

Important CTET Science Question and Answers with Solution

Q1. Why is cellulose rich food a source of roughage in human beings?

- (a) Cellulose gets absorbed in human blood.
- (b) Cellulose is digested and egested as roughage.
- (c) Human beings do not have cellulose digesting enzyme.
- (d) Cellulose is converted into fibres by cellulose digesting bacteria.

Q2. Two metal balls X and Y of same volume and with greater density than water are fully submerged in two identical glasses A and B. Mass of X is 3-times that of Y. In which of the two glasses will the level of water be greater?

- (a) Level of water will be greater in A.
- (b) Level of water will be same in both A and B.
- (c) Level of water will be greater in B.
- (d) Level of water does not depend on density of balls.

Q3. The electronic configuration of 3 elements X, Y and Z are :

X=2, 4

Y=2, 7

Z=2, 1

Which of the following compounds can be formed ?

- (a) X_2Y
- (b) XZ_3
- (c) Y_2Z
- (d) YZ

Q4. Read the statements below and choose the correct option :

S₁: Polio drops should not be given to children suffering from diarrhea.

S₂: Polio drops are eliminated due to diarrhea.

- (a) Both S₁ and S₂ are correct and S₂ is the correct explanation for S₁.
- (b) Both S₁ and S₂ are correct but S₂ is not the correct explanation for S₁.
- (c) S₁ is true but S₂ is false.
- (d) Both S₁ and S₂ are false.

Q5. Match the following in context of Sewage.

Column-A

- (A) Bacterial infections
- (B) Inorganic impurities
- (C) Organic impurities
- (D) Nutrients
- (V) Measles

Column-B

- (I) Nitrates
- (II) Phosphorus
- (III) Cholera
- (IV) Pesticides

- (a) A-III, B-I, C-IV, D-II
- (b) A-V, B-II, C-I, D-III
- (c) A-III, B-IV, C-I, D-II
- (d) A-V, B-IV, C-II, D-III

Q6. Fill in the blanks with appropriate words :

(A) have thin walls and (B) have thick elastic walls. Blood flows at high pressure in (C) .
Valves are present in (D) that helps the blood to flow only in one direction.

- (a) (a)-Arteries, (b)-Veins, (c)- Arteries, (d)-Veins
- (b) (a)-Veins, (b)-Arteries, (c)- Veins, (d)-Arteries
- (c) (a)-Veins, (b)-Arteries, (c)- Arteries, (d)-Arteries
- (d) (a)-Veins, (b)-Arteries, (c)- Arteries, (d)-Veins

Q7. Which of the materials could be used as fuse ?

Material	Conductivity (W/mk)	Melting point (°C)
A	138	2623
B	80	1528
C	67	232

- (a) (A)
- (b) (B)
- (c) (B) and (C)
- (d) (C)

Q8. Four test tubes are taken :

Test-tube A contains aqueous solution of milk.

Test-tube B contains aqueous solution of glucose.

Test-tube C contains aqueous solution of calamine.

Test-tube D contains aqueous solution of amla (gooseberry).

What colour is expected when a piece of red litmus paper is dropped in each test tube?

- (a) A-Blue, B-Blue, C-Red, D-Red
- (b) A-Blue, B-Blue, C-Red, D-Blue
- (c) A-Red, B-Red, C-Blue, D-Red
- (d) A-Red, B-Blue, C-Blue, D-Red

Q9. Which of the following is NOT an application of chemical effects of electric current?

- (a) electrolysis
- (b) electroplating
- (c) electromagnetism
- (d) galvanization

Q10. Which of the following scientific concepts can be illustrated through a periscope?

- (a) Multiple reflections of light
- (b) Refraction of sound
- (c) Refraction of light
- (d) Total Internal Reflection

Q11. In a laboratory, in which zone of flame should Anita hold the test-tube to boil water quickly ?

- (a) Black zone
- (b) Yellow zone
- (c) Blue zone
- (d) Either blue zone or yellow zone

Q12. solutions of which of the following do not show acidic character ?

- (A) Curd
 - (B) Glucose
 - (C) Alcohol
 - (D) Amino Acid
- (a) (A) and (B)
 - (b) (B) and (C)
 - (c) (C) and (D)
 - (d) (D) and (A)

Q13. Steps for production of silk are given below. Arrange them in correct sequence :

- (A) Cocoons are kept under the sun or boiled in water.
 - (B) Female silk moths lay eggs.
 - (C) The larvae or silkworms are kept in clean trays along with fresh mulberry leaves.
 - (D) Eggs are warmed to a suitable temperature for larvae to hatch.
 - (E) After 25-30 days, caterpillars stop eating and start spinning cocoons.
 - (F) Fibers are taken out from cocoons.
- (a) (B)→(C) → (E) → (D) → (A) → (F)
 - (b) (B) → (C) →(D) →(A) → (E) → (F)
 - (c) (B) → (A) → (D) → (C) → (B)→ (F)
 - (d) (B) → (D) → (C) → (E) → (A) → (F)

Q14. 'Cud' is the term given to the food of ruminants which is :

- (a) properly chewed and completely digested
- (b) properly chewed and partially digested
- (c) swallowed and partially digested
- (d) swallowed and indigested

Q15. You are provided with 4 solutions - baking soda solution, salt solution, curd and sugar. Which of the following would you use to find the nature (acidic/basic/neutral) of each solution?

- (a) Methyl orange
- (b) China rose
- (c) Phenolphthalein
- (d) Both (a) and (b)

Q16. Which of the following **does not** occur during photosynthesis?

- (a) Absorption of light energy by chlorophyll
- (b) Conversion of light energy into chemical energy
- (c) Oxidation of carbon-to-carbon dioxide
- (d) Reduction of carbon dioxide to carbohydrates

Q17. The free ends of a wire in a circuit consisting of a cell and a switch are connected one by one to:

- (A) a wire of length 10 cm and thickness 5 mm.
- (B) a wire of length 20 cm and thickness 5mm.

Which of the following is true ?

- (a) More heat will be produced in case of A
- (b) More heat will be produced in case of B
- (c) Same amount of heat will be produced in both A and B
- (d) No Heat will be produced in either A or B

Q18. Sanjay puts an empty plastic bottle in a refrigerator. After few hours, what will he observe ?

- (a) The bottle will expand due to increase in pressure inside the bottle
- (b) The bottle will collapse (contract) due to decrease in pressure inside the bottle
- (c) The bottle will expand due to decrease in pressure inside the bottle
- (d) The bottle will contract due to decrease in the amount of air in the bottle

Q19. Which of the following statements are true ?

- (A) An object can be seen only if it reflects light.
 - (B) A convex lens always produces a real image.
 - (C) Concave mirror can be used to produce an enlarged and erect image.
 - (D) When the size of the image formed by a concave lens is smaller than the object, the image orientation is erect.
- (a) (B) and (C)
 - (b) (A) and (B)
 - (c) (A) and (D)
 - (d) (C) and (D)

Q20. Read the statements below and choose the correct option :

S₁ : Dry Hydrochloric Acid does not change the colour of dry litmus paper.

S₂ : Litmus paper always change of colour only in presence of H⁺ ions and OH⁻ ions

- (a) Both S₁, and S₂ are true and S₂ is the correct explanation for S₁.
- (b) Both S₁ and S₂ are true but S₂ is not the correct explanation for S₁.
- (c) S₁ is true but S₂ is false.
- (d) Both S₁ and S₂ are false

Q21. While teaching Motion in class, a teacher remarked, "Newton's theory could not explain observations relating to very small and massive systems. This was done by Theory of Relativity by Einstein". Which of the following aspects about nature of Science is the teacher highlighting above ?

- (a) Subjectivity in Science
- (b) Tentativeness of Science
- (c) Cultural embeddedness of Science
- (d) Value-neutrality of Science

Q22. Read the statements given below and choose the correct option :

A teacher and her students are doing activity on electricity. They observe that the bulb in an electric circuit did not glow. The teacher asked "Why do you think bulb did not glow ? What can you do to make it glow?" Which of the following skills is the teacher trying to develop among her students ?

- (a) Observing
- (b) Inferring
- (c) Hypothesizing
- (d) Experimenting

Q23. Which of the following tasks/strategies would you adopt to challenge students' alternative conception that, "If there is no source of heat present, there is no change in temperature."

- (a) Provide a problem based on the concept of heat and temperature and discuss the correct answer.
- (b) Ask the students to read the textbook, carefully and reflect on their conception.
- (c) Ask students to do an activity which involves grinding few spices in a mixer grinder and observing the change in temperature during the process.
- (d) Ask students to do an activity which involves keeping an empty plastic bottle in a refrigerator for few hours and noting down the observations.

Q24. Which of the following is NOT true regarding inquiry in Science ?

- (a) It involves generalizing observations.
- (b) It involves drawing inferences.
- (c) It involves laboratory work only.
- (d) It involves controlling of variables.

Q25. Which of the following is NOT an underlying assumption of a 'Constructivist' approach in Science ?

- (a) Knowledge is actively constructed by learners.
- (b) Social interaction in a cultural context is important for construction of knowledge.
- (c) Learners' naive ideas are scientifically incorrect and should be addressed.
- (d) Concept formation in learners progress from concrete to abstract.

Q26. Consider the following excerpt from Class VII, NCERT Science Textbook,
Chapter :- Forests : Our Lifeline.

Tibu told them that the forest is not just home to plants and animals. Many people also live in the forests. Some of them may belong to different tribes. Tibu explained that these people depend mostly on forests. The forest provides them with food, shelter, water and medicines. They have traditional knowledge about many medicinal plants in the forest.

Which of the following objectives of Science education does the above excerpt highlight /indicate ?

- (A) Understand the methods for generation of scientific knowledge.
 - (B) Relate to environment, both local as well as global.
 - (C) Nurture the aesthetic sense and creativity in science and technology.
 - (D) View science as a social enterprise.
- (a) (A) and (B)
 - (b) (B) and (C)
 - (c) (B) and (D)
 - (d) (A) (C) and (D)

Q27. "Mitochondria is the powerhouse of the cell." This statement is represents a/an :

- (a) Law
- (b) Principle
- (c) Observation
- (d) Analogy

Q28. Read the statements below and choose the correct option :

S₁ : Scientific theories may be incommensurable.

S₂ : Meanings of scientific concepts in a theory depends on the theory to which they belong.

- (a) Both S₁ and S₂ are correct and S₂ is the correct explanation for S₁
- (b) Both S₁ and S₂ are correct but S₂ is not the correct explanation for S₁
- (c) S₁ is true but S₂ is false
- (d) S₁ is false but S₂ is true

Q29. Which of the following does NOT characterize an inclusive Science classroom ?

- (a) Teacher uses variety of teaching-learning approaches to promote learning.
- (b) Teacher engages learners in group work and collaborative learning.
- (c) Teacher designs uniform educational approaches for parity among learners.
- (d) Teacher develops individualized educational programme based on level of performance of learners.

Q30. Which among the following is a common alternative conception you are likely to encounter while teaching pressure to learners of Class VIII ?

- (a) Pressure of a fluid increases with depth.
- (b) There is no atmospheric pressure in outer space.
- (c) Pressure of a gas increases with decrease in temperature.
- (d) Atmospheric pressure is proportional to density of air at a given temperature.

Solutions

S1. Ans.(c)

Sol. The correct answer is human beings do not have cellulose-digesting enzymes.

- Cellulose-rich food substances are a good source of roughage for human beings because human beings do not have cellulose-digesting enzymes.
- Cellulose is a polymeric polysaccharide consisting of only one type of monosaccharide i.e., glucose.
- Cellulose plays an important role in the human body because it is an excellent source of fiber.
- Except for cellulose, enzymes secreted from the human mouth, liver, and stomach can digest any type of sugar.
- Cellulose is digested by the enzyme cellulase which is absent in human beings.
- Humans do not have the cellulose-digesting enzyme (cellulase) to degrade the beta-1, 4 glycosidic bonds of cellulose.
- Thus, it cannot be digested by humans and acts as a good source of roughage.
- Roughage helps our body to get rid of undigested food.

S2. Ans.(b)

Sol. The correct answer is Level of water will be same in both A and B.

- The level of water in the glasses depends on the volume of the objects submerged in them, not their mass or density. As Archimedes' principle states, any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object.
- In simpler terms, when an object is submerged in a fluid, it displaces an amount of fluid equivalent to its volume, not its mass or density.
- Both metal balls X and Y have the same volume, so they would displace the same volume of water in each glass. Hence, the levels of water in both glasses A and B would be the same, even though the mass and density of ball X are greater than that of ball Y.

S3. Ans.(d)

Sol. The correct answer is YZ.

- **Element X** has an electronic configuration of 2, 4. This means it has 4 electrons in its outer shell and it would like to lose these 4 electrons to achieve a full outer electron shell, making it a metal.
- **Element Y** has an electronic configuration of 2, 7. This means it has 7 electrons in its outer shell and it would like to gain 1 electron to achieve a full outer electron shell, making it a non-metal.
- **Element Z** has an electronic configuration of 2, 1. This means it has 1 electron in its outer shell and it would like to lose this 1 electron to achieve a full outer electron shell, making it a metal.

The possible compounds would be:

- X and Y would form a compound by ionic bonding. X will lose its 4 electrons to achieve a full outer shell. Y will need to find 1 electron, meaning it can bond with 1 X element and play a part in the formation of the compound XY
- X and Z could form a compound by ionic bonding. X can lose its 4 electrons and Z can lose its 1 electron. The ratio will be XZ, to reflect the number of electrons getting involved from each side.
- Y and Z would form a compound by ionic bonding. Y will gain 1 electron that Z loses. So that compound would be YZ.

S4. Ans.(a)

Sol. The Correct answer is Both S_1 and S_2 are correct and S_2 is the correct explanation for S_1 .

- Based on the information provided, polio drops should not be given to children suffering from diarrhoea because they can be eliminated before they have a chance to provide protection.
- **Statement S1:** "Polio drops should not be given to children suffering from diarrhoea." This is largely in line with the aforementioned fact, as the oral vaccine may not be fully effective in the case of diarrhoea.
- **Statement S2:** "Polio drops are eliminated due to diarrhoea." This statement is also correct. Diarrhoea can prevent the body from fully absorbing the polio drops, leading to them being expelled from the body before they can take effect.

S5. Ans.(a)

Sol. The Correct answer is (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii).

Bacterial infections, inorganic impurities, organic impurities, and nutrients, each have different characteristics and relate to different types of substances or illnesses.

- **Bacterial Infections** - Bacterial infections are caused by harmful bacteria and can result in various diseases. Cholera is a bacterial infection,
- **Inorganic Impurities** - These are non-organic (non-carbon based) substances that can contaminate water or other substances. Nitrates are an example of inorganic impurities
- **Organic Impurities** - Organic impurities refer to substances that are carbon-based, here the relevant match would be Pesticides, which usually contain carbon and are organic in nature.
- **Nutrients** - Nutrients are substances used by an organism to survive, grow, and reproduce. They include compounds containing nitrogen and phosphorus, which in certain quantities, can promote the growth of harmful algal blooms in water bodies.

S6. Ans.(d)

Sol. The Correct answer is (a) – Veins, (b) - Arteries, (c) - Arteries, (d)- Veins.

The circulatory system of the body is made up of blood vessels including arteries, veins, and capillaries. Each type of blood vessel has its structure and function.

- **Veins:** These are blood vessels that carry blood toward the heart. Most veins carry deoxygenated blood from the tissues back to the heart. Veins have thin walls relative to their diameter and are less muscular than arteries.
- **Arteries:** These are blood vessels that carry blood away from the heart. They carry oxygenated blood to the tissues (except for the pulmonary artery). Being high-pressure vessels, arteries have thicker, more elastic walls.

- **Arteries:** Blood flows at high pressure in arteries because they carry blood being pushed from the heart, which is a powerful muscle. This high-pressure flow allows blood to reach all parts of the body.
- **Veins:** Valves are present in veins to prevent backflow of blood. Because the pressure in veins is much lower, these valves help to keep the blood flowing in one direction towards the heart.

S7. Ans.(d)

Sol. The Correct answer is (C).

In the selection of a fuse wire, two primary factors need to be considered based on statements.

- **Melting Point** - The fuse wire needs to have a relatively low melting point, where it would melt and hence break the circuit whenever the current exceeds the safe value.
- **Conductivity** - The fuse also needs to be a good conductor of electricity. While exact thresholds can vary, a higher conductivity would generally make a wire more suitable for use in a fuse.
- Using these criteria, you can evaluate the materials as follows:
- **Material 'A'** has high conductivity but also a very high melting point, which makes it less suitable as it may not melt quickly when the current exceeds the safe threshold.
- **Material 'B'** also has a high melting point, although its conductivity is somewhat lower. Its high melting point makes it less suitable as a fuse wire.
- **Material 'C'** has the lowest melting point, and while it has lower conductivity than the other two, it is not so low as to disqualify direct utility. Given the balance of these factors, this suggests it's the most suitable as a fuse wire.

Therefore: Material 'C' would be the most appropriate choice for a fuse.

S8. Ans.(c)

Sol. The Correct answer is A Red, B - Red, C- Blue, D - Red.

- Chemical substances can affect litmus paper differently based on their acidic or basic nature.
- Litmus paper is a pH indicator that changes color depending on the nature of the solution:
- An aqueous solution of milk: Generally, milk tends to be neutral to slightly acidic, so the red litmus paper might not change at all, or it might turn slightly more intense red if the acidity level is higher.
- An aqueous solution of glucose: As glucose is neutral, the red litmus paper, when dipped in this solution, should remain red without any color change.
- An aqueous solution of calamine: calamine's basic nature, the red litmus paper should turn blue upon reacting with this solution.
- An aqueous solution of amla (gooseberry): Amla is acidic, which means red litmus paper will maintain its color and possibly become a more pronounced red if the amla is particularly acidic.
- An aqueous solution of amla: No change or redder as amla is acidic.

S9. Ans.(c)

Sol. The Correct answer is electromagnetism

- **Electrolysis:** It is an application of the chemical effects of electric current. By passing an electric current through an electrolyte (a conductive liquid, often a solution of salts or other compounds), chemical reactions are induced, including those that cause the electrolyte to decompose.

- **Electroplating:** This also directly involves the chemical effects of electric current. In electroplating, a metal object is coated with a layer of a different metal. This is achieved by passing an electric current through a solution that contains ions of the coating metal, causing these ions to adhere to the object.
- **Electromagnetism:** This is NOT considered an application of the chemical effects of electric current. Electromagnetism involves the generation of a magnetic field around a current-carrying conductor, which is a different kind of effect a physical one, not a chemical one.
- **Galvanization:** This involves the use of electric current to apply a protective layer of zinc to iron or steel, to prevent rusting. Therefore, it's a type of electroplating and IS a result of the chemical effects of electric current.

S10. Ans.(a)

Sol. The Correct answer is Multiple reflections of light.

- **Multiple Reflections of Light:** This concept IS demonstrated by a periscope. A periscope operates based on the principle of multiple reflections of light. It has mirrors placed at a 45-degree angle at each end. When light from an object strikes the top mirror, it is reflected down to the second mirror and then reflected again into the viewer's eye. This is why periscopes are used in submarines and armoured vehicles for viewing things over, around, or through obstacles.
- **Refraction of Sound:** This concept IS NOT demonstrated by a periscope. A periscope involves the reflection of light, not sound. There's no sound manipulation happening inside a periscope.
- **Refraction of Light:** While this is a fundamental concept in optics, a periscope DOES NOT demonstrate refraction of light. Refraction involves the bending of light as it passes from one medium to another medium with a different refractive index. In a periscope, the light is reflected, not refracted.
- **Total Internal Reflection:** This principle IS NOT shown in a periscope. Total internal reflection occurs when light traveling from one medium with a higher refractive index to another with a lower refractive index hits the boundary at an angle larger than a particular critical angle. In a periscope, light is simply reflected off of mirrors – it does not undergo total internal reflection.

S11. Ans.(c)

Sol. The Correct answer is Blue zone.

- **Black Zone:** This is the zone closest to the source of the fuel. It is the coldest part of the flame and does not have enough oxygen for complete combustion to occur. That's why it's not advisable to use this zone for heating purposes.
- **Yellow Zone:** This is a moderately hot part of the flame but it does not receive enough oxygen for complete combustion and thus produces soot (carbon particles).
- **Blue Zone:** The blue zone is the hottest part of the flame and is best for heating purposes. In this zone, combustion is complete due to the presence of sufficient oxygen, and it is the cleanest part of the flame as there is complete combustion of the fuel with no production of soot. Hence, Anita should use the blue zone of the flame to boil the water quickly.
- **Either Blue Zone or Yellow Zone:** Although the yellow zone is hotter than the black zone, it is not as hot as the blue zone. Additionally, it doesn't burn as cleanly.
- Therefore, it's not the optimal choice for quick and efficient heating.

S12. Ans.(b)

Sol. The Correct answer is (B) and (C).

- **Curd:** Curd contains lactic acid, which is produced as a result of the fermentation of milk. Lactic acid can donate hydrogen ions (H), hence displaying an acidic character.
- **Glucose:** Glucose ($C_6H_{12}O_6$) is a sugar, and its molecule does not contain any ionizable hydrogen. No hydrogen ions (H) are released when it is dissolved in water, so glucose solutions are not acidic.
- **Alcohol:** An alcohol (like ethanol, methanol, etc.) has no ionizable hydrogen and therefore, does not release hydrogen ions when placed in solution. Thus, it doesn't show the acidic character.
- **Amino Acid:** Amino acids have a carboxyl group (-COOH) and an amino group (-NH₂). The carboxyl group can donate a hydrogen ion (H) and hence has acidic properties.

S13. Ans.(d)

Sol. The Correct answer is (B) → (D) → (C) → (E) → (A) → (F).

- **(B) Female silk moths lay eggs:** This is the first step in the process of silk production. The female moth lays hundreds of eggs at a time.
- **(D) Eggs are warmed to a suitable temperature for the larvae to hatch:** The laid eggs require a suitable temperature condition to stimulate the larva inside to hatch. This process is called incubation.
- **(C) The larvae or silkworms are kept in clean trays along with fresh mulberry leaves:** After hatching from the eggs, the silkworm larvae or caterpillars are kept in trays and fed with fresh mulberry leaves. Silkworms eat continuously for about 25-30 days.
- **(E) After 25-30 days, caterpillars stop eating and start spinning cocoons:** Once the silkworms have consumed enough and grown to their full potential, they stop eating and begin to spin a protective cocoon.
- **Cocoons are kept under the sun or boiled in water:** Before the adult moth can emerge, the cocoon is subjected to the sun or boiled in water. This prevents the moth from breaking the silk filament in the cocoon and ensures long, unbroken fibers.
- **(F) Fibers are taken out from cocoons:** Finally, the silk fibers (also known as silk threads) are carefully taken out from the cocoon. This is called reeling the silk and is a delicate process because silk fibers are extremely fine and lustrous.

S14. Ans.(c)

Sol. The Correct answer is swallowed and partially digested.

- "Cud" is a term used to refer to the food that ruminant animals, such as cows and deer, regurgitate and re-chew. The process goes like this:
- Ruminants swallow their food without fully chewing it first. This unchewed food (now referred to as "cud") goes to the rumen, the first of their stomach's four compartments. In the rumen, it is soaked and processed by bacterial action, leading to its partial digestion.
- Later, this partially digested food, or "cud", is regurgitated back into the animal's mouth, where it is chewed thoroughly to break it down further before it is swallowed again for further digestion.

Thus, the 'cud' is swallowed and partially digested.

S15. Ans.(a)

Sol. The correct answer is Methyl orange.

- **Methyl Orange:** This is an indicator that turns red in acidic conditions and yellow in basic conditions. This can help identify if a solution is acidic or basic.
- This is a common pH indicator that changes color based on the pH of the solution it is added to. In a pure substance, methyl orange appears red. However, under acidic conditions (in a solution with a pH of less than 7), its color remains red. In neutral conditions (pH of 7), it appears orange. Under basic conditions (in a solution with a pH greater than 7), it appears yellow.
- **China Rose:** The color of a China rose or Hibiscus rosa-sinensis solution changes in the presence of an acid or a base. It turns dark pink in basic solutions and green in acidic solutions.
- **Phenolphthalein:** Phenolphthalein is a chemical compound often used as a pH indicator in titrations. For acidic solutions, it remains colorless and turns pink in basic solutions.
- **Turmeric Solution:** Turmeric is a natural indicator that changes color in acidic and basic conditions. When added to an acidic solution, it will remain yellow, in a neutral solution, it will remain yellow but will turn red or brown in a basic solution.

S16. Ans.(c)

Sol. The Correct answer is Oxidation of carbon-to-carbon dioxide.

- **Absorption of light energy by chlorophyll:** This does happen during photosynthesis. Chlorophyll in the chloroplasts of plant cells absorbs light energy from the sun, which is the first step in photosynthesis.
- **Conversion of light energy into chemical energy:** This is another core process of photosynthesis. The light energy, once absorbed, is used to convert water and carbon dioxide into carbohydrates (specifically, glucose)- a form of chemical energy.
- **Oxidation of carbon to carbon dioxide:** This Does not happen during photosynthesis. Instead, this process occurs during cellular respiration, where glucose (made by photosynthesis) is broken down to release energy, and carbon dioxide is a byproduct. In photosynthesis, carbon dioxide is consumed, not produced.
- **Reduction of carbon dioxide to carbohydrates:** This process also happens during photosynthesis. Under the influence of sunlight, carbon dioxide undergoes reduction, i.e., it gains hydrogen to form carbohydrates (glucose).

S17. Ans.(b)

Sol. The correct answer is More heat will be produced in case of B.

- The amount of heat produced in a wire-carrying current depends on the wire's resistance. Joule's Law of Heating states this mathematically
 - $H = I^2RT$,
 - where H is heat energy, I is current, R is resistance, and T is time.
- Resistance is given by the expression $R = \rho \times (L/A)$
- where ρ is the resistivity, L is the length of the wire, and A is the cross-sectional area of the wire.
- The amount of heat produced in a resistor (here, the wires A and B) when a current I is flowing through it for time t is given by Joule's law of heating, $H = I^2Rt$, where 'R' is the resistance of the resistor.

- Resistance (R) is directly proportional to the length (l) of the conductor (assuming the cross-sectional area (A) and the material of the conductor are constant), that is, $R \propto l$. Thus, a wire of greater length will have greater resistance [0].
- Wire A has a length of 10 cm, and wire B has double that length, 20 cm, while the thickness of the two wires is the same. This means the resistance of wire B will be more than that of wire A.
- With a higher resistance in wire B, according to Joule's law of heating, more heat will be produced if the same current flows for the same amount of time.

S18. Ans.(b)

Sol. The correct answer is The bottle will collapse (contract) due to decrease in pressure inside the bottle.

- The pressure exerted by a gas is due to the continuous, random, and rapid motion of a large number of molecules against the container walls. When you cool a gas (that's what happens when an item is placed in a refrigerator), the kinetic energy of its molecules decreases, causing them to move slower. This reduces the pressure of the gas inside the container.
- If a closed container filled with gas (in this case, a plastic bottle filled with air) is placed in a refrigerator, the pressure inside the container decreases due to the drop in temperature. On the other hand, the ambient pressure outside the refrigerator (and therefore outside the bottle) remains the same as it was before the bottle was refrigerated.
- As the air inside the bottle cools down, the pressure inside the bottle decreases. Since the pressure outside the bottle doesn't change, there is now a higher pressure outside the bottle than inside it.
- This pressure difference causes the bottle to contract or collapse as the air particles inside the bottle take up less space due to a decrease in their kinetic energy.

S19. Ans.(d)

Sol. The correct answer is (C) and (D).

- **An object can be seen only if it reflects light. This statement is TRUE.** We can see objects when light that is reflected from their surfaces enters our eyes. This is a basic principle of optics.
- **A convex lens always produces a real image. This statement is FALSE.** A convex lens can produce either a real or virtual image, depending on the object's position relative to the lens. When the object is at or beyond the focus of the lens, a real image can be formed on a screen. But if the object is between the lens and the focus, the lens produces a virtual, enlarged, and upright image.
- **A concave mirror can be used to produce an enlarged and erect image. This statement is TRUE.** When an object is placed very close to (inside the focus of) a concave mirror, the mirror creates a virtual, enlarged, and erect image.
- **When the size of the image formed by a concave lens is smaller than the object, the image orientation is erect. This statement is TRUE.** Regardless of the object's position, a concave lens will always produce a diminished, virtual, and erect image.

S20. Ans.(c)

Sol. The correct option is S1 is true but S2 is false.

- **S1 is true** because dry hydrochloric acid (HCl) does not change the color of dry litmus paper. This is because HCl does not release H^+ ions in the absence of water, and litmus paper is sensitive to the presence of ions in solution.

- **S2 is false** because litmus paper can change color in the presence of other acidic or basic substances, not just H⁺ ions and OH⁻ ions. It reacts to changes in the concentration of protons (H⁺) or hydroxide ions (OH⁻) in a solution, indicating whether a substance is acidic or basic.

S21. Ans.(b)

Sol. The correct answer is Tentativeness of Science.

Science is always evolving and changing as new evidence is gathered.

- Newton's theory of gravity was a great advance for its time, but it was eventually found to be incomplete.
- Einstein's theory of relativity was able to explain phenomena that Newton's theory could not, and it is now the accepted theory of gravity.
- The teacher's remark highlights the tentativeness of science.

Hence, we can conclude that the teacher highlights the tentativeness of Science.

- **Subjectivity in science** refers to the fact that scientists are human beings and are therefore susceptible to biases and errors.
- **Cultural embeddedness** of science refers to the fact that science is shaped by the culture in which it is practiced.
- **Value-neutrality of science** refers to the fact that science is not supposed to be influenced by values.

S22. Ans.(c)

Sol. The correct answer is Hypothesizing.

Hypothesizing is the ability to make a guess about what might cause something to happen.

- Hypothesizing is a critical skill for scientific inquiry. It allows scientists to explain phenomena and to test their explanations.
- The students observed that the bulb did not glow.
- They can hypothesize that the bulb did not glow because the circuit had no power.
- They can then test this hypothesis by checking the power supply to the circuit.

S23. Ans.(c)

Sol. The correct answer is Ask students to do an activity which involves grinding few spices in a mixer grinder and observing the change in temperature during the process.

The best task/strategy to challenge students' alternative conception is to ask students to do an activity that involves grinding a few spices in a mixer grinder and observing the change in temperature during the process.

- This activity is a good way to challenge students' misconceptions because it is something that they can do themselves and see the results for themselves.
- When students grind spices in a mixer grinder, they generate heat. This is because the friction between the spices causes them to heat up.
- Students can observe this change in temperature by touching the sides of the mixer grinder or by feeling the spices after they have been ground.

S24. Ans.(c)

Sol. The correct answer is It involves laboratory work only.

Inquiry in science is a process of asking questions, gathering evidence, and drawing conclusions.

- It can involve laboratory work, but it can also involve other types of activities, such as field research, reading, and data analysis.
- Laboratory work is just one part of the inquiry in science.
- It is a valuable tool for gathering evidence, but it is not the only way to gather evidence.
- Scientists also gather evidence through field research, reading, and data analysis.

S25. Ans.(c)

Sol. The correct answer is Learners' naive ideas are scientifically incorrect and should be addressed.

Constructivism is a theory of learning that states that learners actively construct their own knowledge by interacting with the world around them.

- Learners do not simply memorize facts, but they make sense of the world by building their own mental models.
- Learners' naive ideas may be incomplete or inaccurate. In some cases, learners' naive ideas may be scientifically accurate.
- However, even in these cases, it is important to build on learners' naive ideas rather than simply dismissing them.
- Learners are more likely to be successful in learning new concepts if they can relate them to their existing knowledge.

S26. Ans.(c)

Sol. The correct answer is Nurture the aesthetic sense and creativity in science and technology.

Objectives focus on developing students' understanding of scientific concepts and principles. They also aim to develop students' critical thinking skills and their ability to solve problems.

The excerpt from the NCERT Science Textbook for Class VII, Chapter: Forests: Our Lifeline, highlights the following objectives of science education:

- **To relate to the environment, both local as well as global.** The excerpt shows how forests are not just home to plants and animals, but also to people.
- It also shows how forests provide food, shelter, water, and medicines to people. This highlights the importance of forests for the environment, both locally and globally.
- **To view science as a social enterprise.** The excerpt shows how people depend on forests for their livelihood.
- This highlights the importance of science for society. Science can be used to understand the environment and to develop solutions to environmental problems.

S27. Ans.(d)

Sol. The correct answer is Analogy.

The statement "Mitochondria is the powerhouse of the cell" represents an analogy. An analogy is a comparison between two things that are not alike but share a common characteristic. In this case, mitochondria are compared to a power plant because both produce energy. This analogy helps to simplify the complex function of mitochondria by relating it to a more familiar concept, making it easier to understand and communicate.

S28. Ans.(a)

Sol. The correct answer is Both S1 and S2 are correct and S2 is the correct explanation for S1.

- Scientific theories and concepts are essential for understanding the natural world. They allow us to make sense of the world around us and to predict how it will behave.
- **S1: Scientific theories may be incommensurable.** This means that two scientific theories may be so different that they cannot be compared or judged against each other.
- This is because the meanings of the concepts used in the two theories may be different.
- **S2: Meanings of scientific concepts in a theory depend on the theory to which they belong.**
- This means that the meaning of a concept in one theory cannot be simply transferred to another theory.
- For example, the concept of "mass" in Newtonian mechanics has a different meaning than the concept of "mass" in special relativity.

S29. Ans.(c)

Sol. The correct answer is Teacher designs uniform educational approaches for parity among learners.

An inclusive science classroom is one that is designed to meet the needs of all learners, regardless of their background, abilities, or interests.

- Designing uniform educational approaches for parity among learners is not inclusive because it does not take into account the individual needs of learners
- All learners are different, and they learn in different ways. A one-size-fits-all approach to education will not be effective for everyone.
- The teacher should use a variety of teaching-learning approaches to promote learning, engage learners in group work and collaborative learning, and develop individualized educational programs based on the level of performance of learners.

S30. Ans.(c)

Sol. The correct answer is Pressure of a gas increases with decrease in temperature.

An alternative conception is a belief or idea about a scientific concept that is different from the scientific consensus.

- The common alternative conception that you are likely to encounter while teaching pressure to learners of Class VIII is Pressure of a gas increases with a decrease in temperature.
- This alternative conception is incorrect because, according to the ideal gas law ($PV=nRT$), the pressure of a gas is directly proportional to its temperature when other variables are held constant.
- Therefore, as the temperature of a gas decreases, its pressure would also decrease, assuming other factors remain the same.
- It's important to address this misconception and help students understand the correct relationship between pressure and temperature in gases.