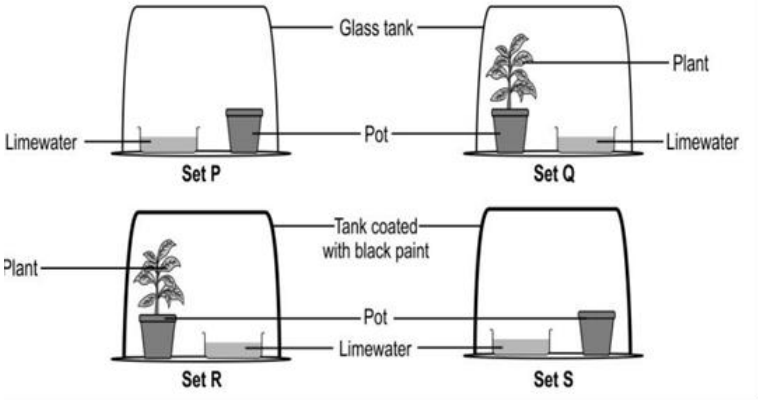
SCIENCE – CODE NO. 086
SAMPLE QUESTION PAPER*
CLASS – X (2026-27)

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

General Instructions:

(i) This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.

(ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of the alternatives in these questions.

	Section – A	
1	During photosynthesis, what happens to carbon dioxide and water as glucose is formed? A. Carbon dioxide gains hydrogen, while water loses electrons. B. Carbon dioxide loses oxygen, while water gains oxygen. C. Carbon dioxide is oxidised, while water is reduced. D. Both carbon dioxide and water undergo reduction.	1
2	Lime water turns cloudy in the presence of a gas, which is a by-product of respiration. Shown below are four setups kept in sunlight for 24 hours. In which setup is lime water expected to be the cloudiest?  A. P B. Q C. R D. S - - - - - - - - - - - - - - <u>*For visually impaired students*</u> Which of the following statement is **incorrect** concerning the experiment to show that sunlight is necessary for photosynthesis? A. The leaf should be destarched before conducting the experiment. B. The leaf kept in darkness will show the presence of starch. C. The leaf exposed to sunlight will show the presence of starch. D. Starch is the end product of photosynthesis.	1

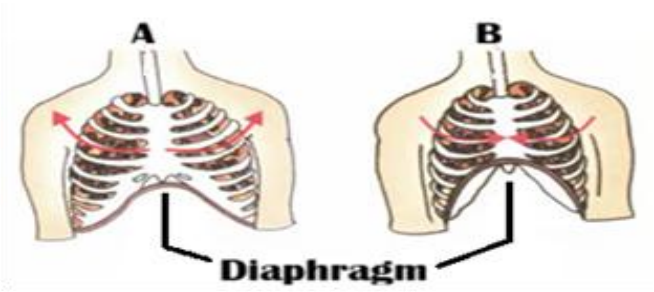
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3	During urine formation, tubular reabsorption and secretion take place in the kidneys. Which of the following sets correctly indicates both the substances that are reabsorbed in the kidneys? A. Glucose and salts B. Glucose and starch C. Glycogen and salts D. Glycogen and starch	1
4	In a controlled experiment, the anthers of a mustard plant's flowers were carefully removed in the bud stage before they matured. The bud was covered with a paper bag. What will be the most likely result for these flowers? A. They will still produce seeds and fruit through self-pollination. B. They will attract more insects and produce larger flowers but no fruit. C. They will not produce any seeds or fruits. D. They will produce seeds and fruits that are genetically identical to the parent.	1
5	The Vas deferens and the Oviduct are both targets for surgical contraception (Vasectomy and Tubectomy respectively). Analysing the process of reproduction, what common biological event is prevented by blocking both these structures? A. The production of gametes (sperm and egg). B. The implantation of the fertilized egg into the uterine wall. C. The successful meeting and fusion of the male and the female gametes. D. The release of hormones - testosterone and estrogen.	1
6	The male gamete of an apple plant has seventeen chromosomes. What is the number of chromosomes in the female gamete and in the cells of the adult plant respectively? A. 17,17 B. 17,34 C. 34,34 D. 34,51	1
7	A fish living in a pond ecosystem feeds on small aquatic insects (larvae). These insect larvae, in turn, feed on green algae and small photosynthetic bacteria. In this specific food chain, what is the trophic level classification of fish? A. Producer B. Primary Consumer C. Secondary Consumer D. Tertiary Consumer	1
The following two questions consist of two statements – **Assertion** (A) and **Reason** (R). Answer these questions by 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.		

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	C. A is true but R is false. D. A is false but R is true.	
8	**Assertion (A):** The rate of breathing in aquatic organisms is much lower than in the terrestrial organisms. **Reason (R):** The amount of oxygen dissolved in water is less as compared to the amount of oxygen in air.	1
9	**Assertion (A):** In an ecosystem, 1% of energy is available for transfer from one trophic level to the next. **Reason (R)**: An average of 10% of the food eaten by organisms is available for flow in the form of chemical energy.	1
10	A. Due to narrowing of the bile duct, the bile secretion from the liver to the small intestine was obstructed. How will the process of digestion be affected? B. How does the length of the intestine depend on the nature of food habit in different animals?	2
11	*Students to attempt either option A or B.* A. Which parts of the brain perform certain actions for which we do not have any thinking control? What are such actions called, give two examples. **OR** B. How is the information of touch in the '**sensitive plant'** controlled and coordinated?	2
12	What changes are observed in the uterus subsequent to implantation of the young embryo in a human female?	2
13	How do muscles move at the cellular level and respond when processed messages are received from the brain?	3
14	Study the food chain given below: Phytoplankton → zooplankton → small fishes → large fish A. In the given food chain, the amount of energy available at the fourth trophic level is 10 kJ, what will be the energy available at the producer level? B. Is it possible to have three more trophic levels in the above food chain? Justify. C. Which of these trophic levels will have the maximum amount of pesticide, if it had washed down in the water body from agricultural fields. Why?	3
15	In order to study patterns of inheritance, Neha had performed typical Mendelian experiments with pea plants in the field. In experiment one, she crossed a pea plant having white flowers (vv) with another pea plant bearing violet flowers (VV). In another experiment, in addition to the colour of the flower she also focussed on the height of the pea plant. This time she crossed a pea plant having violet flowers and tall height (VVTT) with another pea plant having white flowers and short height (vvtt).	4

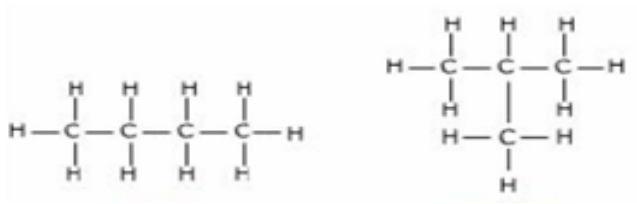
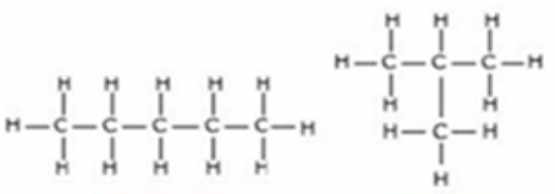
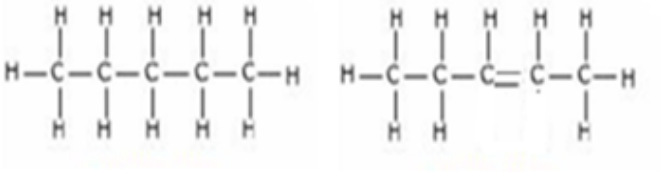
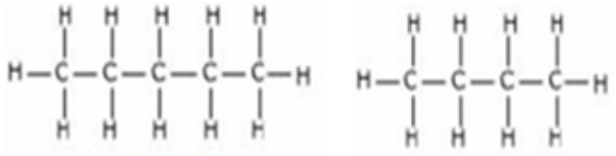
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	What percentage is expected for the following traits as a result of these experiments? Give a reason. A. Violet flowers in F1 and F2 generation in experiment one? (1) B. Tall height plants with white flowers in F2 generation in experiment two? (1) *Attempt either sub-part C or D.* C. Percentage of medium height plants with light violet flowers in F1 and F2 generations in experiment two? Give a reason. **OR** D. Percentage of short height plants with white flowers in F1 and F2 generations in experiment two? (2)	
16	*Attempt either option A or B*  A. Observe the structure of hearts A, B and C shown above and answer the following questions I. Which of the hearts depicted above is present in both birds and Mammals and how are they able to maintain their body temperature? Give reason for your answer. II. Which of the hearts depicted above is present in fishes, how does circulation of blood take place in them? **OR** B. I. Observe both the diagrams A and B. Which diagram indicates inhalation? Describe how it occurs.  II. If diffusion were to move oxygen in our body, it is estimated that it would take 3 years for a molecule of oxygen to get to our toes from our lungs. Then, how is oxygen delivered to all parts of our body? - - - - - - - - - - - - - - *For visually impaired students* A. I. How many chambers are present in the hearts of birds and mammals and how are they able to maintain their body temperature? Give reason for your answer	5

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	II. How many chambers are present in the heart of fishes, how does circulation of blood take place in them? **OR** B. I. Describe the process of inhalation and also mention how are the lungs designed in human beings to maximise the area for exchange of gases? II. If diffusion were to move oxygen in our body, it is estimated that it would take 3 years for a molecule of oxygen to get to our toes from our lungs then, how is oxygen delivered to all parts of our body?	
Section – B		
17	Chameleons contain crystals that reflect light and produce colour. Adjusting the spacing between these crystals, they can alter the wavelengths of light reflected, thus changing their skin colour. Based on the above information, we can infer that the change in colour by chameleons is a: A. chemical change because change in colour takes place. B. chemical change because wavelength of reflected light changes. C. physical change because the space between crystals is adjusted. D. physical change because light is reflected by crystals.	1
18	Rishita summarizes the chlor-alkali process in the following table. **Option** / **Product** / **Formed** / **Use** I / Hydrogen / At cathode / Used as a fuel II / Chlorine / At anode / Used to make margarines III / Sodium Hydroxide / Near cathode / To make soap IV / Sodium Hydroxide / Near anode / To make bleaching powder Identify the options that are correctly matched. A. I, II and III B. I and III C. II and IV D. I, II, III and IV	1
19	Manjeet wants to wash clothes, but the water available is hard. He compares the action of soap and detergent in hard water, to decide which one to use for washing his clothes. He observes: • Soap forms scum in hard water. • Detergent produces lather easily in hard water. Which of the following inferences is correct? A. Ca^{2+} and Mg^{2+} ions react with soap, forming insoluble compounds, whereas detergents do not form such insoluble salts. B. Soap is acidic, and detergents are basic.	1

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	C. Soap react with Na^+ ions in hard water to form scum while detergents do not react with Na^+ ions. D. Detergents form lather easily because they are ionic compounds and react with Ca^{2+} and Mg^{2+} ions while soaps do not react with hard water.	
20	Which of the following salts contain water of crystallisation: (i) Plaster of Paris, (ii) Washing soda, (iii) Baking soda and (iv) Gypsum. A. (i), (ii) and (iii) B. (i), (iii) and (iv) C. (ii), (iii) and (iv) D. (i), (ii) and (iv)	1
21	Which of the following pair of compounds are isomers? A.  B.  C.  D.  - - - - - - - - - - - - - - *For visually impaired students* The unsaturated hydrocarbon with three carbon atoms is: A. propene B. propane C. pentane D. pentene	1

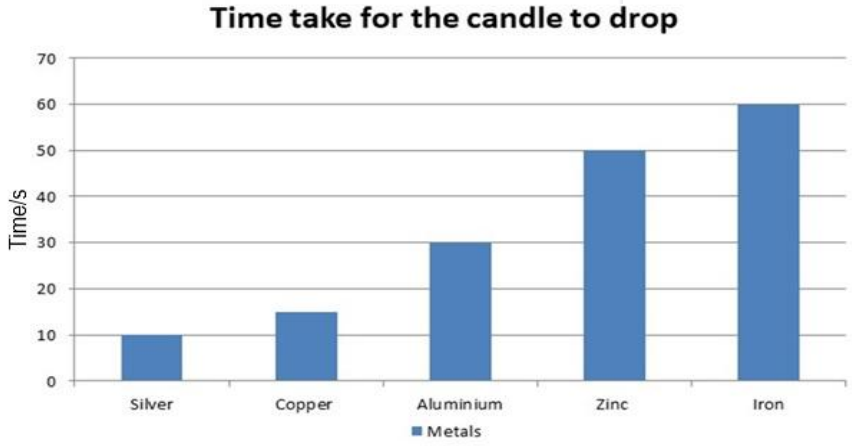
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22	A food label is given below. E304 and E307b are added to the flavoured biscuits.  **FLAVOURED BISCUITS** **Wheat** Flour, Vegetable Oil, Sugar, Salt, Malt Extract (From **Barley**), Baking Powder, Flavour Enhancers (E621, E635), Onion Powder, Natural Flavour, Maltodextrin (Maize), Chicken, Spices, Antioxidants (E304, E307b From **Soy**), Emulsifier (**Soy** Lecithin). **CONTAINS SOY AND GLUTEN CONTAINING CEREALS.** **MAY CONTAIN TRACES OF EGG, MILK, PEANUT, SESAME AND TREE NUT.** Which of the following is added to food packets for the same reason? A. salt B. vinegar C. nitrogen D. vanilla - - - - - - - - - - - - - - <u>*For visually impaired students*</u> In the food industry nitrogen is used as a/an A. preservative. B. oxidising agent. C. antioxidant. D. colouring agent.	1
23	Electrical wires made of aluminum A. corrode easily as aluminium is a very reactive metal. B. corrode easily because porous flaky aluminium oxide is formed. C. do not corrode easily as aluminium oxide forms a protective layer. D. do not corrode easily as aluminium is less reactive than metals like sodium, magnesium and zinc.	1
The following question consists of two statements – **Assertion** (A) and **Reason** (R). Answer this question by 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.		
24	**Assertion (A):** Onion extract loses its smell, when it is added to baking soda solution whereas it retains its smell when added to lemon juice. **Reason (R):** Onion acts as an olfactory indicator.	1

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25	Carbon forms millions of compounds whereas silicon, which is just below it in the Periodic Table, forms a few compounds. Explain the reason for the difference in their ability to form compounds.	2
26	*Attempt either option A or B.* A. An organic compound "X" with formula C_2H_6O is used to blend with petrol in order to reduce the dependence on fossil fuels and lower down the harmful emissions from the cars. It is also used as a solvent in medicines such as tincture iodine, cough syrups and many tonics. (i) Draw the electron dot structure of "X". (ii) Write the name and formula of the next homologue of "X". (iii) Write the reaction of "X" with acetic acid to form a sweet smelling substance. **OR** B. Ramya performs an experiment in the following two steps: Step 1: Heats ethanol with conc. H_2SO_4 at 170°C to get product A. Step 2: Passes hydrogen gas over product A, using Ni as a catalyst and gets product B. (i) Name the products A and B. (ii) Write the reactions involved in both the steps. - - - - - - - - - - - - - - *For visually impaired students* *Attempt either option A or B.* A. An organic compound "X" with formula C_2H_6O is used to blend with petrol in order to reduce the dependence on fossil fuels and lower down the harmful emissions from the cars. It is also used as a solvent in medicines such as tincture iodine, cough syrups and many tonics. (i) Name the compound "X". (ii) Write the formula of the next homologue of "X". (iii) Write the reaction of "X" with acetic acid to form a sweet smelling substance. **OR** B. Ramya performs an experiment in the following two steps: Step 1: Heats ethanol with conc. H_2SO_4 at 170°C to get product A. Step 2: Passes hydrogen gas over product A, using Ni as a catalyst and gets product B. (i) Name the products A and B. (ii) Write the reactions involved in both the steps.	3
27	Give reason for the following : A. A solution of sports electrolyte drink conducts electricity, but coconut oil does not.	3

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	B. Milkiness disappears when excess of carbon dioxide is passed through lime water. C. An iron bridge near the sea rusts much faster than an iron bridge located in a dry hilly region.	
28	Aavya and Vihan are studying the properties of metals in school. They decide to design and conduct an experiment to test the relative conduction of heat by metals. They use the apparatus (Figure) with rods of five different metals aluminium, silver, copper, iron and zinc attached to a central point. This central point is heated using a burner. The metal rods are of equal length and thickness. They observe that the candles at the end of the rods fall at different times. (Study the graph)   A. On the basis of the graph obtained, which metal is the best conductor of heat? B. Gold is a better conductor of heat than aluminium but it is not as good as copper. The time taken for the candle to drop if one of the rods were made of gold would have been: (i) 15 s (ii) 20 s (iii) 35 s (iv) 10 s *Attempt either sub-part C or D.* C. The length of all the metal rods is increased by 20% without any change in the thickness. Will the time required for the candles to drop be affected? How and why?	4

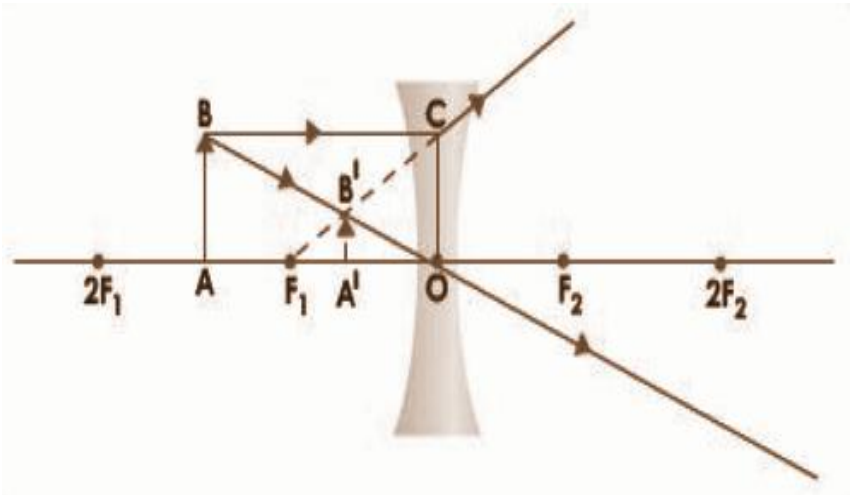
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	OR D. Mayank tries the experiment with an apparatus similar to figure (1). He ensures the length of all metal rods is the same. However, the thickness of rods is not the same in his apparatus. Will the inference he draws on the basis of his experiment be correct? Justify your answer. - - - - - - - - - - - - - - *For visually impaired students* Aavya and Vihan are studying the properties of metals in school. They decide to design and conduct an experiment to test the relative conduction of heat by metals. They use rods of equal length and thickness made of five different metals – A, B, C, D and E. A heat sensor is attached at one end of each rod. The other end of the rod is heated and time required for the heat sensor to beep is noted for all metal rods. The heat sensor at the end of B rod beeps in 10 seconds, C rod in 15 seconds, A a 30 seconds, E in 50 seconds and D sensor beeps in 60 seconds. A. On the basis of the experimental result, which metal is the best conductor of heat? B. Metal G is a better conductor of heat than metal A but it is not as good as metal C. The time taken for the sensor to beep if one of the rods were made of G would have been: (i) 15 s (ii) 20 s (iii) 35 s (iv) 10 s *Attempt either sub-part C or D.* C. The length of all the metal rods is increased by 20% without any change in the thickness. Will the time required for the sensor to beep be affected? How and why? **OR** D. Mayank tries the experiment with little variation. He keeps the length of all the rods of the same length, but, the thickness of rods is not the same. Will the inference he draws on the basis of his experiment be correct? Justify your answer.	
29	*Attempt either option A or B.* A. I. Refer to the dialogue between Alisha, Drishti and Bhushan in the chemistry lab. They are discussing rusting of iron and formation of ammonia gas. Who all do you agree with and why? Alisha: The formation of ammonia by reaction of nitrogen with hydrogen is a reduction reaction. Dristhti: Both rusting of iron and formation of ammonia are redox reactions. Bhushan: Rusting of iron is an oxidation reaction.	5

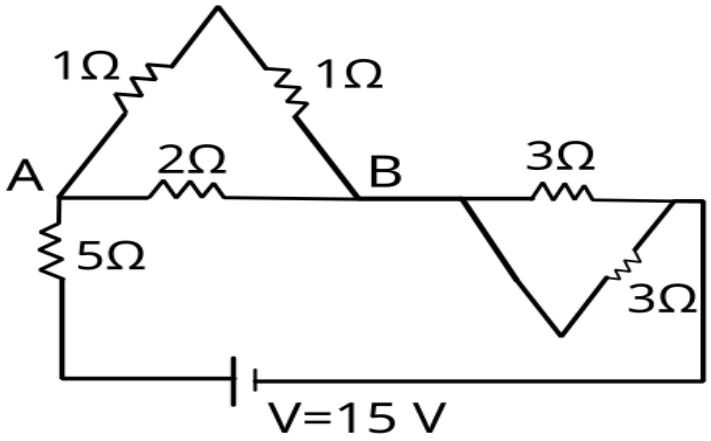
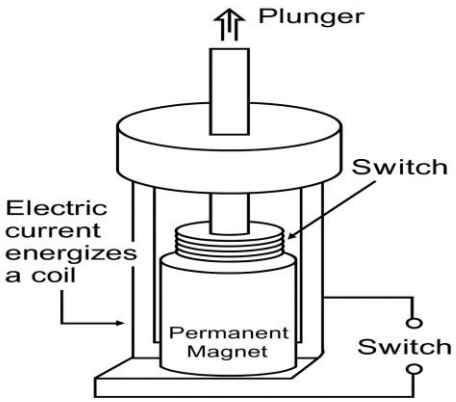
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	II. Assess the following chemical equations. Identify the error(s) and rewrite the equation after correction. (i) $MgCl_2 + AgNO_3 \rightarrow AgCl_2 + MgNO_3$ (ii) $Al + H_2SO_4 \rightarrow Al_2SO_4 + H_2O$ **OR** B. I. Refer to the dialogue between Daljeet and Avik in the chemistry lab. They have learnt about decomposition reactions. Who has understood decomposition reactions correctly? Justify your answer. Daljeet: During a decomposition reaction, a substance decomposes to give two simpler compounds. $MgCO_3$ decomposes on heating to magnesium oxide and carbon dioxide. Avik: No, during a decomposition reaction, a substance decomposes to give two elements. Water on electrolysis gives hydrogen and oxygen, both are elements. II. Analyse the observations given in following two cases. Are these observations correct? Give reasons to support your answer. (i) Iron fillings are added to an aqueous solution of magnesium sulphate. Observation: The colourless solution turns greenish due to formation of iron sulphate. (ii) Aluminium metal is added to dilute sulphuric acid Observation: Brisk effervescence are seen due to evolution of a gas.	
Section – C		
30	A student wants to determine the focal length of a convex lens using sunlight. Which of the following practical procedures will give the most accurate result? A. Move the lens close to a wall and measure the blurred circle. B. Hold the lens above a sheet of paper and adjust until the smallest, brightest spot is formed. C. Measure the thickness of the lens with a scale. D. Look through the lens at a distant object.	1
31	An electrical appliance rated 1000 W is operated at 250 V. What current does it draw? A. 0.25 A B. 2.5 A C. 4.0 A D. 10 A	1
The following one question consists of two statements – **Assertion** (A) and **Reason** (R). Answer these questions by 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.		

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	C. A is true but R is false. D. A is false but R is true.	
32	**Assertion** (A): The apparent depth of a coin in water is less than its real depth. **Reason** (R): Light bends away from the normal when it travels from water to air.	1
33	A. State Snell's Law of refraction. B. Define the refractive index of a material with respect to another material giving the mathematical expression.	2
34	*Attempt either option A or B.* A. I. State Joule's Law of heating. II. What happens to the heat produced in a conductor if the resistance is doubled while keeping other variables constant? **Or** B. I. Define resistivity. II. Justify with an example why resistivity is an intrinsic property of a material.	2
35	 A concave lens forms an image that is 1/3rd the size of the object, as shown in the diagram. If the object is placed 24 cm in front of the lens, determine: A. the type of lens. B. the image distance C. the focal length of the lens - - - - - - - - - - - - - - *For visually impaired students* A student places an object 24 cm from a convex lens of focal length 12 cm. Calculate the image position and determine whether the image is real or virtual.	3
36	A. State the Right-Hand Thumb Rule and describe how it helps determine the direction of magnetic field around a current-carrying conductor. B. Explain how the magnetic field changes with distance from the conductor.	3

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37	 The figure shows a circuit with a 15 V battery connected to several resistors. Using the given circuit diagram: A. Find the total current supplied by the battery. B. Calculate the potential difference between points A and B. - - - - - - - - - - - - - - *For visually impaired students* A 15 V battery is connected in series with three resistors of 2 Ω, 3 Ω, and 5 Ω. Calculate: A. The total resistance in the circuit. B. The total current supplied by the battery. C. The voltage drop across the 3Ω resistor.	3
38	A school has installed an automatic electromagnetic door-locking system at the main entrance. The locking mechanism uses a solenoid controlled by a switch at the security desk. When electricity flows through the solenoid, it creates a magnetic field strong enough to pull an iron bolt, unlocking the door. As soon as the switch is turned off, the magnetic field disappears, and a spring pushes the bolt back, locking the door.  A. Why is an iron core kept inside the solenoid in this locking mechanism? B. How can we determine the magnetic poles in this solenoid?	4

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	Attempt either subpart (C) or (D). C. If the current in the solenoid is increased from 1 A to 2 A, explain how the magnetic effect changes and its effect on unlocking the door. **OR** D. If the source of the current is fixed, how can we increase the magnetic field in the solenoid? - - - - - - - - - - - - - - *For visually impaired students* A student places a small magnetic compass on a wooden table and aligns it so that the compass needle points naturally toward North–South. She then stretches a straight charging cable above the compass so that the wire is parallel to the compass needle. When the phone charger is switched on and current begins to flow through the wire, the compass needle deflects away from its North–South position. A. What causes the compass needle to deflect when current flows through the wire? B. What happens to the compass needle when the current in the wire is switched off? C. Explain how the amount of current in the wire affects the magnitude of deflection of the compass needle? **OR** D. When the direction of current is reversed, the compass deflects in the opposite direction. Explain how the Right-Hand Thumb Rule accounts for this change.	
39	*Attempt either option A or B.* A. I. What is meant by accommodation of the human eye? II. What is the near point of a normal eye and what does it signify? III. Name which type of lens is used to correct the defect in which a person cannot see distant objects clearly. IV. Draw a diagram to show how the choice of your lens in (d) helps to see distant objects clearly? **OR** B. I. What is dispersion of light? II. Which colour of light deviates the least during dispersion through a prism? III. State why the sky appears dark to an astronaut in outer space. IV. Draw a simple labelled diagram to show how white light splits into different colours while passing through a glass prism.	5

**There is no change in the Question Paper Design and Assessment Pattern for Academic Session 2026-27.*

	- - - - - - - - - - - - - - *For visually impaired students* A. I. What is meant by hypermetropia (long-sightedness)? II. What is the far point of a normal human eye and what does it signify? III. Name the type of lens used to correct hypermetropia. IV. Explain why a hypermetropic eye is unable to focus nearby objects on the retina. **OR** B. I. Why does Earth's atmosphere exhibit Tyndall's effect? II. Which colour of light has the shortest wavelength? III. Why do danger/stop signs use red colour? IV. State why the sky appears blue even though sunlight is white.	

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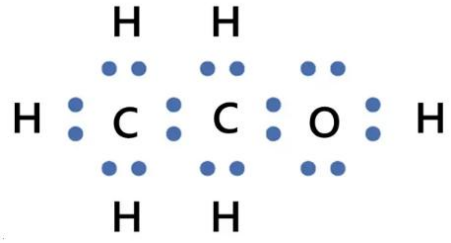
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SCIENCE – Code no. 086
MARKING SCHEME
CLASS – X (2026-27)

Section – A		
1	A. Carbon dioxide gains hydrogen, while water loses electrons.	1
2	C. R *For visually impaired students* B. The leaf kept in darkness will show the presence of starch	1
3	A. Glucose and salts	1
4	C. They will not produce any seeds or fruits.	1
5	C. The successful meeting and fusion of the male and female gametes	1
6	B. 17, 34	1
7	C. Secondary Consumer	1
8	D. A is false but R is true.	1
9	D. A is false but R is true	1
10	The Bile juice from the liver makes the food alkaline for the pancreatic enzymes to act. In addition, bile salts break down fats into smaller globules increasing the efficiency of enzyme action. If bile duct is obstructed, it can lead to improper digestion of fats. (0.5+0.5) Herbivores eating grass need a longer small intestine to allow the cellulose to be digested. Meat is easier to digest, hence carnivores like tigers have a shorter small intestine. (1)	2
11	The actions on which we do not have any thinking control are controlled by the mid-brain and hind-brain. These are called involuntary actions. Examples (any two) blood pressure, salivation and vomiting **OR** The information of touch is communicated by electrical-chemical means from cell to cell. Plant cells change shape by changing the amount of water in them, resulting in swelling or shrinking, thus changing shapes and causing movement.	2
12	• Uterine lining thickens and is richly supplied with blood vessels to nourish the embryo. • Placental connection is developed between the uterus and embryo.	2

13	• When a nerve impulse reaches the muscle, the muscle cells will move by changing their shape so that they shorten. • Muscle cells have special proteins that change both their shape and their arrangement in the cell in response to nervous electrical impulses. • When this happens, new arrangements of these proteins give the muscle cells a shorter form.	3
14	A. 10000 KJ B. No, the loss of energy at each step is so much that very little usable energy will be left. C. Large fish, due to biological magnification of pesticide.	3
15	A. In experiment one, in F1 all plants (100%) will have violet (Vv) flowers and in F2, 75% (3/4) plants will have violet flowers (1/4 VV and 2/4Vv) because violet colour of the flower is a dominant trait in pea plant. (1) B. 3/16 or 18.75% pea plants will have tall height and white flowers (vvTT/vvTt)– a combination of a dominant and a recessive trait. (1) *Attempt sub - part C or D.* C. In pea plants, no half way characteristics are produced because even a single copy of T or V will produce the same result as two copies of T or V. Thus, no plants with medium height and light violet flowers will be produced in F1 or F2 generation (zero percent). (2) **OR** D. In F1 generation all plants will have only dominant traits so no plant with short height and white flowers (recessive traits) will be produced (zero percent). In F2 generation 1/16 or 6.25 % plants will have short height with white flowers (vvtt) as both these traits are recessive. (2)	4
16	*Student to attempt either option A or B.* A. I. C – Four chambered heart. (1) The separation of the right side and the left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing. Such separation allows a highly efficient supply of oxygen to the body. This is useful in animals that have high energy needs, such as birds and mammals, which constantly use energy to maintain their body temperature. (2) II. A – Two chambered heart. (1) The blood is pumped to the gills, is oxygenated there, and passes directly to the rest of the body. Thus, blood goes only once through the heart in the fish during one cycle of passage through the body. (1) **OR**	5

	B. I. A depicts inhalation. (1) · Ribs get lifted (0.5) · Diaphragm is flattened, (0.5) · The chest cavity becomes larger (0.5) · Air is sucked in. (0.5) II. In human beings, the respiratory pigment haemoglobin has a very high affinity for oxygen. This pigment is present in the red blood corpuscles. This oxygen-rich blood is then pumped by the heart to the rest of the body. (2) <u>*For visually impaired students*</u> I. Four chambers are present. (1) The separation of the right side and the left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing. Such separation allows a highly efficient supply of oxygen to the body. This is useful in animals that have high energy needs, such as birds and mammals, which constantly use energy to maintain their body temperature. (2) II. Two chambered heart. (1) The blood is pumped to the gills, is oxygenated there, and passes directly to the rest of the body. Thus, blood goes only once through the heart in the fish during one cycle of passage through the body.(1) **OR** I. · Ribs get lifted (0.5) · Diaphragm is flattened, (0.5) · The chest cavity becomes larger (0.5) · Air is sucked in. (0.5) The exchange of gases can take place on the surface, which is provided by the alveoli. The walls of the alveoli are supplied with an extensive network of blood vessels. - So lungs maximize the area for a gaseous exchange through the presence of large numbers of alveoli which are richly supplied with blood. (1) II. In human beings, the respiratory pigment haemoglobin has a very high affinity for oxygen. This pigment is present in the red blood corpuscles. This oxygen-rich blood is then pumped by the heart to the rest of the body. (2)	
Section – B		
17	C. physical change because the space between crystals is adjusted. No new substance is formed in this process, only the spacing between crystals changes that alters the wavelength of light reflected.	1

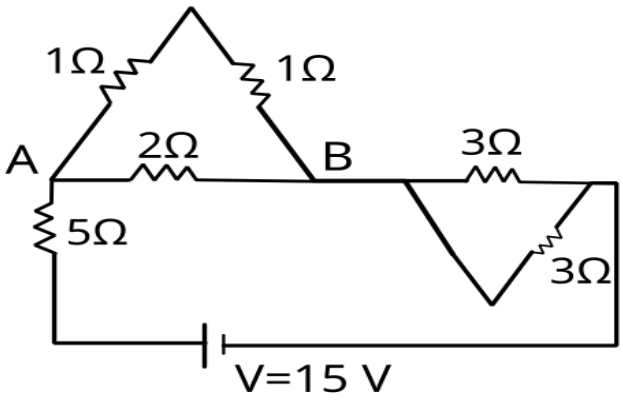
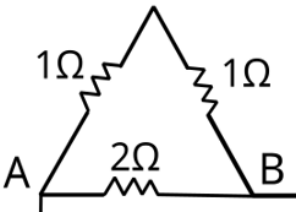
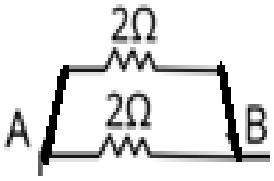
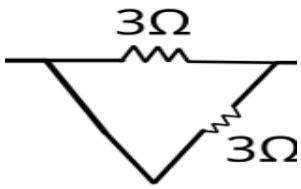
18	B. I and III II & IV are incorrect as Chlorine is produced at the anode, but it is not used to make margarine. And sodium hydroxide is deposited near cathode.	1
19	A. Ca^{2+} and Mg^{2+} ions react with soap, forming insoluble compounds, whereas detergents do not form such insoluble salts.	1
20	D. (i), (ii) and (iv) Plaster of Paris is $CaSO_4.1/2\ H_2O$, Washing soda $Na_2CO_3.10\ H_2O$ Baking soda $NaHCO_3$ and Gypsum is $CaSO_4.2H_2O$	1
21	A. The compounds in this pair have same molecular formula but different structural formula. *For visually impaired students* A. Propene	1
22	C. nitrogen, In the label E304 and E307b are antioxidants. Nitrogen is also used as an antioxidant. *For visually impaired students* C. antioxidant	1
23	C. do not corrode easily as aluminium oxide forms a protective layer.	1
24	B. Both A and R are true, and R is not the correct explanation of A.	1
25	Carbon forms millions of compounds because it has small atomic size, therefore, it forms strong and stable C–C bonds, showing extensive catenation. Silicon, being larger in size, forms weaker Si–Si bonds and cannot show catenation to the same extent, so it forms fewer compounds.	2
26	*Attempt either option A or B.* A. (i)  (1)	3

	(ii) Propanol, C_3H_7OH (0.5+0.5) (iii) $C_2H_5OH + CH_3COOH \xrightarrow{\text{conc. } H_2SO_4} CH_3COOC_2H_5 + H_2O$ (1) **OR** B. (i) Product A – Ethene, Product B – Ethane (0.5+0.5) (ii) $CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4} CH_2=CH_2 + H_2O$ (1) $CH_2=CH_2 + H_2 \xrightarrow{Ni} CH_3CH_3$ (1) *For visually impaired students* A. (i) Ethanol (1) (ii) C_3H_7OH (1) (iii) $C_2H_5OH + CH_3COOH \xrightarrow{\text{conc. } H_2SO_4} CH_3COOC_2H_5 + H_2O$ (1) **OR** B. (i) Product A – Ethene, Product B – Ethane (0.5+0.5) (ii) $CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4} CH_2=CH_2 + H_2O$ (1) $CH_2=CH_2 + H_2 \xrightarrow{Ni} CH_3CH_3$ (1)	
27	A. A sports drink contains ions (electrolytes) which help conduct electricity. Coconut oil does not contain ions so it cannot conduct electricity. (1) B. Limewater turns milky due to the formation of insoluble calcium carbonate ($CaCO_3$). When excess CO_2 is passed, calcium carbonate reacts further to form soluble calcium hydrogen carbonate, causing the milkiness to disappear. (1) C. Air near the sea contains high moisture (humidity), which speeds up rusting. In a dry hilly region, moisture is low, so rusting occurs much slowly. (1)	3
28	A. Silver (1) B. (ii) 20 s (1) *Attempt either sub-part C or D.* C. Yes, the time required for candles to drop will increase for all the metals. The order of falling of candles will remain the same. Particles vibrate and transfer heat to one another in conduction. Conduction of heat will take more time to travel from one end to the other as longer distance has to be covered by heat energy. (2) **OR** D. No, if the thickness of rods is changed the inference will not be correct. The dimensions of the rods have to be the same. A thicker rod will take more time to conduct heat. (2)	4

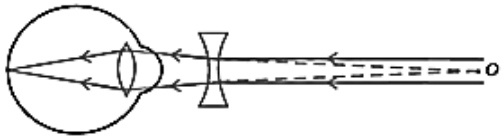
	For visually impaired students A. Metal B (1) B. (ii) 20 s (1) *Attempt either sub-part C or D.* C. Yes, the time required for sensor to beep will increase for all the metals. The order of falling of pins will remain the same. Particles vibrate and transfer heat to one another in conduction. Conduction of heat will take more time to travel from one end to the other, as longer distance has to be covered by heat energy. (2) **OR** D. No, if the thickness of rods is changed the inference will not be correct. The dimensions of the rods have to be the same. A thicker rod will take more time to conduct heat. (2)	
29	*Student to attempt either option A or B.* A. I. Drishti.(Alisha and Bhushan are partially correct) (1) Oxidation and reduction go hand in hand. In case of formation of ammonia, nitrogen is getting reduced and hydrogen is oxidised. In case of rusting of iron, iron is getting oxidised while oxygen gets reduced. (2) II. (i) $MgCl_2 + 2AgNO_3 \rightarrow 2AgCl + Mg(NO_3)_2$ (1) (ii) $2Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$ (1) **OR** B. I. Both have understood decomposition partially. Decomposition reaction is when a single substance breaks down into simpler substances. The single substance undergoing decomposition has to be a compound while the products formed can be either elements or compounds. $MgCO_3$ decomposes on heating to magnesium oxide and carbon dioxide even when both products formed are compounds, it is decomposition. (2) Water on electrolysis gives hydrogen and oxygen both are elements. It is also a decomposition reaction. (1) II. (i) Incorrect observation, iron is less reactive than Mg so it cannot displace magnesium. (1) (ii) Hydrogen gas is formed, which produces few bubbles. Brisk effervescence is formed when carbon dioxide is formed. (1)	5

Section – C		
30	B. Hold the lens above a sheet of paper and adjust until the smallest, brightest spot is formed.	1
31	C. 4.0 A	1
32	A. Both A and R are true, and R is the correct explanation of A.	1
33	A. The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. (1) B. Consider a ray of light travelling from medium 1 into medium 2.Let v_1 be the speed of light in medium 1 and v_2 be the speed of light in medium 2. The refractive index of medium 2 with respect to medium 1 is given by (n_{21}) $n_{21} = \frac{v_2}{v_1}$ (1)	2
34	*Student to attempt either A or B.* A. I. Joule's law of heating: The heat produced in a resistor is (i) directly proportional to the square of current for a given resistance, (ii) directly proportional to resistance for a given current, and (iii) directly proportional to the time for which the current flows through the resistor. $H = I^2Rt$, where 'I' is current and 'R' is resistance. (1) II. If resistance is doubled: For the same current I, heat H becomes $H = I^2(2R)t = 2I^2Rt = 2H$, i.e. heat doubles. (1) **OR** B. I. Definition: The resistivity (ρ) of a material is defined as the resistance of a wire having unit cross-sectional area and unit length $R = \frac{\rho L}{A}$,where R is resistance of a wire of length L and cross-sectional area A (1) II. Intrinsic property justification: Resistivity depends only on material (not on dimensions). Example: Two copper wires of different lengths and thick-nesses yield the same ρ when computed using R*A/L. (1)	2

35	A. Object distance u = 24 cm (in front of lens). Type of lens: Concave (diverging) lens (given). (1) B. Image distance, v: Magnification $m = \frac{h_i}{h_o} = \frac{v}{u}$. For a concave lens the image is upright and diminished, so, $m = +\frac{1}{3}$. Using sign convention $m = -24\ cm$, $v = mu = \frac{1}{3} \times (-24) = -8\ cm.$ (1) Thus, the image is located 8 cm on the same side of the lens as the object (virtual image). C. Focal length f : Use lens formula $$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$ Substitute, $v = -8\ cm,\ u = -24\ cm$: $$\frac{1}{f} = \frac{1}{-8} + \frac{1}{-24} = -\frac{1}{8} + \frac{1}{24} = -\frac{3+1}{24} = -\frac{2}{24} = -\frac{1}{12}$$ So, $f = -12\ cm$ (1) - - - - - - - - - - - - *For visually impaired students* If a student places an object 24 cm from a convex lens of focal length 12 cm, then $$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$$ $$\frac{1}{12} = \frac{1}{v} - \frac{1}{-24}$$ $= \frac{1}{12} - \frac{1}{24} = \frac{2-1}{24} = \frac{1}{24} = v = 24\ cm,$ (2) And, the image is real (on the opposite side) at 24 cm. (1)	3
36	A. Right-hand thumb rule: Imagine that you are holding a current-carrying straight conductor in your right hand such that the thumb points towards the direction of current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field. (1) If the thumb of the right hand points in the direction of conventional current, the curled fingers indicate the direction of the magnetic field lines around the conductor. This helps determine the direction of the magnetic field. (1) B. Variation with distance: Magnetic field magnitude around a long straight conductor at distance r falls as $$B \propto \frac{I}{r},$$ i.e. it decreases inversely with distance from the conductor. (1)	3

37	A.  1 Ω and 1Ω are in series and the combination is in parallel with 2 Ω   $\frac{1}{R} = \frac{1}{2} + \frac{1}{2}$ R_{AB} =1 Ω  $\frac{1}{R} = \frac{1}{3} + \frac{1}{3}$ R = 1.5 Ω 5 Ω , 1 Ω and 1.5 Ω are in series: R_s = 5 + 1+1.5 R_s = 7.5 Ω V = I R 15 V = I* 7.5 I = 2A (2) B. R_{AB}= 1 Ω, net current between points A and B is 2A $V_{AB}=I_{AB} * R_{AB}$ V_{AB}= 2 *1 = 2V (1) - - - - - - - - - - - - *For visually impaired students* A. Total Resistance: $R_{\text{total}} = 2 + 3 + 5 = 10\ \Omega$ (1) B. Total current:	3

	$I = \frac{V}{R_{\text{total}}} = \frac{15}{10} = 1.5\ A.$ (1) C. Voltage drop across the 3 Ω resistor: $V_{3\ \Omega} = I \times 3 = 1.5\ \times 3 = 4.5\ V$ (1)	
38	A. An iron core placed inside the solenoid concentrates and amplifies the magnetic field, producing a stronger pulling force on the bolt. (1) B. Using the right-hand thumb rule(Curl the fingers of your right hand in the direction of current, then the direction of thumb will point towards the direction of north pole of the solenoid) Use a bar magnet with a known north pole towards one of the ends of the solenoid, Repulsion will indicate North pole. (1) C. If current increases then the magnetic field B inside a solenoid will also increases as magnetic field is directly proportional to current. (2) **OR** D. Increase the number of turns N of the coil, reduce coil length, or insert a soft iron core. (any two points) (2) *For visually impaired students* A. The compass needle is influenced by the magnetic field developed by the current carrying conductor. Hence it shows a deflection. (1) B. It aligns itself with the Earth's magnetic field in the north–south direction. (1) C. The deflection increases with the increase in the amount of current as Magnetic Field in a current carrying conductor is directly proportional to the current flowing through the conductor. (2) **OR** D. The Right-Hand Thumb Rule explains the reversed compass deflection. When current direction reverses, the magnetic field's direction reverses (fingers curl the opposite way), causing the compass needle (a tiny magnet) to align with the new field, thus deflecting oppositely, showing that the magnetic field is now in the opposite direction. (2)	4
39	*Students to attempt either option A or B.* A. I. Accommodation: Ability of the eye lens to change its focal length to focus objects at different distances on the retina. (1) II. Near point: The nearest point (about 25 cm for a normal eye) at which an object can be seen distinctly; it signifies the closest comfortable focus. (1) III. Lens for defect (cannot see distant objects): A diverging (concave) lens is used to correct myopia (short-sightedness). (1) IV. Diagram:	5



(2)

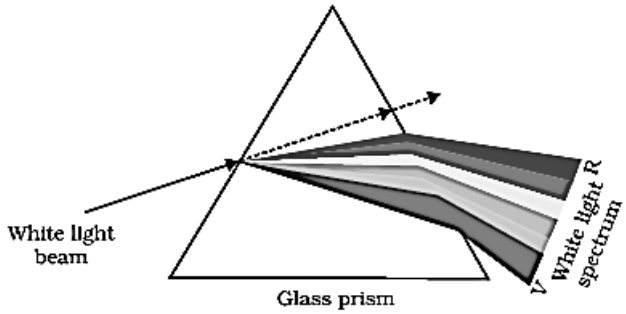
B.

I. Dispersion: Splitting of white light into its component colours due to wavelength-dependent refraction. (1)

II. Colour deviating least in prism: Red deviates least (longest wavelength). (1)

III. Sky dark in space: No atmosphere to scatter sunlight — space appears dark. (1)

IV. Diagram:



(2)

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For visually impaired students

A.

I. Hypermetropia is a defect of vision in which a person can see distant objects clearly but cannot see nearby objects clearly. (1)

II. The far point of a normal human eye is at infinity. It signifies that a normal eye can see objects clearly even when they are extremely far away. (1)

III. A convex (converging) lens is used to correct hypermetropia. (1)

IV. A hypermetropic eye cannot focus nearby objects on the retina because:

a) The eyeball is too short, or

b) The eye lens is not converging enough (insufficient curvature) As a result, the image of a nearby object forms behind the retina, instead of on it. A convex lens is used to increase the convergence of light so that the image forms on the retina. (2)

OR

B.

I. The earth's atmosphere is a heterogeneous mixture of minute particles. These particles include smoke, tiny water droplets, suspended particles of dust and molecules of air. When a beam of

	light strikes such fine particles, the path of the beam becomes visible. The phenomenon of scattering of light by the colloidal particles gives rise to Tyndall effect. (2) II. Violet light has the shortest wavelength. (1) III. Red light is least scattered by air because it has the longest wavelength. It remains visible over long distances even in fog, smoke, or dust. Hence, red is chosen for alert and stop signals. (1) IV. Sunlight is white but when it enters the atmosphere, the smaller particles of air scatter shorter wavelengths (blue and violet) more strongly than others. Our eyes are more sensitive to blue than violet, so the sky appears blue. (1)	

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