INTERNATIONAL OLYMPIAD ACADEMY
CSAR Learning Solutions Pvt. Ltd. initiative

**SAMPLE PAPER**
**2025-26**

**GRADE – 7 & 8**
CATEGORY: FARADAY

# CSAR INTERNATIONAL SCIENCE OLYMPIAD

## Basic: (3 Points)

**1.** In a sugar-water solution, sugar seems to disappear. Yet, the solution tastes sweet. Which conclusion can best explain this observation at the particle level?

(A) Sugar molecules evaporated

(B) Sugar formed a new compound

(C) Sugar particles are evenly dispersed in water

(D) Sugar became a gas

(E) Sugar formed crystals

**2.** A solution turns blue litmus red and conducts electricity. Based on these two observations, what can be inferred about its chemical nature?

(A) It is a weak acid

(B) It is a strong base

(C) It is a strong acid

(D) It is a neutral salt

(E) It is a poor electrolyte

**3.** During a thunderstorm, the light from lightning reaches you almost instantly, but sound travels much slower. Assume the storm front is 3.0 km away and the speed of sound ≈ 340 m/s. About how long after the flash will you hear the thunder?

(A) 0.3 s

(B) 1 s

(C) 3 s

(D) 6 s

(E) 9 s

**4.** When wood burns, smoke, heat, light, and ash are produced. Which of the following observations best proves that a chemical change has taken place?

(A) Ash can be separated from the remaining charcoal easily.

(B) The change is temporary and can be reversed.

(C) The wood changes only in its physical state.

(D) New substances with entirely different properties are formed.

(E) Water is removed during heating.

**5.** A healthy green plant is kept inside a sealed glass terrarium exposed to sunlight. Over time, the plant performs photosynthesis using carbon dioxide and water. Which of the following changes in the composition of gases inside the terrarium is most likely to occur?

(A) Oxygen level increases

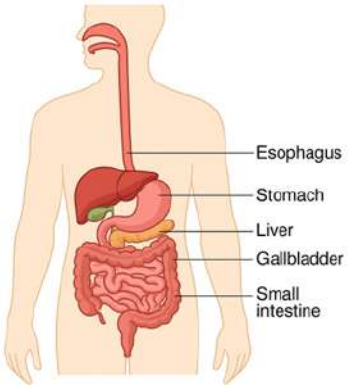
(B) Carbon dioxide level increases

(C) Oxygen level decreases

(D) Nitrogen level decreases

(E) Methane level increases

**6.** A patient reports dehydration and hard, dry stools during medical examination. These symptoms suggest that the organ responsible for absorbing excess water from undigested food is not functioning properly. Which organ is most likely affected?




(A) Small intestine

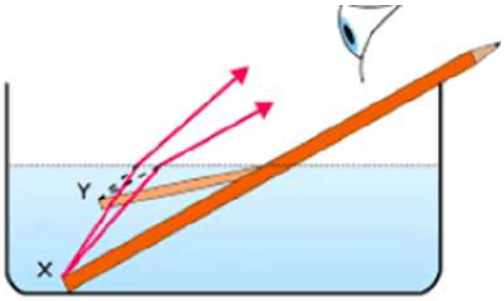
(B) Large intestine

(C) Liver

(D) Pancreas

(E) Gallbladder

**7.** A swimmer looks at a coin at the bottom of a pool. The coin appears 20 cm closer to the surface than it really is i.e., it looks shallower. Which statement best explains this effect?




(A) Water increases image brightness.

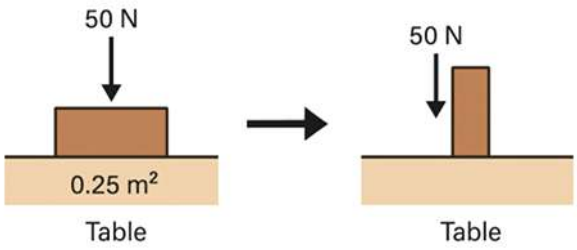
(B) Light bends toward the normal when entering air.

(C) Light travels faster in water than in air.

(D) Light bends away from the normal when it passes from water into air

(E) Light mainly reflects off the pool bottom.

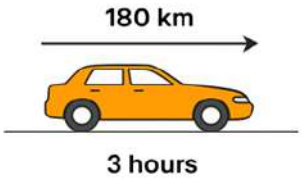
**8.** A wooden block weighing 50 N rests flat on a table, covering a contact area of 0.25 m². If the same block is turned on its edge so that its contact area becomes half as large, how does the pressure on the table change?




(A) It doubles (B) It halves (C) It stays the same (D) It becomes zero

(E) It triples

**9.** A car covers a distance of 180 km in 3 hours. A student quickly divides distance by time but forgets to convert the units from km/h to m/s. What is the correct average speed of the car in metres per second (m/s)?




(A) 1.67 m/s (B) 60.0 m/s (C) 600.0 m/s

(D) 0.0167 m/s (E) 16.7 m/s

**10.** Which of the following is not one of the applications of a plane mirror?

(A) Real view mirror of a car

(B) Periscopes

(C) As decoration to make a room appear larger

(D) Blind corner mirror in parking areas

(E) Optical instruments for reflection experiments



## Foundation: (4 Points)

**11.** A series of compressions and rarefactions of a sound wave is shown below. Within the 12 m span, there are three complete cycles. What is the wavelength of the wave?


(A) 3 m (B) 4 m (C) 6 m (D) 9 m (E) 12 m

**12.** A student rubs rods made of plastic, glass, wool, and aluminum with dry cloths to test for static electricity. After rubbing, only some of the rods attract small pieces of paper. When the experiment is repeated on a humid day, none of the rods attract paper bits. Which combination of reasons best explains these observations?

(A) Metals allow charges to move freely, while insulators retain charge; high humidity causes the accumulated charge to neutralize gradually.

(B) Metals and insulators both charges equally, but humidity increases friction so paper sticks less.

(C) Only metals become positively charged; humidity prevents negative charging.

(D) All materials lose electrons equally; paper pieces are neutral so attraction is random.

(E) Humidity increases the mass of the paper, preventing electrostatic attraction.

**13.** A student investigates why leftover rice sealed in an airtight container smells foul the next day, while the same rice left uncovered dries but does not smell. The sealed sample is moist, sticky, and shows small gas bubbles trapped inside.

Which of the following best explains both outcomes based on microbial physiology and environmental factors?

(A) Aerobic fungi decomposed the sealed rice faster due to more frictional heat.

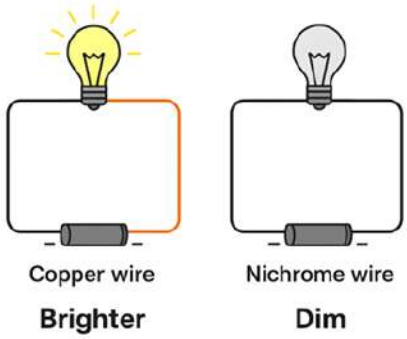
(B) Anaerobic bacteria carried out fermentation in the airtight, moist environment, releasing gases and odorous compounds.

(C) Viruses multiplied in rice starch cells and released methane gas during decay.

(D) Protozoa thrived in darkness, using oxygen from water vapor to break down starch.

(E) Algae performed photosynthesis in low light, producing sticky residues on the rice surface.

**14.** During a classroom experiment, a student connects a bulb in two separate circuits — one using copper wire and the other using nichrome wire of equal length and thickness. The brightness of the bulb is observed to differ.




Assertion (A): In an electric circuit, a bulb connected with copper wire glows brighter than when connected with nichrome wire of the same length and thickness.

Reason (R): Copper has a much lower resistivity than nichrome, allowing greater current flow and higher power dissipation in the bulb filament.

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

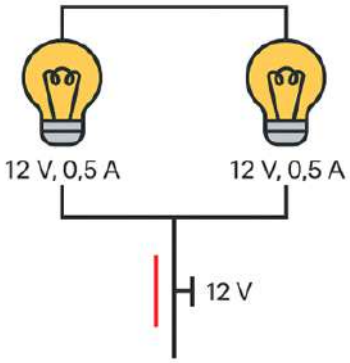
(B) Both A and R are true, but R is not the correct explanation of A

(C) A is true, but R is false

(D) A is false, but R is true

(E) Both A and R are false

15. A bulb marked “12 V, 0.5 A” is connected to a battery of 12 V and allowed to run continuously for 10 minutes. If two such identical bulbs are now connected in parallel to the same battery, and both glows normally, what is the total energy consumed by the two bulbs together during the same time?




(A) 3600 J (B) 7200 J (C) 14 400 J (D) 28 800 J (E) 36 000 J

16. In a stage-light experiment, three colored spotlights — red, green, and blue — are projected on the same white screen. The brightness of each light can be adjusted between 0 and 100 units. The technician sets the lights as follows: Red = 60 units, Green = 80 units, Blue = 20 units.

Assume that light colors add together, and that equal intensities of red + green + blue make white. What color will appear at the spot where all three lights overlap?

(A) Yellowish-green (B) Orange (C) Pure white (D) Pinkish-white (E) Cyan

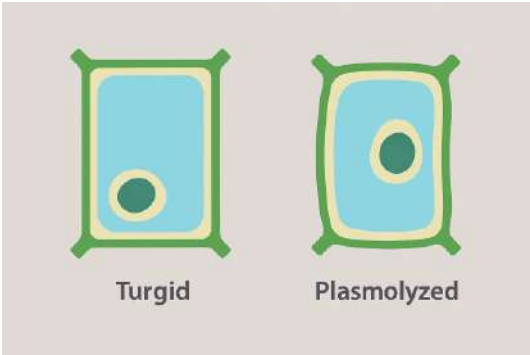
17. When potassium chlorate ($KClO_3$) is heated strongly, it decomposes into potassium chloride (KCl) and oxygen gas ($O_2$) according to the equation: $2KClO_3 \rightarrow 2KCl + 3O_2$

In an experiment, 24.5 g of $KClO_3$ is heated until the reaction is complete. (Molar masses: K = 39, Cl = 35.5, O = 16)

Which of the following is approximately the mass of oxygen gas released?

(A) 5.0 g (B) 6.0 g (C) 7.8 g (D) 9.6 g (E) 12.0 g

18. If a plant cell's central vacuole were to suddenly lose its ability to store water and maintain turgor pressure, the internal pressure of the cell would drop rapidly. Which chain of events will most likely occur in the plant within a few minutes?




(A) Photosynthesis halts immediately

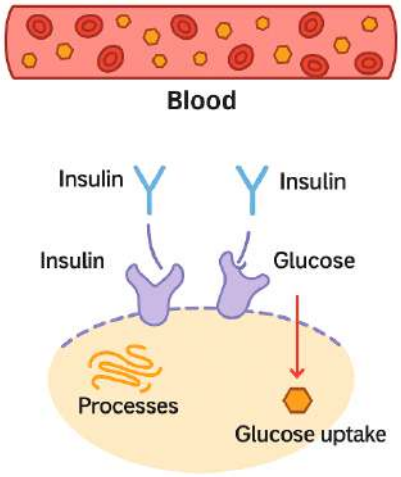
(B) Cell wall strengthens and becomes rigid

(C) Plasma membrane pulls away → Guard cells lose pressure → Leaves wilt visibly

(D) Sugar transport increases rapidly

(E) Roots stop growing due to increased turgidity

19. A patient's blood test shows persistently high glucose levels even though their pancreas releases normal amounts of insulin. The person also reports fatigue after meals and unexplained weight loss. Which of the following most accurately explains the underlying malfunction?




(A) Insulin receptors on body cells are defective, preventing glucose entry.

(B) Liver glycogen breakdown is excessively high due to lack of insulin.

(C) Excess insulin is stimulating glucose uptake beyond normal levels.

(D) Pancreatic β-cells secrete too little glucagon, lowering blood sugar.

(E) Kidney tubules reabsorb too much glucose, raising blood concentration.

20. In a lab, a strip of magnesium is added to dilute phosphoric acid ($H_3PO_4$). Bubbling is observed, and the ionic product in solution is magnesium phosphate, $Mg_3(PO_4)_2$. Using the smallest whole-number coefficients, what is the stoichiometric coefficient of the gas formed in the balanced equation?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 6



## Exploration: (5 Points)

**21.** A train travels from City A to City B (120 km apart) and then continues from B to City C (180 km apart). On the first part of the trip, it moves at 40 km/h. On the second part, it starts at 60 km/h, but halfway to C, heavy rain forces the driver to reduce the speed by 25% for the remaining distance. Ignoring the stoppages, find the average speed for the entire journey from A to C.

(A) 46.8 km/h (B) 48 km/h (C) 50 km/h (D) 52.5 km/h (E) 54 km/h

22. Two twin-sized blocks enter a lab: one iron, one lead. A pair of identical heaters blast them with the same energy for the same time—like firing the starting pistol on a 100-meter dash. Which block's temperature surges ahead?

(A) Iron shows a greater temperature rise due to its higher specific heat

(B) Lead shows a smaller temperature increase due to faster cooling

(C) Iron and lead reach thermal equilibrium due to equal energy supplied

(D) Lead's temperature rises more because it requires less energy per °C

(E) Both show identical temperature rise since energy input is equal

23. Riya was waiting at a bus stop when she heard an ambulance racing toward her, siren wailing. At first, the siren sounded sharper and higher. But the moment the ambulance zoomed past and sped away, the same siren suddenly sounded deeper and lower.

Yet, the siren itself never changed its note! So what magical trick of sound is Riya experiencing?

(A) The siren plays different notes while moving

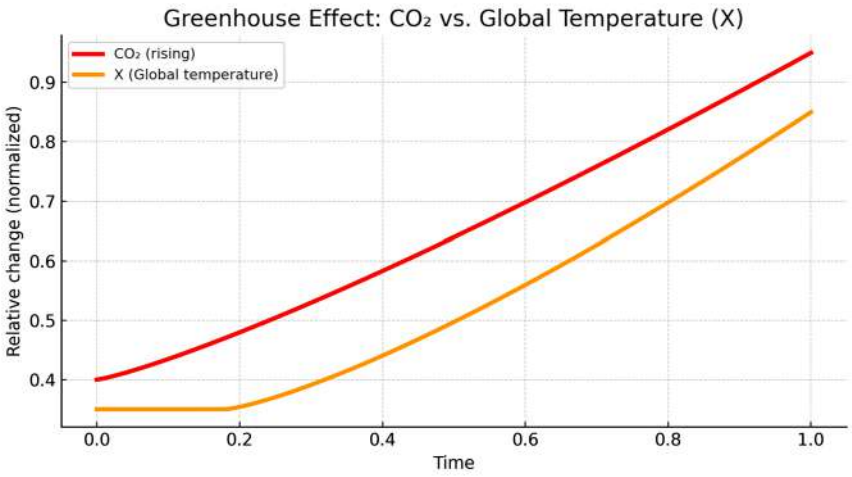
(B) The air makes the sound weaker after passing

(C) The sound waves bunch up when approaching and spread out after passing

(D) Riya's ears become used to the sound after some time

(E) The wind carries the sound away when the ambulance moves past

24. A researcher is analyzing long-term global climate data. The graph below shows how the concentration of dissolved $CO_2$ and another variable X have changed with time in oceanic water samples. As $CO_2$ concentration increases steadily, X shows a slower response initially but rises sharply later. The researcher claims this pattern reflects the complex feedbacks of the greenhouse effect.




What could the variable X represent?

(A) Rate of photosynthesis in marine plants – initially falls due to acidification, but later rises as adaptation increases

(B) pH of ocean water – decreases continuously as $CO_2$ dissolves to form carbonic acid

(C) Dissolved oxygen concentration – decreases first due to higher temperature but later rises from algal blooms

(D) Average global temperature – increases due to enhanced greenhouse trapping by excess $CO_2$

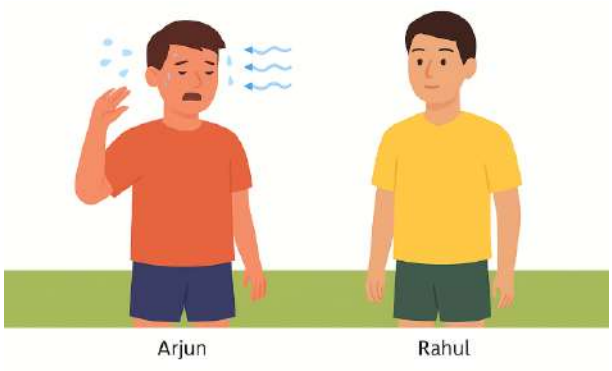
(E) Ocean water level – rises continuously from thermal expansion and ice melt

25. Two persons, A and B, stand on level ground facing a tall, vertical wall. The distance from A to the wall is 150 m, the distance from B to the wall is 250 m, and the separation between A and B (parallel to the wall) is 300 m.

At t = 0, person A fires a gun. Both A and B hear two distinct sounds — the first arriving directly through the air, and the second after reflection from the wall. If the speed of sound in air is 340 m/s, determine the difference between the time intervals (echo time minus direct sound time) experienced by A and B.

(A) 0.09 s (B) 0.12 s (C) 0.18 s (D) 0.24 s (E) 0.30 s

26. After a long, intense football match under the blazing afternoon sun, Arjun is drenched in sweat. His friend Rahul, who watched the game from the shade, feels cool and dry. Their biology teacher smiles and says, "Your bodies are playing their own match — to keep the inside temperature steady!"




What physiological response is Arjun's body showing to prevent overheating?

(A) His muscles start shivering to generate heat

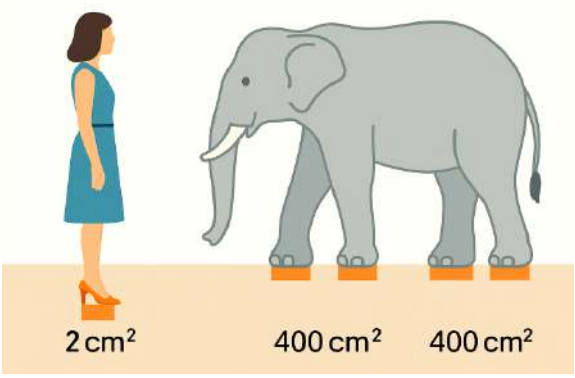
(B) His skin reduces blood flow to conserve warmth

(C) His blood vessels constrict to reduce heat loss

(D) His metabolic rate increases to generate more energy

(E) His sweat glands increase perspiration, allowing cooling by evaporation

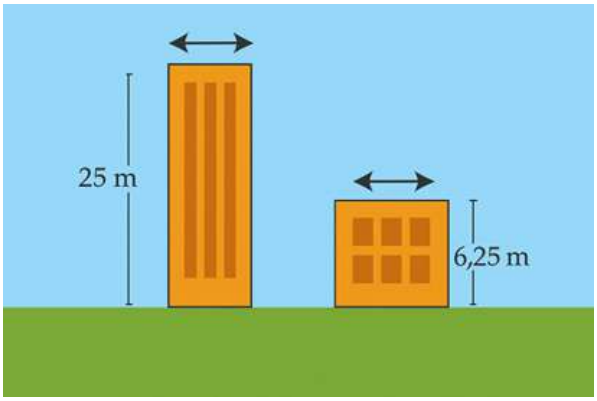
27. A woman of mass 60 kg stands on two narrow heels, each of 2 cm² area. An elephant of mass 4800 kg stands evenly on four feet, each of 400 cm² area. Find the difference in pressure exerted by the woman and the elephant on the floor. (Take g = 10 m/s²)




(A) $5.5 \times 10^5$ Pa (B) $6.0 \times 10^5$ Pa (C) $1.2 \times 10^6$ Pa (D) $8.5 \times 10^5$ Pa

(E) $9.0 \times 10^5$ Pa

28. During a mild earthquake, the ground oscillates with a frequency of 2 Hz. Two buildings in the same area are modeled as simple pendulums of different effective heights. Building A (tall and narrow) has an effective height of 25 m. Building B (short and wide) has an effective height of 6.25 m.




Take g = 10 m/s². For small oscillations, a building's natural frequency is approximately:

$$f = (1 / 2\pi) \times \sqrt{(g / L)}$$

Which building is more likely to resonate strongly with the earthquake waves?

(A) Building A – its natural frequency ≈ 0.32 Hz, far below 2 Hz.

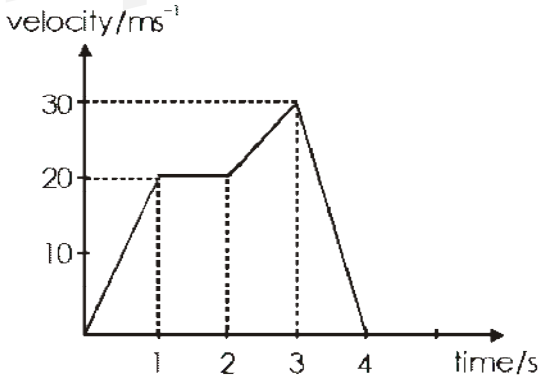
(B) Building B – its natural frequency ≈ 0.64 Hz, closer to 2 Hz.

(C) Building A – its natural frequency ≈ 2 Hz, matches ground frequency.

(D) Building B – its natural frequency ≈ 2 Hz, matches ground frequency.

(E) None – both frequencies are far from 2 Hz.

29. The graph shows how the speed of an object varies with time. Which of the following statements is correct?




(A) The average speed of the object during the first 4 seconds is 20 m/s

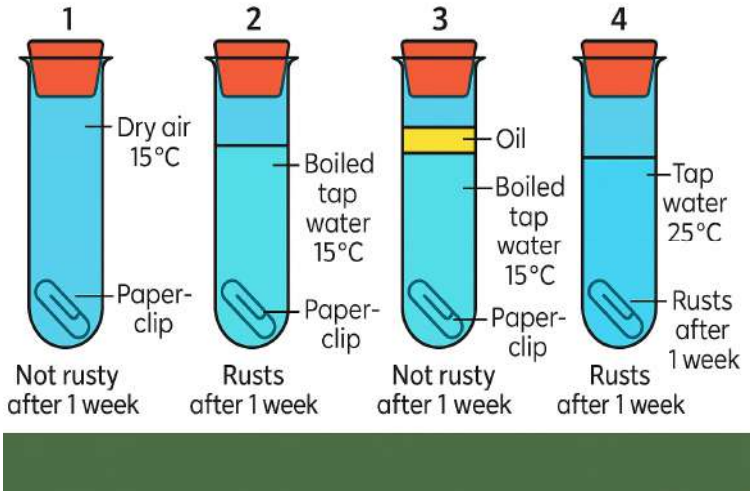
(B) The acceleration of the object during the first second is 20 m/s²

(C) The deceleration of the object is 10 m/s²

(D) The object is traveling at a constant speed during the last second

(E) The total distance covered by the object in 4 seconds is 80 m

30. Four experiments on rusting of iron are shown below. Each test tube contains an iron paper-clip under different conditions.




Which two experiments can be used to show that air is needed for iron to rust?

(A) 1 and 3 (B) 1 and 4 (C) 2 and 3 (D) 2 and 4 (E) 3 and 4

❑❑❑



## ANSWER KEY

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. (C) | 2. (C) | 3. (E) | 4. (D) | 5. (A) | 6. (B) | 7. (D) |
| 8. (A) | 9. (E) | 10. (A) | 11. (B) | 12. (A) | 13. (B) | 14. (A) |
| 15. (B) | 16. (A) | 17. (D) | 18. (C) | 19. (A) | 20. (C) | 21. (A) |
| 22. (D) | 23. (C) | 24. (D) | 25. (E) | 26. (E) | 27. (C) | 28. (E) |
| 29. (B) | 30. (E) | | | | | |