WHAT IS SCIENCE? (SOLUTIONS)

TEACHING TASK (Page 8 – 10)

Multiple Choice Questions (Single Correct Answer)

1) What type of scientist studies patterns in nature by observing organisms or celestial bodies?
Answer: b) Ecologist
Solution: Ecologists study patterns in nature by observing organisms and their interactions with the environment. While astronomers (a type of physicist) study celestial bodies, the inclusion of organisms points specifically to ecologists.

2) Why do societies allocate resources to support scientific research?
Answer: a) To enhance the well-being of individuals
Solution: Societies fund scientific research primarily to improve quality of life through advancements in health, technology, and knowledge, benefiting individuals and communities.

3) Which scientist famously formulated the heliocentric theory?
Answer: d) Nicolaus Copernicus
Solution: Nicolaus Copernicus is credited with formulating the heliocentric theory, which proposed that the Sun, not the Earth, is the center of the solar system.

4) What is the purpose of wearing safety goggles during scientific experiments?
Answer: b) To protect your eyes from harm
Solution: Safety goggles are worn to shield eyes from hazardous substances, flying debris, or other dangers during experiments.

5) What skill is NOT essential for scientists?
Answer: d) Blind faith
Solution: Scientists rely on critical thinking, numeracy, and creativity to

analyze data and develop hypotheses. Blind faith, which implies belief without evidence, is contrary to the scientific method.

6) Which step of the scientific method involves making observations using the senses?
Answer: c) Observation and questioning
Solution: The observation and questioning step involves using the senses to gather information about phenomena, which forms the basis for further scientific inquiry.

7) Who famously described science as a "history of corrected mistakes"?
Answer: c) Karl Popper
Solution: Karl Popper, a philosopher of science, described science as a process of correcting mistakes through falsification and testing, emphasizing its iterative nature.

8) What type of scientist studies the composition and behaviour of matter?
Answer: b) Chemist
Solution: Chemists study the composition, properties, and behaviour of matter, including how substances interact and transform.

9) Which of the following is NOT a process skill in scientific inquiry?
Answer: b) Daydreaming
Solution: Observation, comparison, and classification are process skills used in scientific inquiry to collect and analyze data. Daydreaming is not a recognized scientific skill.

10) What is the ultimate goal of the scientific method?
Answer: b) To refine understanding through evidence
Solution: The scientific method aims to build and refine knowledge by systematically gathering and analysing evidence, not to prove preconceived notions or suppress ideas.

Advanced Level Questions (More than One Answer Type)

11) What are some motivations for societies and nations to support scientific research?
Answer: a) Enhancing well-being, b) Economic development, d) Political dominance
Solution: Societies support scientific research to improve quality of life (well-being), drive economic growth through innovation, and sometimes gain political or strategic advantages. Cultural preservation is not typically a primary motivation for scientific research.

12) Which is not the purpose of forming a hypothesis in the scientific method?
Answer: a) To prove existing theories, b) To gather data, d) To draw conclusions
Solution: A hypothesis is a proposed explanation to guide investigation, not to prove existing theories, gather data, or draw final conclusions. Its purpose is to propose a possible answer (c) to a question.

13) Which skills are employed in Swetha's investigation of towel water absorption?
Answer: a) Hypothesis formulation, b) Experimental design, c) Variable control, d) Data interpretation
Solution: Investigating towel water absorption requires formulating a hypothesis (e.g., which towel absorbs more water), designing an experiment to test it, controlling variables (e.g., water volume), and interpreting the resulting data.

Reason and Assertion Type

14) Reasoning question: "Why is reading essential for scientists in their research endeavors?
Assertion: Reading allows scientists to delve deeply into subjects, comprehend scientific terms, and absorb new information crucial for their investigations.
Answer: The assertion is correct.
Solution: Reading is essential for scientists to stay informed about existing

research, understand specialized terminology, and gain insights that inform their investigations, enabling them to build on prior knowledge.

15) Reasoning question: "Why is writing an important tool for scientists to communicate their discoveries?
Assertion: Writing enables scientists to effectively convey their findings, connect new ideas with existing knowledge, and advocate for important scientific issues.
Answer: The assertion is correct.
Solution: Writing is a critical tool for scientists to document and share their findings, link new discoveries to prior knowledge, and advocate for scientific advancements or issues, ensuring clear communication.

16) Reasoning question: "Why is understanding numerical data important for scientists?
Assertion: Understanding numerical data is vital for scientists to accurately interpret measurements, compare values, and present the results of their investigations effectively.
Answer: The assertion is correct.
Solution: Numerical data is central to scientific research, as it allows scientists to quantify observations, compare results, and present findings accurately, supporting evidence-based conclusions.

Matrix Matching Type

17) Match the safety precaution with the corresponding action:
Answer:

Planning ahead and familiarizing with the experiment steps → B. Be attentive

Wearing safety goggles when handling hazardous materials → C. Protect your eyes

Refraining from eating or drinking during experiments → D. Avoid ingestion

Ensuring cords are safely placed to prevent tripping hazards → A. Prevent electrical hazards

Solution:

Planning ahead ensures attentiveness to experimental procedures (1-B).

Safety goggles protect eyes from hazardous materials (2-C).

Avoiding eating/drinking prevents ingestion of harmful substances (3-D).

Safely placing cords prevents tripping or electrical hazards (4-A).

Comprehension Type

18) Questions based on the passage about Copernicus and Newton:

i) What was Copernicus's contribution to scientific understanding?
Answer: Copernicus formulated the heliocentric theory, which placed the Sun at the center of the solar system, challenging the Earth-centered model and improving understanding of planetary orbits.
Solution: The passage states that Copernicus's heliocentric theory shifted humanity's understanding by proposing the Sun as the center, revolutionizing celestial motion concepts.

ii) How did Newton's investigations into gravity impact scientific thought?
Answer: Newton's laws of motion and universal gravitation provided a framework for understanding motion and celestial mechanics, transforming scientific thought.
Solution: The passage highlights that Newton's work on gravity yielded groundbreaking insights, offering a new framework for understanding physical forces and celestial motion.

iii) What characteristics define the innovators mentioned in the passage?
Answer: The innovators, Copernicus and Newton, are characterized by their unconventional approaches, willingness to challenge conventional beliefs, and rigorous analysis of natural phenomena.
Solution: The passage describes them as daring to challenge conventional beliefs, using unconventional approaches, and conducting rigorous analysis, which drove scientific advancement.

LEARNERS TASK (Page 11 – 13)

Multiple Choice Questions (Single Correct Answer)

1) What is the primary goal of science?
Answer: b) To comprehend the natural world
Solution: The primary goal of science is to understand the natural world through observation, experimentation, and evidence-based reasoning, not to accumulate wealth, dominate civilizations, or enforce ideologies.

2) Which approach in science involves conducting controlled experiments?
Answer: c) Experimental
Solution: The experimental approach involves conducting controlled experiments to test hypotheses, unlike observational (data collection without manipulation), theoretical (model-based), or speculative (unsubstantiated) approaches.

3) What Latin root word does "science" derive from?
Answer: a) Scientia
Solution: The word "science" comes from the Latin root "scientia," meaning knowledge, reflecting the pursuit of understanding through systematic study.

4) What is the purpose of the scientific method?
Answer: b) To provide a structured approach to scientific inquiry
Solution: The scientific method offers a systematic framework for asking questions, testing hypotheses, and drawing conclusions, not for memorizing facts, creating fiction, or enforcing dogma.

5) Which of the following is NOT a step in the scientific method?
Answer: b) Making wild guesses
Solution: The scientific method includes observation and questioning, forming a hypothesis, and conducting experiments. Making wild guesses lacks the rigor and evidence-based approach required in science.

6) Which scientist proposed the theory of gravity?
Answer: a) Isaac Newton
Solution: Isaac Newton formulated the theory of universal gravitation, describing the force governing the motion of objects and celestial bodies.

7) What is the purpose of wearing safety goggles during scientific experiments?
Answer: b) To protect your eyes from harm
Solution: Safety goggles are worn to shield eyes from hazardous materials, chemicals, or debris, ensuring safety during experiments.

8) Which step of the scientific method involves making predictions based on observations?
Answer: c) Forming a hypothesis
Solution: Forming a hypothesis involves making testable predictions based on observations, which guide the design of experiments.

9) What type of scientist studies the movement and properties of celestial bodies?
Answer: c) Astronomer
Solution: Astronomers study celestial bodies, their movements, and properties, unlike chemists (matter), ecologists (ecosystems), or biologists (living organisms).

10) What is NOT a reason societies support scientific research?
Answer: c) To impede progress
Solution: Societies support scientific research to foster economic growth, enhance well-being, and promote innovation, not to hinder progress.

Advanced Level Questions (More than One Answer Type)

11) What are some ways writing is utilized in scientific practice?
Answer: a) Describing observations, b) Advocating for scientific issues
Solution: Writing is used in science to document observations accurately and advocate for scientific issues (e.g., in publications or policy). Composing songs and expressing emotions are not primary scientific practices.

12) Which factors contribute to safety in science?
Answer: a) Communication, c) Cleanliness
Solution: Effective communication ensures safety protocols are understood, and cleanliness prevents contamination or hazards. Observations and experimentation are part of inquiry but not directly tied to safety.

13) What skills are essential for engaging in scientific inquiry?
Answer: a) Problem identification, b) Data analysis, c) Result analysis
Solution: Scientific inquiry requires identifying problems, analyzing data, and interpreting results to draw conclusions. Storytelling, while useful for communication, is not a core inquiry skill.

Reason and Assertion Type

14) Reasoning question: "Why is safety paramount in scientific investigations?
Assertion: Safety is crucial during scientific investigations to prevent accidents and ensure the well-being of individuals.
Answer: The assertion is correct.
Solution: Safety is essential in scientific investigations to protect researchers from hazards like chemicals or equipment, ensuring their well-being and preventing accidents.

15) Reasoning question: "Why do scientists conduct experiments to explore new ideas or challenge existing ones?
Assertion: Scientists conduct experiments to push the boundaries of knowledge, leading to paradigm shifts in our understanding of the natural world.
Answer: The assertion is correct.
Solution: Experiments are conducted to test new ideas or challenge existing theories, driving scientific progress and potentially leading to significant shifts in understanding.

16) Reasoning question: "Why do scientists follow a structured approach like the scientific method in their investigations?
Assertion: Scientists follow the scientific method to systematically plan and execute their experiments, ensuring reliable results and conclusions based on evidence.

Answer: The assertion is correct.
Solution: The scientific method provides a structured, systematic approach to ensure experiments are repeatable, reliable, and yield evidence-based conclusions.

Matrix Matching Type

17) Match the scientific process skill with the corresponding investigation:
Answer:

Observation, comparison, and classification → A. Aravind's Investigation

Hypothesis formation, experimental design, data collection, and analysis → C. Charitha's Investigation

Prediction, inference, and experimentation → B. Swetha's Investigation

Hypothesis formulation, experimental design, variable control, data collection, and interpretation → D. Saketh's Investigation

Solution:

Observation, comparison, and classification (1) align with Aravind's investigation, likely focusing on descriptive analysis (A).

Hypothesis formation, experimental design, data collection, and analysis (2) suggest a comprehensive experimental process, fitting Charitha's investigation (C).

Prediction, inference, and experimentation (3) indicate a predictive and experimental approach, suitable for Swetha's investigation (B).

Hypothesis formulation, experimental design, variable control, data collection, and interpretation (4) describe a full scientific inquiry cycle, matching Saketh's investigation (D).

Comprehension Type

18) Questions based on the passage about scientific research and societal well-being:

1) What role do geneticists and biologists play in advancing healthcare outcomes?

Answer: Geneticists and biologists study hereditary traits and disease transmission, enabling innovative medical interventions and personalized healthcare approaches.

Solution: The passage states that geneticists and biologists unravel genetic complexities, paving the way for advanced medical interventions and personalized healthcare.

2) How do earth scientists contribute to mitigating the impacts of natural disasters?

Answer: Earth scientists use predictive modeling to anticipate weather patterns and natural disasters, enabling timely preparedness and response to minimize impacts.

Solution: The passage explains that earth scientists' predictive modeling helps forecast disasters, supporting preparedness efforts to reduce harm to lives and infrastructure.

3) What does the allocation of resources to support scientific research signify for society?

Answer: It signifies a society's commitment to safeguarding the well-being of its populace.

Solution: The passage notes that resource allocation reflects a society's dedication to improving quality of life and addressing challenges through scientific advancements.