Problem Set 01 - Nature Of Science

Due Date	@February 19, 2025
Status	Done
Type	Problem Set

Question no. 01

1.1 The statement describes a ***scientific law*** because it is a universal observed relationship that describes how light behaves during reflection. It does not explain why this happens, which would be The role of a theory.

1.2.1 It is not a ***scientific hypothesis*** because it is based on an opinion rather than a measurable or testable evidence.

1.2.2 It is a ***scientific hypothesis*** because it can be tested for falseness using observations, and data from space missions.

1.3 It should be ***accepted*** but still subject to further testing. Scientific knowledge is always open to revision if new evidence emerges.

1.4.1 Newton's Second Law of motion.

1.4.2 Newton's Second Law states that force is directly ***proportional*** to mass and acceleration, given by The equation: ***F = ma***.

This means that increasing force increases acceleration, while increasing mass reduces acceleration for The same applied force.

Question no. 02

2.1

Frequency = 2 Hz

Time = 1 / F = 1 / 2 = 0.5 s

Velocity initial = 1 m / 0.5 s = 2 m / s

Velocity final = 5 m / 0.5 s = 10 m / s

Acceleration = (Final Velocity - Initial Velocity) / 2 Time = (10 - 2) / (2 × 0.5) = 8 m / s ^ 2

2.2

The hypothesis should be classified as a ***scientific law*** because it describes a fundamental, repeatable relationship in nature.

Question no. 03

3.1.1 Yes, Einstein's theory of general relativity is ***scientific knowledge*** because it is based on mathematical formulations, observational evidence, and experimental verification.

3.1.2

1. ***Scientific Knowledge*** is based on evidence, experimentation, and observation. It is testable, falsifiable, and subject to change with new evidence.
2. ***Religious Knowledge*** is based on faith, and spiritual beliefs. It is not tested through experimentation and is often considered absolute within a belief system.

3.2

A ***scientific fact*** is an observation that has been repeatedly confirmed through experiments. However, scientific facts can change with new discoveries.

Example:

It was once a fact that The Sun orbits The Earth. This changed when new evidence showed that The Earth orbits The Sun.

3.3.1

Bohr's explanation of hydrogen energy levels is a ***scientific model, not a theory***.

- A ***scientific model*** is a simplified representation of reality used to explain observations.

The Bohr Model helped explain atomic structure but was later replaced by quantum mechanics, which provides a more accurate description.

3.3.2

Yes, The theory of ***quantum mechanics*** is highly reliable because it is supported by extensive experimental evidence and has been used to develop technologies like semiconductors, lasers, and quantum computers.

Question no. 04

4.1 To apply scientific knowledge for practical purposes to solve problems and improve human life.

4.2 By making medical services more efficient and accessible.

4.3

Advantages:

1. Increased productivity.
2. Improved access to information.

Disadvantages:

1. Environmental degradation.
2. Job displacement due to automation.

4.4 In my experience, collaboration tools like ***Figma, GitHub, Google Docs or WhatsApp*** have increased productivity in remote work and education. They allow multiple developers to work on projects and documents in real time, reducing The need for emails and making team-work more efficient.

4.5 Technology can address The ***digital divide*** in education by providing online learning platforms like ***Udemy or Coursera***. These platforms make education more accessible to students in remote areas, allowing them to learn from expert instructors without needing to be physically present in a classroom.

With Love, Shawqi.