Class : 9th

Subject : Physics

Chapter : 9 (Thermal Properties of Matter)

New Book Punjab Board

Short Answer Questions

9.1 State in your own words, what is science? Write its two main groups.

Ans. Science: Science is a collective knowledge about the natural phenomena, processes and events occurring around us.

Classification: The study of nature basically into two main part.

(i) The biological sciences which deal with the living things.

(ii) The physical sciences which are about the study of non-living things.

9.2 What is physics all about? Name some of its branches.

Ans. Physcis: Physics is the fundamental science that deals with the constituents of the universe, that is, matter, energy, space, time and their mutual relationships and interactions.

(i) Mechanics

(ii) Optics

(iii) Nuclear physics

Explanation: If strives to understand how the universe works, from the smallest subatomic particles to the largest star and galaxies.

9.3 What is meant by interdisciplinary fields? Give a few examples.

Ans. Interdisciplinary fields combine knowledge and methods from multiple disciplines to solve complex problems. Examples include biophysics (biology and physics), astrobiology (astronomy and biology), environmental science (biology, chemistry, geology), etc.

9.4 List the main steps of scientific method.

Ans. The main steps of the scientific method are observation, question, hypothesis, prediction, experiment, analysis, conclusion and communication.

9.5 What is a hypothesis? Give one example.

Ans. Hypothesis: On the basis of the data collected through observations or experimentation, we can develop a hypothesis. This is done in order to test its logical results,

For example : We assume that shadows of opaque objects are formed when they come in the path of light because light travels in a straight line.

9.6 Distinguish between a theory and a law of physics.

Ans. After the successful verification of an assumption and with the help of careful experimentation, it becomes a theory and is applicable to similar phenomena. When a theory has been tested many times and generally accepted as true, it is called a law.

9.7 What is the basis of laser technology?

Ans. Laser technology is based on the principles of atomic physics. It is widely used in medical diagnosis and treatment, metallurgy, industry, telecommunication and space exploration. It is also used extensively for military purpose.

9.8 What is falsifiability concept? How is it important?

Ans. Falsifiability: It is a concept introduced that suggests a theory to be considered scientific if it also make predictions that can be tested and potentially proven false. The requirement of falsifiability ensures that theories are not based on vague, non-specific or untestable claims.

Importance : It distinguishes scientific theories from false or pretended beliefs that cannot be experimentally tested.

Constructed Response Questions

9.1 Is the theory of science an ultimate truth? Describe briefly.

Ans. No, the theory of science is not the ultimate truth. Scientific theories are based on current evidence and understanding, but they are subject to revision or replacement as new data or better explanations emerge as new discocries are made, and theories are refined to better explain observations and phenomena.

9.2 Do you think that the existing laws of nature may need a change in future? Describe briefly.

Ans. Yes, the laws of nature may need to be revised in the future. Current laws are based on existing evidence, but new discoveries could reveal situations where these laws don't fully apply, as seen with quantum mechanics and general relativity. Science involves and our understanding may change over time.

9.3 Describe three jobs that need the use of scientific knowledge.

Ans. 1. Medical Scientist: Conducts research to improve health care develop new treatments, and understand diseases.

2. Environmental Scientist: Studies the environment and works on solutions to protect natural resources and address issues like pollution and climate change.

3. Forensic scientist: Uses scientific techniques to analyze evidence from crime scenes helping solve criminal cases.

9.4 Describe when a theory is rejected or needs its modification.

Ans. A theory is rejected or needs modification when new evidence contradicts its predictions, or it fails to explain. Certain phenomena or observations that arise. If a theory cannot accommodate new findings or letter explanations are developed, it may be revised or replaced.

9.5 Comment on the statement. "A theory is capable of being proved right but not being proved wrong is not a scientific theory".

Ans. The statement is incorrect. A scientific theory must be testable and falsifiable meaning it must be capable of being proven wrong. If a theory can't be disproven, it ins't a valid scientific theory.

9.6 What has been the general reaction to new ideas about established truths?

Ans. New ideas about established truths are often met with skepticism and resistance. Over time, if supported by evidence, they may be accepted, leading to a shift in understanding. However, this process usually occurs gradually.

9.7 If a hypothesis is not testable, is the hypothesis wrong? Explain.

Ans. The hypothesis is not "wrong" if it is not testable, but it is not scientifically useful. Science relies on testable hypotheses to gather evidence and draw conclusions. If a hypothesis cannot be

tested or falsified it cannot be proven true or false, making it outside the realm of scientific inquiry.

9.8 Explain how a small amount of data cannot prove that a prediction is always correct but can prove it is not always correct.

Ans. A small amount of data can't prove a prediction is always correct, as it may not cover all scenarios. However, it can show the prediction is not always correct if even one instance contradicts it. More data is needed to proved a prediction true in all cases.

9.9 What is the relationship between an experiment and a hypothesis?

Ans. An experiment tests a hypothesis. The hypothesis is a prediction or explanation that can be tested through experimentation. The experiment collects data to confirm or refute the hypothesis, helping to determine nether (if) it is supported by evidence.

9.10 Describe why the solution of complex problems need interdisciplinary research and collaboration.

Ans. Complex problems often involve multiple factors across different fields, such as science, technology and social aspects. Interdisciplinary research and collaboration bring together expertise from various disciplines, allowing for a more comprehensive understanding and effective solutions. By combining diverse perspectives and knowledge interdisciplinary teams can tackle problems more holistically and develop innovative approaches the wouldn't be possible within a single field.

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