CBSE

ADDITIONAL PRACTICE QUESTIONS
SCIENCE (086)

Time Allowed: 3 hours   **Max. Marks: 80**

General Instructions:

i. This question paper consists of 39 questions in 5 sections.
ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
iii. Section A consists of 20 objective type questions carrying 1 mark each.
iv. 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.
v. 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.
vi. 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.
vii. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section A

Select and write the most appropriate option out of the four options given for each of the questions 1 - 20. There is no negative mark for incorrect response.

Q.Nos.	Questions	Marks
1	A single displacement reaction is represented below. PQ + R ----> PR + Q Which of the following is true about the reactants and products?	1

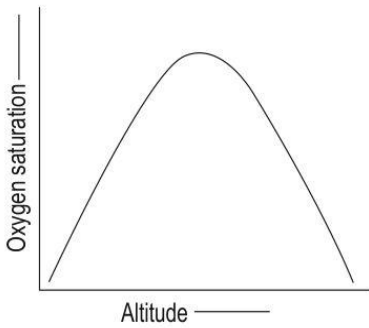| Option	Nature of R in product	Stability of PR as compared to PQ
A	cation	more stable
B	cation	less stable
C	anion	more stable
D	anion	less stable

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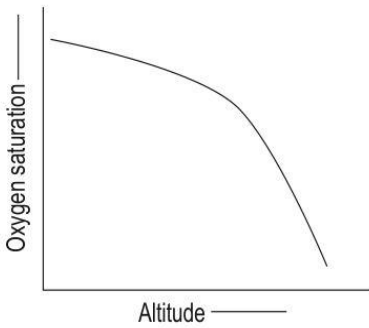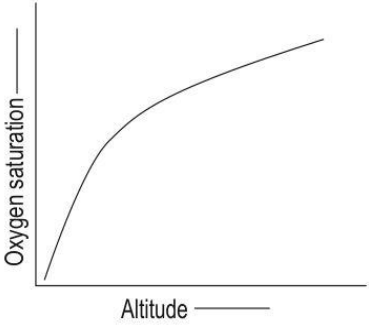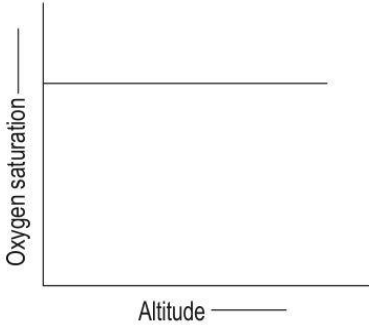(d) D

2	Some types of chemical reactions are listed below. - decomposition - combination - displacement - double displacement Which two of the following chemical reactions are of the SAME type? P) $AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$ Q) $Mg + 2\ HCl \longrightarrow MgCl_2 + H_2$ R) $CH_4 + 2\ O_2 \longrightarrow CO_2 + 2\ H_2O$ S) $2\ KOH + H_2SO_4 \longrightarrow K_2SO_4 + H_2O$ (a) P and Q (b) Q and R (c) R and S (d) P and S	1
3	Neetu has two test tubes containing dilute hydrochloric acid and dilute sodium hydroxide solution, but they are not labeled. Adding which of the following solutions to the test tubes will help her to identify the acidic and basic solution? - vinegar - baking soda - sodium chloride (a) vinegar (b) baking soda (c) sodium chloride (d) (none of them)	1
4	Sonia has aqueous solutions of three salts, sodium acetate, sodium chloride and ammonium chloride in three test tubes. The test tubes are not labeled. On checking, she finds the pH of the solutions to be 4.6, 7.0 and 8.9. Which of the following correctly matches the salts with their respective pH? (see table below) (a) P (b) Q	1

	pH 4.6	pH 7.0	pH 8.9
P	sodium acetate	sodium chloride	ammonium chloride
Q	sodium chloride	ammonium chloride	sodium acetate
R	ammonium chloride	sodium acetate	sodium chloride
S	ammonium chloride	sodium chloride	sodium acetate

		(c) R (d) S	
5		Galvanisation is a process of coating iron articles with a layer of zinc to prevent the iron from rusting. The iron is protected even if the zinc coating is scratched and iron is exposed. Which of the following is true about how zinc prevents the rusting of iron? P) A galvanised iron article does not undergo oxidation. Q) The zinc coating prevents contact of iron with air. R) Zinc undergoes corrosion more easily than iron. (a) only P (b) only Q (c) only P and Q (d) only Q and R	1
6		During purification of a metal by electrolysis, what happens at the negative electrode? (a) Metal ions lose electrons to become neutral atoms. (b) Neutral metal atoms gain electrons to become ions. (c) Neutral metal atoms lose electrons to become ions. (d) Metal ions gain electrons to become neutral metal atoms	1
7		Metals are lustrous and shine especially when their freshly cut surfaces are exposed. Salma cut pieces and compared the lustre of the freshly cut surfaces of the following metals. aluminium, sodium, copper, iron The freshly cut surface of which of these metals is likely to lose its lustre first on exposure to air? (a) aluminium (b) sodium (c) copper (d) iron	1
8		Which of the following statements is TRUE about the uptake of water in plants? (a) It occurs all the time due to diffusion. (b) Water enters the roots due to osmosis. (c) At night when transpiration is low, roots do not take up water. (d) The movement of water from roots to leaves is bidirectional.	1

9	Oxygen saturation levels refer to the extent haemoglobin is bound to oxygen. As altitude increases, the atmospheric pressure decreases. Which of the following graphs correctly represents the oxygen saturation levels as altitude increases? (a) P (b) Q (c) R (d) S	1
10	Which of the following method/s are useful to prevent fertilisation even when ovulation occurs? P) surgical blocking of the fallopian tube Q) copper-T R) oral pills S) condom (a) only P (b) only Q and R (c) only P, Q and S (d) only Q, R and S	1
11	In cattle, having horns is a recessive trait (h) to not having horns (H). When cattle with horns are crossed with cattle that do not have horns, the number	1

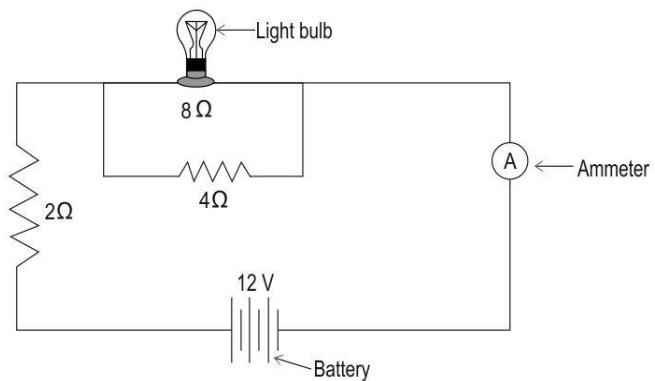|	of offspring having horns was equal to those not having horns. Which of the following is MOST LIKELY to be true? (a) Both parents are homozygous dominant. (b) One parent is homozygous dominant. (c) Both parents are heterozygous. (d) One parent is heterozygous.	
12	Patient X was suffering from a pancreatic condition due to which the pancreas was not functioning adequately. Which of the following is a doctor likely to suggest to such an individual? (a) including a large amount of protein in the diet (b) eating a diet with low-fat content (c) eating only carbohydrates (d) including only liquid foods	1
13	When an object was kept at position X in front of a concave mirror, an enlarged and virtual image was formed. Which among the following identifies 'X' correctly? (a) anywhere between the centre of curvature and principal focus (b) anywhere between the pole and principal focus (c) exactly at the centre of curvature (d) exactly at the principal focus	1
14	The face of the moon that is visible to us is called as the near side and the face of the moon which is invisible to us is called as far side. What colour would the sky appear to an astronaut standing on the "far side" of the Moon and why? (a) blue, as the Moon's atmosphere scatters sunlight just like Earth (b) white, as the Moon's surface reflect all the light that falls on it (c) black, as there is no atmosphere on Moon to scatter sunlight (d) black, as sunlight does not fall on the far side of the Moon	1
15	Plants receive energy from the Sun which they utilise for several processes. The energy utilized for which of the following plant processes gets transferred to the next trophic level that consumes plants? (a) only growth (b) only respiration and transport of substances	1

	(c) only transport of substances and reproduction (d) all - growth, photosynthesis, respiration and transport of substances	
16	The action of which among the following is crucial to the formation of ozone? (a) humans (b) sunlight (c) carbon dioxide (d) chlorofluorocarbons	1

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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

b) Both A and R are true, and R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

17	Assertion (A): Zinc oxide can be reduced to zinc metal on heating with carbon. Reason (R): Carbon is less reactive than zinc.	1
18	Assertion (A): Variations always provide a survival advantage to an organism. Reasons (R): Variations can be caused due to incorrect DNA copying.	1
19	Assertion (A): Iron filings scattered around a straight current carrying conductor in a plane perpendicular to the length of the conductor, arrange themselves in concentric circles. Reason (R): Magnetic field has both magnitude and direction.	1
20	Assertion (A): Omnivores receive 10% of their energy from the trophic level below them. Reason (R): An omnivore is always in the trophic level just above herbivores.	1

Section B

Question No. 21 to 26 are very short answer questions

| 21	(a) Write the balanced chemical equation for the reaction that is prevented by storing potassium metal under kerosene. (b) Identify the type of chemical reaction that is prevented.	2

22	Ravi cultivated mustard, a plant with bisexual flowers, on his farm. His plants were diseased due to a gene defect and therefore had reduced yield. Ravi removed the stamens from the diseased plants and also planted fresh disease-free mustard plants where he removed the pistils. How will Ravi's strategy help in improving the yield of mustard?	2
23	A plant X was enclosed in a glass jar with some lizards. A similar plant Y was enclosed in another glass jar but without lizards. Both the jars are kept under the same light conditions for a few hours. Which plant is likely to photosynthesize more and why? **OR** Proteinuria is a condition in which significant amounts of protein can be detected in urine. Which process in the nephron is likely to be affected causing proteinuria? Justify.	2
24	Search mirrors are mirrors that are used to look for hidden objects underneath the cars as shown. The hidden objects can be easily spotted as the mirror provides a wider field of view. (a) What type of mirrors are generally used to make search mirrors? (b) With the help of a ray diagram describe the nature of image formed by the type of mirror identified in (a).	2
25	Ramya wants to measure the current flowing through the circuit shown below. 	2

Which among the four ammeters can she use for the same? Show your calculations.

Ammeter	Minimum range	Maximum range
P	0 mA	1 m A
Q	0 mA	10 mA
R	0 A	1 A
S	0 A	10 A

OR

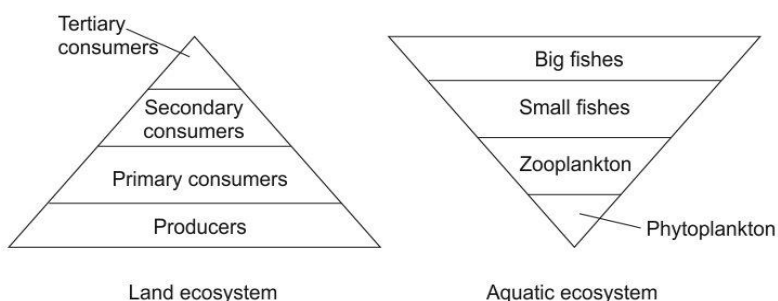A helical coil whose length is greater than its diameter is connected to a battery as shown below.
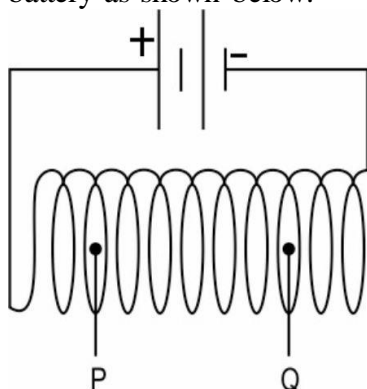
(a) How does the magnetic field at point P compare with the magnetic field at point Q? Justify your answer.

(b) State one way in which the strength of the magnetic field inside a current carrying helical coil can be changed?

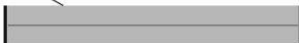| 26 | Shown below are two food pyramids. | 2 |

The pyramid representing the land ecosystem is traditional with producers being greater in mass than primary consumers and so on. Sometimes, in aquatic ecosystems, an inverted pyramid exists. Here, the total mass of producers (phytoplankton) is much smaller than the top consumers (big fishes).
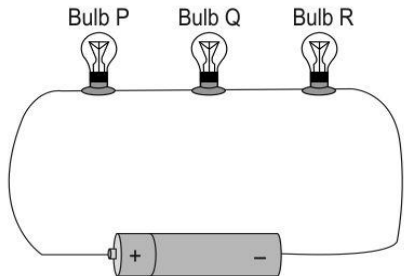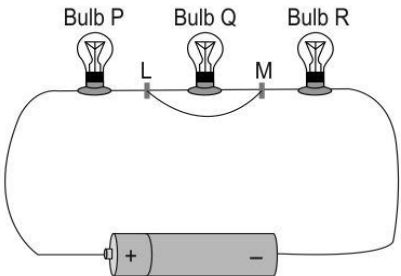
(a) Which level is likely to have the most amount of energy in such an aquatic ecosystem? Give a reason to support your answer.
(b) Such aquatic ecosystems are considered to be unstable. Justify this statement.

Section C

Question No. 27 to 33 are short answer questions

27	Equal sized bars of aluminium and iron are exposed to the environment as shown below. Exposed surface Exposed surface Aluminium bar Iron bar Which of them is likely to corrode till the level marked by the line FIRST? Justify your answer.	3

28	The electronic configuration of some elements is given in the table below.	3

Element	Electronic configuration
P	2, 8, 8
Q	2, 8, 8, 1
R	2, 6
S	2, 5
T	2, 8, 2
U	2, 8, 7

(a) Identify any two pairs of elements that will react to form compounds by a transfer of electrons.
(b) Write the molecular formula of the compounds formed by the pairs of elements identified in (a).

OR

A metal X is obtained from its chloride salt by exposure to sunlight.

(a) In which section of the reactivity series of metals- top, middle or bottom, is it likely to be placed? Justify your answer.
(b) Identify the type of reaction the chloride salt of metal X undergoes on exposure to sunlight.

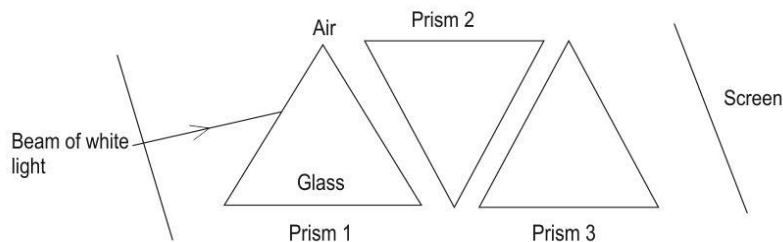| 29	In animals, hormones can be secreted by one organ and can act on multiple organs. Justify this statement by explaining the effect of a single animal hormone on three organs.	3
30	If two pea plants having round and green seeds (RRGg) are crossed, identify the percentage of the following with respect to the F1 generation: (a) gametes having both the round and yellow seed traits (b) offspring having the same genotype as the parents (c) offspring having the same phenotype as the parents	3
31	Absolute refractive indices of two media P and Q are 1.33 (n_P) and 2.52 (n_Q) respectively. The speed of light in medium P is 2×10^8 m/s. (a) What would be the speed of light in medium Q (V_Q)? (b) If the angle of incidence for a ray of light travelling from medium P to Q is $0°$, then what will be the path of light in the medium Q?	3
32	Kaveri conducted an experiment to study the energy efficiency of different bulbs. She connected a bulb A having a resistance of 100 ohms to a 240 V power supply in a laboratory. (a) How much energy will be consumed by the bulb, if it is kept ON for 4 hours each day for a week? Express your answer in kJ. (b) Kaveri connects another similar bulb B in series with bulb A and connects the combination to a 240 V supply. Will there be any change in the brightness with which bulb A glows now? Explain mathematically.	3
33	(a) Vijaya connects three bulbs P, Q and R is series with a battery in two different ways using identical conducting wires as shown below. She notices that in case I all three bulbs glow but in case II only the bulbs P and R continue to glow. What could be the reason for the bulb Q to not glow in case II? Explain. (b) Two resistances when connected in parallel give a combined resistance of 10/3 ohms. When the same two resistors are connected in series, the combined resistance becomes 15 ohms. Calculate the individual resistance of each resistor.	3

Question No. 34 to 36 are long answer questions.

|		
34	A carbon compound P has six carbon atoms and twelve hydrogen atoms. (a) Is P a saturated or unsaturated carbon compound. Justify your answer by drawing the structural formula. (b) Describe a test that can be used to determine if compound P is saturated or unsaturated. (c) Name the products that are formed on burning compound P in an excess of air. **OR** A carbon compound P is found to be neutral when tested with red and blue litmus. A gas, that burns with a 'pop' sound, is produced when a metal reacts with carbon compound P. (a) Write the chemical equation for the reaction. (b) The carbon compound P is heated with concentrated sulphuric acid to produce carbon compound Q. (i) Write the chemical equation for the reaction. (ii) Describe the type of flame that Q produces on combustion. (c) What is likely to be observed on heating compound P with ethanoic acid with an acid as catalyst? Write the chemical equation for the reaction.	5
35	(a) Certain specialised cells in animals called stem cells have the ability to divide and differentiate into different cell types. This helps in the replacement of a damaged organ. Name and explain two methods of asexual reproduction that are similar to stem cells and occur mostly in multicellular organisms. (b) Identify TWO pairs of reproductive organs in males and females that are functionally similar to each other. Justify. **OR** (a) Sagar saw a beautiful rose and smelled it. As he was smelling it, he happened to touch a thorn and pull his hand away. State TWO differences and similarities each in the way the nervous system performs the two actions. (b) Are all involuntary actions reflex actions? Justify.	5
36	Savera passed a beam of white light through a series of equilateral prisms as shown.	5

(a) What colour(s) will be seen on the screen?

(b) Copy the diagram above and draw the beam entering Prism 1 and emerging from Prism 3 and falling on the screen.

(c) Name all the processes that takes place when the beam of light enters the Prism 1 and emerges from Prism 3.

OR

(a) Rupal suffers from myopia. Where would the image form in her eye?

(b) Name the type of lens that is generally used to correct myopia.

(c) Rupal underwent cataract surgery and her eye lens was replaced with an artificial lens with a fixed focal length, made of a plastic material, silicone. State one likely visual disadvantage that Rupal is likely to experience as compared to a person who has normal eyesight.

(d) Identify the parts of the eye labeled in the diagram from the descriptions given below by writing the labels as your answer.
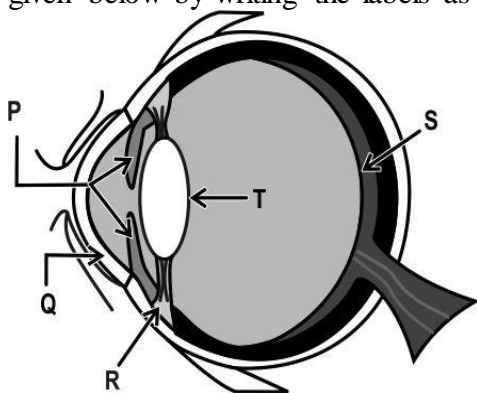
(i) It helps in changing the focal length of the lens.

(ii) It causes most of the refraction of the light entering the eye.

(iii) It controls the amount of light entering the eye.

(iv) It acts as a screen on which the image is formed.

Section – E

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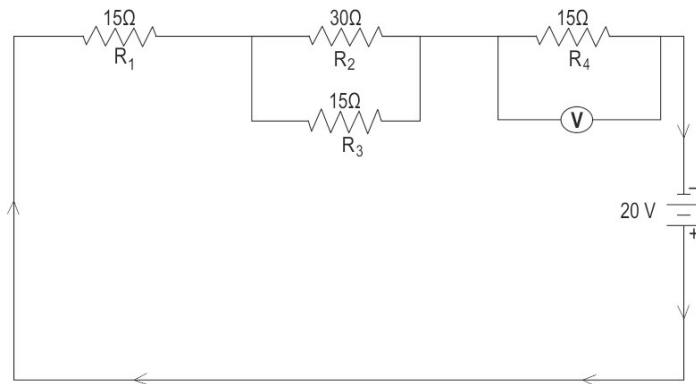**Internal choice is provided in one of these sub-parts**

37	Given below is a four carbon skeleton of a hydrocarbon compound.	4
	$$\begin{array}{c} C \\ | \\ C - C \\ | \\ C \end{array}$$ (a) Fill in the hydrogen atoms/bonds to form: (i) a saturated hydrocarbon (ii) an unsaturated hydrocarbon (b) If the four-carbon skeleton is of a straight chained alkene, draw the structures of all the possible compounds. **OR** If the four-carbon skeleton is of a straight chained alkyne: (i) How many carbon atoms may NOT be bonded to any hydrogen atoms? (ii) How many hydrogen atoms will there be in the compound?	
38	Ram and Asha were a married couple where Ram had normal vision whereas Asha could not see some colours (colour-blind). They give birth to five children - 3 sons and 2 daughters. Of these, all sons were colour-blind while both daughters had normal vision. (a) Using a reason to support your answer for each, identify if the trait for colour blindness is: (i) recessive or dominant? (ii) linked to the X chromosome or Y chromosome? (b) Based on (a), what is the genotype of Ram and Asha with respect to the colour-blind trait? Draw a Punnett square to show the cross. **OR** If one of the sons gets married to a girl who is heterozygous for the colour-blind trait, what is the possibility of their son being colour-blind? Show the cross.	4

39	Four resistors, a voltmeter and a battery are connected in a circuit as shown below.	4
	(a) What is the net resistance in the circuit?	
	(b) How much potential difference will the voltmeter connected across the resistor R_4 measure?	
	OR	
	What is the power dissipated by the resistor R_1?	
	(c) If R_3 is removed, will the net current in the circuit increase or decrease or remain the same? Justify your answer.	

CBSE

ADDITIONAL PRACTICE QUESTIONS - MARKING SCHEME
SCIENCE (086)

Class X | 2023–24

Time Allowed: 3 hours   **Max. Marks: 80**
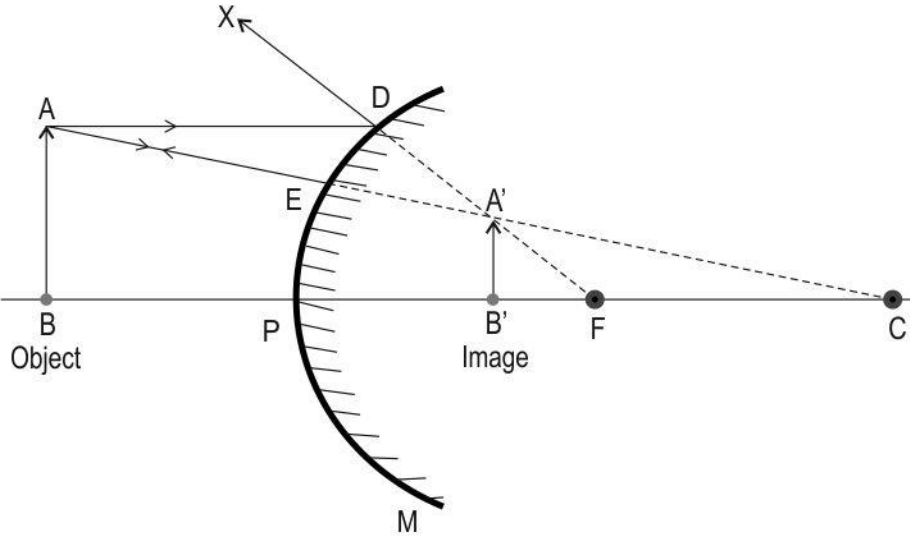
Q. Nos.	Answers	Marks
	Section A	
1	(c) C	1.0
2	(d) P and S	1.0
3	(b) baking soda	1.0
4	(d) S	1.0
5	(d) only Q and R	1.0
6	(d) Metal ions gain electrons to become neutral metal atoms	1.0
7	(b) sodium	1.0
8	(b) Water enters the roots due to osmosis.	1.0
9	(b) Q	1.0
10	(c) only P, Q and S	1.0
11	(d) One parent is heterozygous.	1.0

12	(b) eating a diet with low-fat content	1.0
13	(b) anywhere between the pole and principal focus	1.0
14	(c) black, as there is no atmosphere on Moon to scatter sunlight	1.0
15	(a) only growth	1.0
16	(b) sunlight	1.0
17	(c) A is true, but R is false.	1.0
18	(d) A is false and R is true.	1.0
19	(b) Both A and R are true, and R is not the correct explanation of A.	1.0
20	(c) A is true but R is false.	1.0
Section B		
21	(a) $4 K + O_2 \longrightarrow 2 K_2O$ *[1 mark]* (b) combination reaction OR oxidation reaction *[1 mark]*	2.0
22	1 mark each for the following: - Ravi made the bisexual flower unisexual thereby encouraging cross-pollination instead of self-pollination. - Cross-pollination will increase variation and thereby the chances of having more disease-free offspring. *[Accept any other valid answer.]*	2.0
23	1 mark each for the following: - Plant X - Due to respiration of the lizard, the amount of carbon dioxide will increase leading to a higher amount of photosynthesis. **OR** 1 mark each for the following: - Filtration OR selective reabsorption by the nephron may not be functioning properly.	2.0

	- Improper filtration will lead to proteins getting filtered even though they are not waste. **OR** After filtration, useful substances such as proteins may not be getting reabsorbed.	
24	(a) convex mirror *[0.5 marks]* (b) - 0.5 marks for any two of the following: virtual, erect and diminished - 1 mark for the ray diagram 	2.0
25	- From Ohm's law we have V = IR I = V/R given V = 12 V and R_1 = 2 ohm, R_2 = 8 ohm and R_3 = 4 ohm Therefore, net resistance R = R_1 + (R_2 x R_3)/ (R_2 + R_3) = 2 + (8 x 4/8 + 4) = 2 + 32/12 = 2 + 2.66 R = 4.66 ohm *[1 mark]* I = 12/4.66 I = 2.58 A *[0.5 marks]* - She can use ammeter S to measure the current in the circuit. *[0.5 marks]*	2.0

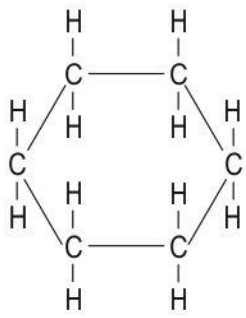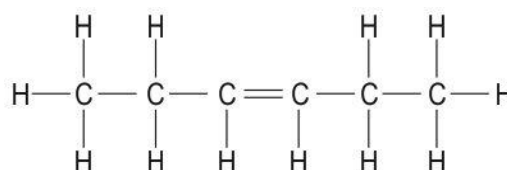|		
	OR - The magnetic field at P and Q is the same. *[0.5 marks]* - because the magnetic field lines inside the helical coil of wire which behaves like a solenoid is uniform/in the form of parallel straight lines. *[0.5 marks]* *[Accept any other valid another answer.]* (b) 1 mark for any one of the following: - increasing/decreasing the number of turn in the coil - increasing/decreasing the current through the coil	
26	(a) 0.5 marks each for the following: - phytoplankton - Producers will still have the highest amount of energy captured from sunlight which will continue to reduce as we move towards the top of the pyramid. *[Accept any other valid answer.]* (b) Since the total mass in the lower trophic level is lesser there will be lesser food available to higher trophic levels causing organisms to die sooner than usual. *[1 mark]* *[Accept any other valid answer.]*	2.0
	Section C	
27	- The iron bar will corrode till the level marked by the line first. *[1 mark]* - Iron gets oxidised on exposure to air and moisture. The layer of rust formed on the surface allows air and moisture to pass through and reach the metal, causing corrosion to continue. *[1 mark]* - Aluminium gets oxidised on exposure to air. The layer of oxide formed on the surface forms a protective coating that prevents air from reaching the metal and thus prevents further corrosion. *[1 mark]*	3.0
28	(a) 1 mark each for any two correct pairs of elements identified such as: - Q and R - Q and U - T and R - T and U	3.0

(b) 0.5 marks each for the formula for two compounds such as:
- Q_2R
- QU
- TR
- TU_2

OR

(a) - bottom section [*1 mark]*
- Metals at the bottom of the reactivity series are the least reactive. They occur in their free state; their compounds are unstable and hence easily converted to metal. *[1 mark]*

(b) photolytic decomposition *[1 mark]*

29	1 mark each for the following: - Adrenaline induces the sweat glands to produce more sweat. - It acts on the heart to increase the contraction of its muscles/pumping causing improved oxygen delivery. - It acts on blood vessels of the digestive system constricting them. *[Accept any other valid answer.]*	3.0
30	1 mark each for the following: (a) 50% (b) 50% (c) 75%	3.0
31	(a) n_P = (Speed of light in vacuum/ speed of light in medium P) n_q = (Speed of light in vacuum/ speed of light in medium Q) *[0.5 marks]* Therefore, $n_P/n_Q = V_Q/V_P$ $= 1.33/2.52 = V_Q / 2 \times 10^8$ *[0.5 marks]* $V_Q = (1.33 \times 2 \times 10^8)/ 2.52$ $= 1.056 \times 10^8$ m/s *[1 mark for the calculation and arriving at the correct answer.]*	3.0

	(b) the ray will travel undeviated through the medium Q *[1 mark]* *[Accept any other valid answer.]*	

32	(a) Given V = 240 V and R = 100 ohms
	
	Therefore,
	Power (P) = V^2/R
	   = $(240)^2/100$
	   = 576 W *[0.5 marks]*
	
	Energy consumed by bulb A = P × t
	E = 576 x 4 x 7 × 60 × 60
	E = 58,060.8 kJ *[0.5 marks]*
	
	[Marks to be awarded if the students use any other method to arrive at the correct answer.]
	
	(b) When bulbs A and B are connected in series:
	
	R_{net} = R1 + R2
	   = 100 + 100
	R_{net} = 200 ohms
	
	Total power consumed by bulb A when connected in series with bulb B
	P_{tot} = V^2/R_{net} = $(240)^2/200$ = 288 W *[0.5 marks]*
	$P_{A'}$ = $P_{tot}/2$ = 144 W *[0.5 marks]*
	
	Power consumed by bulb A when connected without bulb B to 240 V
	P_A= V^2/R
	= $(240)^2/100$
	= 576 W
	
	As $P_{A'}$ < P_A , the brightness of the bulb A decreases when connected in series with bulb B. *[1 mark]*
	
	[Marks to be awarded if the students use any other method to arrive at the correct answer.]
		3.0

33	(a) The current will flow through the additional wire that connects the points L and M (avoiding the bulb) as it offers a path of least/lower resistance as compared with the bulb *[1 mark]*	3.0

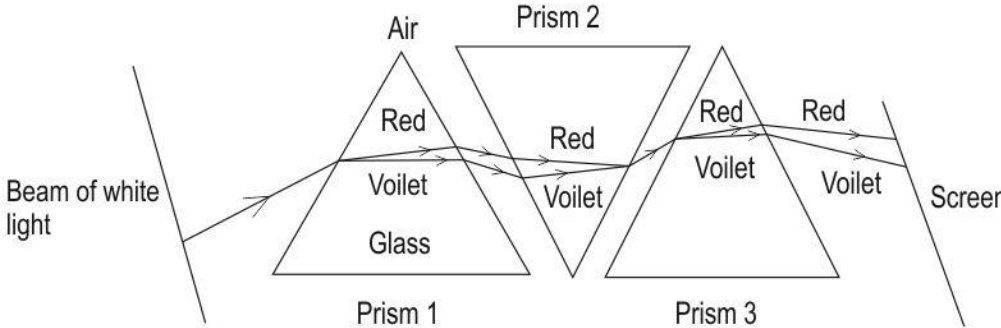|	(b)	
	$3/10 = 1/R_1 + 1/R_2$ .... (1) $R_1 + R_2 = 15, R_1 = 15 - R_2$ Substituting in (1) $3/10 = (15 - R_2 + R_2)/ (15 - R_2) R_2$ *[1 mark]* $15R_2 - R_2^2 = 150/3 = 50$ $R_2^2 - 15 R_2 + 50 = 0$ $R_2 = 10$ ohm, $R_1 = 5$ ohm or $R_1 = 10$ ohm, $R_2 = 5$ ohm *[1 mark]* *[Accept any other correct method]*	
	Section D	
34	(a) Compound P may be either saturated or unsaturated. *[1 mark]* - saturated compound: cyclohexane *[1 mark]* - unsaturated compound: 2-hexene *[1 mark]* *[Accept any correct structural isomer]* (b) burning the compound in an excess of air will produce a sooty flame if it is unsaturated and a clean flame if it is saturated *[1 mark]*	5.0

(c) carbon dioxide and water *[1 mark]*
[No marks to be given for only one product]

OR

(a) $2\,Na + 2\,CH_3 - CH_2OH \longrightarrow 2\,CH_3 - CH_2O^-Na^+ + H_2$
[Marks to be given for writing the correct reaction of sodium metal with any alcohol.]

(b)
(i) $CH_3 - CH_2OH \longrightarrow CH_2 = CH_2 + H_2O$ *[1 mark]*
(ii) Compound Q (ethylene) burns with a yellow flame with black smoke. *[1 mark]*

(c) A compound with a fruity smell will be produced. *[1 mark]*

$$CH_3COOH + CH_3CH_2OH \xrightarrow{\quad H_2SO_4 \quad} CH_3COOCH_2CH_3$$

| 35 | 0.5 marks each for the name and 0.5 marks each for the explanation:
- Regeneration
- In this process, if an individual organism is cut or broken up into many pieces, many of these pieces grow into separate individuals.

- Budding
- In budding, a small outgrowth or bud forms on the parent organism, which eventually detaches and develops into a new individual.

[Accept any other valid answer.]

(b)
- testes and ovaries *[0.5 marks]*
- Both structures perform the function of producing gametes and hormones crucial for reproduction *[1 mark]*

- vas deferens and fallopian tube *[0.5 marks]*
- Both structures are responsible for carrying the gamete to the site of fertilisation. *[1 mark]* | 5.0 |

[No marks are to be allotted if the pair mentioned is incorrect.]

OR

(a) 1 mark for each point such as:
Similarities:
- In both cases, the signal is initiated by receptors located at the specific sense organ.
- In both cases, neurotransmitters are released and accepted by neurons to carry the impulse.

Differences:
- The action of smelling the rose is voluntary whereas pulling the hand away is involuntary in nature.
- While smelling the rose, the nerve impulse reaches the brain and back whereas on touching a thorn the nerve impulse travels only to the spinal cord and back.

[Accept any other valid points.]

(b) 0.5 marks each for the following:
- No
- Most involuntary actions do not require a stimulus to occur as is necessarily required in the case of a reflex action.

[Accept any other valid answer.]

36	(a) VIBGYOR *[1 mark]* - violet - indigo - blue - green - yellow - orange - red (b) 1 mark each for drawing the incident and emergent rays in the three prisms respectively. [Image not up to scale.]	5.0

Beam of white light

Air

Prism 1 — Glass — Red, Voilet

Prism 2 — Red, Voilet

Prism 3 — Red, Red — Voilet, Voilet

Screen

(c) 0.5 marks each
- dispersion
- refraction

OR

(a) in front of the retina *[1 mark]*
(b) concave lens *[1 mark]*
(c) The person would not have the power of accommodation. *[1 mark]*
(d) 0.5 marks each for the following:
(i) R
(ii) Q
(iii) P
(iv) S

Section E

| 37 | (a) 1 mark each for the following:

(i)

$CH_3 - C - H$ with CH_3 above and CH_3 below the central C | 4.0 |

(ii)

$$CH_2 = \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}$$

(b) 1 mark each for the following:

$H_3C - CH_2 - CH = CH_2$ $H_3C - CH = CH - CH_3$

OR

(i) one or two *[1 mark]*
(no marks if both 1 or 2 not given)
(ii) six *[1 mark]*

38	(a) (i) 0.5 marks each for the following: - Yes, it is recessive. - Since the trait does not express itself in all children, it is likely to be a recessive trait. *[Accept any other valid reason.]* (a) (ii) 0.5 marks each for the following: - Yes, it is X-linked. - Yes, since both male children received the X chromosome from the mother who is colour blind, it is likely to be linked to the X-chromosome. *[Accept any other valid reason.]* (b) 0.5 marks each for the genotypes: - Ram - XY - Asha - X^cX^c	4.0

Punnett square *[1 mark]*

	X	Y
X^c	X^cX	X^cY
X^c	X^cX	X^cY

OR

Punnett square *[1 mark]*

	X^c	Y
X^c	X^cX^c	X^cY

50% possibility of the son being colour-blind *[1 mark]*

39	(a) The net resistance is: $R_1 + (1/R_2 + 1/R_3) + R_4$ *[0.5 marks]* = 15 + 10 + 15 R = 40 Ω *[0.5 marks]* (b) Voltage drop across R_4 = Net current x R_4 Net current = V/R = 20/40 = 0.2 A *[1 mark]* Voltage drop across R_4 = 0.2 x 15 = 3 V *[1 mark]* **OR** Power dissipated by the resistor R_1 is given by: P = I^2R_1 I = V/R = 20/40 I = 0.2 A *[1 mark]* Therefore, Power = $(0.2)^2$ x 15 = 0.6 W *[1 mark]* (c) - net current will decrease *[0.5 marks]* - because R_3 is connected in parallel and removing it will increase the net resistance in the circuit thereby reducing the net current. *[0.5 marks]* *[Accept any other valid correct answer.]*	4.0