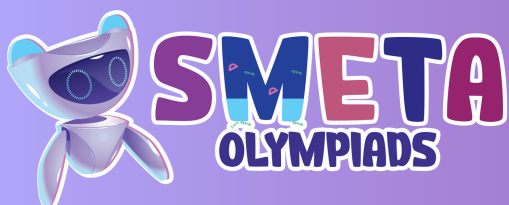


SMETA SCIENCE OLYMPIAD

SAMPLE PAPER
GRADE 9-10



Q1. A scientist finds a human-like fossil but notices that the bones are extremely brittle and thin.

Which condition could have caused this?

- A) High calcium levels in bones
- B) Osteoporosis
- C) Overdevelopment of muscles
- D) Thickening of cartilage

Answer: B) Osteoporosis

Q2. A patient in the hospital urgently needs a blood transfusion. The doctors find that his blood type is B+.

Which blood type(s) can he safely receive?

- A) A+, A-, O+, O-
- B) B+, B-, O+, O-
- C) AB+ only
- D) Any blood type

Answer: B) B+, B-, O+, O-

Q3. Which of the following is true about viruses but not true about bacteria?

- A) They can reproduce on their own without a host.
- B) They contain ribosomes for protein synthesis.
- C) They lack a cellular structure and must infect a host to replicate.
- D) They can be treated using antibiotics.

Answer: C) They lack a cellular structure and must infect a host to replicate.

Q4. A farmer is crossbreeding pea plants to study flower color. He crosses a true-breeding purple flower (PP) with a true-breeding white flower (pp).

What will be the flower color of the offspring, and why?

- A) White, because the white allele is dominant.
- B) Purple, because the offspring receive one dominant allele (P) from one parent.
- C) Purple and white, in equal amounts.
- D) The plants will not flower.

Answer: B) Purple, because the offspring receive one dominant allele (P) from one parent.

Q5. A restaurant server accidentally spills a hot drink on a glass table. The glass suddenly cracks.

What is the most likely reason?

- A) The glass absorbed too much heat and melted.
- B) The sudden temperature change caused thermal stress.
- C) The drink chemically reacted with the glass.
- D) The glass was defective from the beginning.

Answer: B) The sudden temperature change caused thermal stress.

Q6. In a grassland ecosystem, scientists study the following food chain:

Grass → Grasshopper → Frog → Snake → Hawk

If the energy available in the grass is 10,000 Joules, how much energy would be available to the hawk?

- A) 10,000 J
- B) 1,000 J
- C) 100 J
- D) 10 J

Answer: D) 10 J

Q7. A sailor notices that when he removes weight from his small wooden boat, it rises slightly in the water.

Which principle explains this?

- A) Bernoulli's Principle
- B) Archimedes' Principle
- C) Newton's Third Law
- D) Boyle's Law

Answer: B) Archimedes' Principle

Q8. In the early 1900s, scientist Ernest Rutherford conducted an experiment where he shot alpha particles at a thin sheet of gold. Most particles passed through, but some bounced back.

What did this experiment reveal about atomic structure?

- A) Atoms are indivisible and solid like Dalton suggested.
- B) Atoms have a tiny, dense nucleus containing most of their mass.
- C) Electrons are embedded in a solid, positive mass like in Thomson's model.
- D) The nucleus is a large, positively charged region that occupies most of the atom's space.

Answer: B) Atoms have a tiny, dense nucleus containing most of their mass.

Q9. On burning magnesium metal (Mg) in oxygen (O₂). The reaction is:



What will the balanced equation be?

- A) Mg + O₂ → MgO
- B) 2Mg + O₂ → 2MgO
- C) Mg + O₂ → Mg₂O
- D) Mg₂ + O₂ → 2MgO

Answer: B) 2Mg + O₂ → 2MgO

Q10. A chemistry student mixes vinegar (acetic acid) with baking soda (sodium bicarbonate). The reaction produces carbon dioxide bubbles, water, and salt.

What type of reaction is this?

- A) Synthesis – Two reactants combine to form one product.
- B) Decomposition – A compound breaks into simpler substances.
- C) Single Replacement – One element replaces another.
- D) Double Replacement – Two compounds react and swap ions.

Answer: D) Double Replacement

Q11. A new element, X, has two naturally occurring isotopes:

- X-100 with 60% abundance
- X-104 with 40% abundance

What is the average atomic mass of element X?

- A) 101.6 amu
- B) 102.4 amu
- C) 103.2 amu
- D) 104.0 amu

Answer: B) 102.4 amu

Q12. Chemist adds a piece of zinc (Zn) into hydrochloric acid (HCl). The reaction produces a gas.

What gas is released?

- A) Oxygen (O₂)
- B) Carbon Dioxide (CO₂)
- C) Hydrogen (H₂)
- D) Chlorine (Cl₂)

Answer: C) Hydrogen (H₂)

Q13. A satellite is orbiting Earth. If the mass of the satellite doubles, what happens to the gravitational force between Earth and the satellite?

- A) It remains the same.
- B) It doubles.
- C) It reduces by half.
- D) It becomes four times larger.

Answer: B) It doubles.

Q14. A student shakes one end of a rope faster, while keeping the amplitude the same.

How does this affect the wave?

- A) Wavelength increases, and frequency decreases.
- B) Wavelength decreases, and frequency increases.
- C) Both wavelength and frequency increase.
- D) Neither wavelength nor frequency changes.

Answer: B) Wavelength decreases, and frequency increases.

Q15. Which electromagnetic wave is used in airport security scanners to detect metal objects?

- A) Microwaves
- B) Ultraviolet waves
- C) X-rays
- D) Radio waves

Answer: C) X-rays

Q16. A security guard looks into a concave mirror and notices that his face appears larger than normal.

Where is he standing relative to the mirror?

- A) Between the focal point and the mirror
- B) At the center of curvature
- C) Beyond the focal point
- D) At infinity

Answer: A) Between the focal point and the mirror

Q17. A submarine uses sonar to detect underwater objects. A sound wave is emitted and returns 2 seconds later after bouncing off an obstacle. If the speed of sound in water is 1500 m/s, how far is the object?

- A) 750 m
- B) 1500 m
- C) 3000 m
- D) 6000 m

Answer: B) 1500 m

Q18. Scientists drill into Antarctic ice and remove a 500,000-year-old ice core sample. Inside, they find unusually high levels of carbon dioxide (CO₂).

What can they infer from this data?

- A) Ancient Earth had very little oxygen.
- B) The planet was experiencing global warming at that time.
- C) Humans were burning fossil fuels back then.
- D) Glaciers did not exist at that time.

Answer: B) The planet was experiencing global warming at that time.

Q19. A student rubs a balloon against a wool sweater, then brings it close to small paper pieces. The paper jumps towards the balloon.

What force is responsible for this?

- A) Gravity
- B) Magnetic force
- C) Static electricity
- D) Nuclear force

Answer: C) Static electricity

Q20. Which electromagnetic wave is used in airport security scanners to detect metal objects?

- A) Microwaves
- B) Ultraviolet waves
- C) X-rays
- D) Radio waves

Answer: C) X-rays

Q21. A security guard looks into a concave mirror and notices that his face appears larger than normal.

Where is he standing relative to the mirror?

- A) Between the focal point and the mirror
- B) At the center of curvature
- C) Beyond the focal point
- D) At infinity

Answer: A) Between the focal point and the mirror

Q22. Only a tiny fraction of all organisms that ever lived became fossils. Why?

- A) Most organisms decompose before fossilizing.
- B) Only small animals can become fossils.
- C) Fossils can only form underwater.
- D) All ancient creatures were soft-bodied.

Answer: A) Most organisms decompose before fossilizing.

Q23. Liam, an underwater explorer, finds a rock deep in the ocean with a leaf fossil inside. He is puzzled because plants don't grow deep underwater.

What is the most logical explanation?

- A) The leaf fossil drifted into the ocean from land.
- B) The rock was originally part of a forest floor but got submerged.
- C) The leaf belonged to an ancient underwater plant.
- D) Leaves can form fossils anywhere, even in the ocean.

Answer: B) The rock was originally part of a forest floor but got submerged.

Q24. A student is given three colorless liquids and must identify them as water, vinegar, and hydrogen peroxide using simple tests.

Which test should they perform first?

- A) Check for bubbles by adding baking soda.
- B) Smell each liquid to check for strong odors.
- C) Mix them together and observe.
- D) Use litmus paper to test for acidity.

Q25. Javed is studying rust formation. He places iron nails into four different test tubes:

- 1** Dry air, no water
- 2** Water only
- 3** Saltwater
- 4** Oiled and sealed from air

In which test tube will the nails rust the fastest?

- A) Dry air, no water
- B) Water only
- C) Saltwater
- D) Oiled and sealed from air

Answer: C) Saltwater