Secondary School Examination, **2023**
Marking Scheme – Science (SUBJECT CODE -086)
(PAPER CODE –31/5/3)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.

2. **"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC."**

3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**

4. The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.

5. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after delibration and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.

6. Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**

7. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.

8. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

9. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **"Extra Question"**.

10. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.

11. A full scale of marks **80** (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.

12. Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.

13. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.
    - Wrong totaling of marks awarded on a reply.
    - Wrong transfer of marks from the inside pages of the answer book to the title page.
    - Wrong question wise totaling on the title page.
    - Wrong totaling of marks of the two columns on the title page.
    - Wrong grand total.
    - Marks in words and figures not tallying / not same.
    - Wrong transfer of marks from the answer book to online award list.
    - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
    - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

14. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

15. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

16. The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for spot Evaluation**" before starting the actual evaluation. Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

17. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

18. The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME

Secondary School Examination, 2023
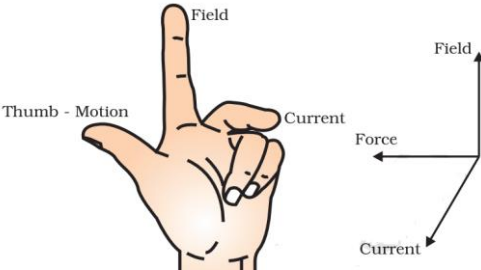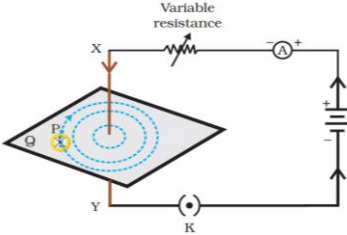
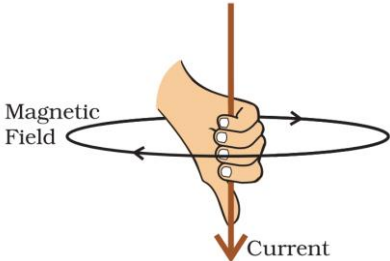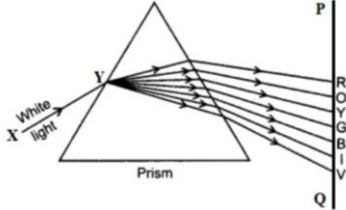## SCIENCE (Subject Code–086)

[Paper Code: 31/5/3]
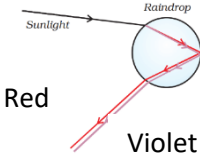
Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION–A		
1	(c)	1	1
2	(a)	1	1
3	(d)	1	1
4	(a)	1	1
5	(c)	1	1
6	(a)	1	1
7	(c)	1	1
8	(b)	1	1
9	(b)	1	1
10	(d)	1	1
11	(c)	1	1
12	(c)	1	1
13	(b)	1	1
14	(b)	1	1
15	(c)	1	1
16	(d)	1	1
17	(c)	1	1
18	(a)	1	1
19	(b)	1	1
20	(d)	1	1
	SECTION-B		
21	(a) Brain is inside a bony box / skull / cranium	½	
	The vertebral column or backbone protects the spinal cord.	½	
	(b) (i) Medulla : Controls involuntary actions such as blood pressure / salivation /vomiting.	½	
	(ii) Cerebellum : It is responsible for precision of voluntary actions / maintaining the posture and balance of the body.	½	
	(Any one function of each)		2
22	(a) (i) X = $CaSO_4 . 2H_2O$ /Gypsum / Calcium sulphate dihydrate	½	
	Y=$CaSO_4.\frac{1}{2}H_2O$/Plaster of Paris/Calcium sulphate hemi-hydrate	½	

	(ii) $CaSO_4 . \frac{1}{2} H_2O + 1\frac{1}{2} H_2O \longrightarrow CaSO_4 . 2H_2O$	1	
	OR		
	(b) (i) M, it is an acidic solution	½ , ½	
	(ii) Neutral	½	
	M is an acid and N is a base. / Neutralization reaction	½	2
23	(a) Movement of water from root to other parts of the plant does not take place , so plants may die.	1	
	(b) Platelets help in clotting at the site of bleeding / leakage of blood would lead to loss of pressure reducing the efficiency of pumping system.	1	2
24	(a) (i) Absorption of light energy by chlorophyll.	½	
	(ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.	1	
	(iii) Reduction of carbon dioxide to carbohydrates.	½	
	OR		
	(b) (i) Excess water is excreted by transpiration.		
	(ii) Oxygen as waste product of photosynthesis is excreted through stomata.		
	(iii) Shedding of leaves.		
	(any two)	1,1	2
25			

Biodegradable	Non-biodegradable
• Substances that can be broken down by biological processes.	•Substances that cannot be broken down by biological processes .

		1	
	• Safe Disposal:		
	(a) Composting	½	
	(b) Putting in the green coloured bins. **(Or Any other)**	½	2
26	(a) Hypermetropia/Far sightedness	½	
	(b) •Focal length is too long	½	
	•Size of eyeball is small.	½	
	•Convex lens/Converging lens	½	2
	SECTION - C		
27	(a) (i) $2Al + 3H_2SO_4 \longrightarrow Al_2(SO_4)_3 + 3H_2\uparrow$	1	
	(ii) $2Al + 2NaOH \longrightarrow 2NaAlO_2 + H_2\uparrow$	1	
	(credit marks even if reaction is not balanced)		
	(b) •Blue green	½	3
	• due to the formation of Copper chloride /Copper (II)chloride / Cupric chloride	½	
28	(a) Reactions in which there is an exchange of ions between the	1	
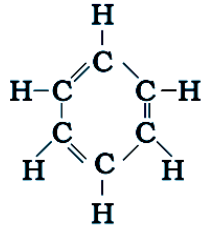
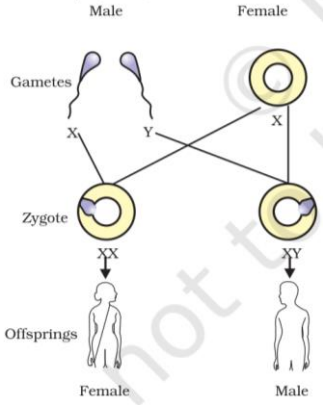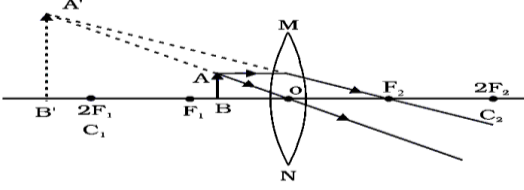|				
		reactants.		
		(b) (i)		
		• $HCl + NaOH \longrightarrow NaCl + H_2O$ **(or any other reaction)**	½	
		•Acid reacts with base forming salt and water.	½	
		(ii)		
		• $Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2NaCl$ **(or any other reaction)**	½	
		• Insoluble substance or precipitate($BaSO_4$) is formed.	½	3
29	(a)	h_1 = 3 cm		
		f = -12 cm	½	
		u = -18 cm		
		(i) Image Distance		
		$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$	½	
		$\frac{1}{-12} = \frac{1}{v} + \frac{1}{-18}$		
		$\frac{1}{-12} + \frac{1}{18} = \frac{1}{v}$		
		$\frac{1}{v} = \frac{-3+2}{36} = \frac{-1}{36}$		
		v = -36 cm	1	
		(ii) Height of image		
		$m = \frac{h_2}{h_1} = \frac{-v}{u}$	½	
		$\frac{h_2}{3} = \frac{-[-36]}{-18}$		
		$h_2 = \frac{-36}{18} \times 3$		
		h_2 = -6cm	½	
		OR		
		(b)Degree of convergence or divergence of light／ Reciprocal of focal length of lens in metre.	1	
		• It is diverging/concave lens	½	
		• $P = \frac{1}{f(m)} = \frac{100}{f(cm)}$	½ ½	
		$P = \frac{100}{-10 \text{ cm}} = -10 \text{ D}$		
		• Sign of magnification = + or positive	½	3
30	(a)			
		• Take 1 ml 1% starch solution in two test tubes A and B.		
		• Add 1 ml saliva in test tube A and leave both test tubes		

	undisturbed for 20 – 30 minutes. Now add a few drops of iodine to both the test tubes. • The colour of iodine does not change in the test tube A as starch is converted to sugar by enzymes present in saliva. • The colour of iodine changes to blue-black in test tube B because it contains only starch solution. **[Note: If quantity is not mentioned do not deduct marks]** **(or any other activity)** (b) (1) Bile changes the acidic medium of food to alkaline medium so that the pancreatic enzymes can act on it. (2) It also emulsifies fats. / Breaks down the large fat globules into smaller particles. **(any one)**	½ × 4 1		3
31	(a) (i) (1) Increased. (2) Increased. (3) The direction of displacement is reversed (ii) • Flemings left-hand rule • According to this rule, stretch the thumb, forefinger and middle finger of left hand such that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor. **Alternate answer of the statement** **All the physical quantities mentioned in the diagram should be** **perpendicular to each other.** **OR** (b) • 	½ ½ ½ ½ 1		

	• Pattern • Direction of current • Magnetic field direction	½ ½ ½	
	(Note: If the variable resistor and ammeter are not drawn, do not deduct marks.) • Right hand thumb Rule	½	
	• Imagine that we are holding a current carrying straight conductor in our right hand such that the thumb points towards the direction of current. Then our finger will wrap around the conductor in the direction of the field lines of the magnetic field.	1	
	Alternate answer of the statement: 		3
32	• UV radiations act on the oxygen molecule (O_2) and then split oxygen molecule into free (nascent) oxygen.	1	
	• These free oxygen atoms combine with oxygen molecule (O_2) to form ozone (O_3)	1	
	Alternate answer: $$O_2 \xrightarrow{\text{UV}} O + O$$ $$O + O_2 \longrightarrow O_3$$ **Damage to ozone layer :** • UV radiations reach the Earth and cause harmful effects like skin cancer in human beings.	1	3
33	(i) (ii) 	1½ 1½	

	(1 mark for diagram, ½ mark for labelling)		3
	SECTION - D		
34	(a) (i) Outside the abdominal cavity in scrotum, sperm formation requires a lower temperature than the normal body temperature. Function: • Formation of sperms / male gamete • Production of testosterone / male sex hormone (ii) (1) The fertilized egg (zygote) starts dividing to form embryo and gets implanted in the lining of uterus. (2) The inner lining of uterus slowly breaks and comes out through the vagina as blood and mucous. (iii) Vas deferens is blocked / Vasectomy in males. Fallopian tube is blocked / Tubectomy in females. **OR** (b) (i) (1) Buds present on the leaf margins in notches begin to grow to give rise to a new plant – Vegetative propagation (2) Each part of Planaria grows into complete organism – Regeneration. (3) The spores begin to grow after reaching a suitable moist surface – Spore formation. (ii) • Zygote divides several times to form an embryo within the ovule. • Ovule develops a tough coat and is converted into seed. • Ovary grows rapidly and ripens to form a fruit. • Petals, sepals, stamens, style and stigma may shrivel and fall off.	½ , ½ ½ ½ 1 1 ½ ½ ½ , ½ ½ , ½ ½ , ½ ½ × 4	5
35	(a) • The rate at which electrical energy is dissipated / consumed in a circuit. • Watt or W • 1 unit (1 kWh) = $3 \cdot 6 \times 10^6$ joule (J) (b) E= P × T Electrical energy, E_1, consumed by 2 bulbs of 50 W each is E_1 = 50 × 2 × 6 = 600 Wh Electrical energy, E_2, consumed by electric geyser of 1 kW is E_2 = 1000 × 1 = 1000 Wh Total energy consumed in the month of 30 days [E_1 + E_2] × 30 = [600 + 1000] × 30 Wh = 1600 × 30 = 48000 Wh = 48 kWh Cost of using these electrical devices at the rate of ₹ 8·00 per kwh is	1 ½ ½ ½ ½ ½ ½	

	₹ 48 × 8 = ₹ 384	1	5
36	(a) Carbon has 4 electrons in its outermost shell, and needs to gain or lose 4 electrons to attain noble gas configuration.	1	
	Losing or gaining 4 electrons is not possible due to energy considerations, hence it shares electrons to form covalent bonds.	1	
	Two reasons : (i) Catenation : Unique ability of carbon to form bonds with other atoms of carbon, giving rise to long chains of different types of compounds.	1	
	(ii) Tetravalency : Since carbon has a valiancy of 4, it is capable of bonding with four other atoms of carbon or atoms of elements like oxygen, hydrogen, nitrogen, sulphur, chlorine etc.	1	
	The reason for the formation of strong bonds by carbon is its small size which enables the nucleus to hold on to the shared pair of electrons strongly.	1	
	OR		
	(b) (i) • Alkene , C_nH_{2n} / Alkyne , C_nH_{2n-2}	½ , ½ ½	
	• Presence of catalyst such as Ni or Palladium		
	$$CH_2 = CH_2 + H_2 \xrightarrow{\text{Ni or Pd}} CH_3 - CH_3$$ Ethene Ethane	1 ½	
	In addition reaction unsaturated hydrocarbon gets converted to saturated hydro carbon whereas in substitution reaction one atom or a group of atoms replace hydrogen in a saturated hydrocarbon.	1	
	(ii)	1	
			5
	SECTION E		
37	(a) If X chromosome of male sperm fuses with X chromosome of female ova, girl child is born.	½	
	If Y chromosome of male sperm fuses with X chromosome of female ova, boy child is born. **Alternate answer:**	½	

(b) Because one is a normal sized 'X' while the other is a short one 'Y'. | 1

(c)
- During formation of germ cell/gametes the chromosome number is reduced to half.
- When two germ cells from two individuals combine to form a new individual, they restore the original number of chromosomes. | 2

OR

(iii) Example 1 : Reptiles – The temperature at which fertilized eggs are kept determines whether the animals developing in the eggs will be male or female. | ½ + ½

Example 2 : Snails – Individuals can change sex during their lifetime. | ½ + ½ | 4

38	(a) Convergent	1	
	(b) $f(m) = \frac{1}{P} = \frac{1}{-2.5} = -0.4$ m or -40 cm	½ , ½	
	(c)		

   | 2 | |

OR

(c) • Convex lens – magnified | ½
Concave lens – diminished | ½
• Convex – object between O and F | ½
Concave – object anywhere between optical centre and infinity. | ½ | 4

| 39 | (a) Cinnabar ; HgS (Sulphide form) | ½ , ½ | |
| | (b) To form Zinc oxide (Calcination) | 1 | |

Alternate answer:

$$ZnCO_3 \text{ (s)} \xrightarrow{\text{heat}} ZnO + CO_2$$

(c) (I) Aluminium, Thermit Reaction | ½ , ½

(II) $Fe_2O_3 + 2Al \longrightarrow 2Fe + Al_2O_3 + \text{Heat}$ | 1

	OR		
	(b) • Sodium has more affinity for oxygen than carbon / Sodium is highly reactive.	1	
	• At cathode $Na^+ + e^- \longrightarrow Na$	½	4
	•At anode $2Cl^- \longrightarrow Cl_2 + 2e^-$	½	

****