]


d. Our age-old social, cultural and spiritual beliefs about nature have helped conserve our biodiversity. Justify the statement with any **TWO** specific examples of such beliefs.

[2]
