**General Science: Unit 5 Comprehensive Notes**

**1. Units of Measurement**

Units of measurement are standards used to quantify physical quantities. The International System of Units (SI) is the globally accepted standard.

**Key SI Units:**

* **Length:** Meter (m)
* **Mass:** Kilogram (kg)
* **Time:** Second (s)
* **Electric Current:** Ampere (A)
* **Temperature:** Kelvin (K)
* **Amount of Substance:** Mole (mol)
* **Luminous Intensity:** Candela (cd)

**Derived Units:**

* **Speed:** Meter per second (m/s)
* **Force:** Newton (N = kg·m/s²)
* **Energy:** Joule (J = N·m)
* **Power:** Watt (W = J/s)

**Fundamental Units:**

Fundamental units are the basic building blocks for measuring all physical quantities. They include the seven SI base units listed above and are essential for defining all derived units.

**Importance:**

Standardized units ensure consistency in scientific experiments, engineering, and commerce globally.

**2. Features of Gravity**

Gravity is a fundamental force of nature that governs the attraction between objects with mass.

**Key Features:**

1. **Newton’s Law of Universal Gravitation:**
   * Formula:
     + : Force between two masses
     + : Gravitational constant (6.674×10⁻¹¹ N·m²/kg²)
     + : Masses of two objects
     + : Distance between their centers
2. **Acceleration Due to Gravity (g):**
   * On Earth, .
   * Varies with altitude, latitude, and planetary mass.
3. **Tidal Effects:**
   * Caused by differences in gravitational pull, particularly between the Earth, Moon, and Sun.
4. **Einstein’s General Theory of Relativity:**
   * Describes gravity as the curvature of spacetime caused by mass.

**Role of Gravity:**

* Maintains the structure of the universe by keeping celestial bodies in orbit.
* Influences ocean tides, atmospheric circulation, and weather patterns.
* Provides stability for human activities and infrastructure.

**Applications:**

* Orbits of planets and satellites
* Tides and ocean currents
* Construction of buildings and bridges

**3. Scientific Inventions**

Scientific inventions are pivotal for technological and societal advancement. Below are significant inventions and their inventors:

**Key Inventions:**

1. **Electric Bulb:** Thomas Edison
2. **Telephone:** Alexander Graham Bell
3. **Radio:** Guglielmo Marconi
4. **Airplane:** Wright Brothers
5. **Penicillin:** Alexander Fleming
6. **Steam Engine:** James Watt

**Importance of Scientific Discoveries and Inventions:**

* **Healthcare:** Improved treatments and medicines have enhanced life expectancy.
* **Technology:** Advancements in communication and computation revolutionized industries.
* **Environment:** Innovations in renewable energy and sustainability support ecological balance.
* **Daily Life:** Tools, devices, and systems improve convenience and quality of life.

**Applications:**

* Enhancing global connectivity through communication technologies.
* Advancing transportation systems for efficiency and speed.
* Supporting exploration of space and oceans.

**4. Important Facts about Physics**

Physics explains natural phenomena and is the foundation for many scientific disciplines.

**Key Concepts:**

1. **Laws of Motion (Newton):**
   * **First Law (Law of Inertia):** An object remains at rest or in uniform motion unless acted upon by an external force.
   * **Second Law:** , where is force, is mass, and is acceleration.
   * **Third Law:** For every action, there is an equal and opposite reaction.
2. **Energy Forms:**
   * **Kinetic Energy:** , where is mass and is velocity.
   * **Potential Energy:** , where is mass, is gravitational acceleration, and is height.
   * Interconversion between kinetic and potential energy governs many natural and engineered systems.
3. **Electromagnetism:**
   * Explains electric and magnetic fields.
   * Maxwell’s equations govern electromagnetic waves.
4. **Thermodynamics:**
   * Laws governing heat, work, and energy transfer.
5. **Optics:**
   * Study of light and its interactions.
   * Includes reflection, refraction, and diffraction.

**5. Branches of Science**

Science is divided into various disciplines based on the field of study:

**Major Branches:**

1. **Physics:** Study of matter, energy, and their interactions.
2. **Chemistry:** Study of substances, their properties, and reactions.
3. **Biology:** Study of living organisms and life processes.
4. **Earth Science:** Study of Earth’s structure, processes, and history.
5. **Astronomy:** Study of celestial bodies and the universe.

**Interdisciplinary Fields:**

1. **Biochemistry:** Combination of biology and chemistry.
2. **Geophysics:** Study of physical processes within Earth.
3. **Astrobiology:** Study of life in the universe.

### Questions for Practice

#### Very Short Answer Questions:

1. What is the SI unit of length?
2. State Newton’s First Law of Motion.
3. Define potential energy.
4. Name the scientist who discovered penicillin.
5. What is the value of the acceleration due to gravity on Earth?
6. Which unit is used to measure electric current?
7. Write the formula for gravitational force.
8. What is the unit of power in the SI system?
9. Name one interdisciplinary field of science.
10. What does Maxwell’s equations describe?

#### Short Answer Questions:

1. Explain the significance of fundamental units in science.
2. Write a short note on Newton’s Law of Motion with an example.
3. Differentiate between kinetic energy and potential energy with formulas.
4. Describe the role of gravity in maintaining the structure of the universe.
5. What are the main branches of science? Briefly explain any two.
6. Discuss the applications of electromagnetism in daily life.
7. What are derived units? Provide two examples.

#### Long Answer Questions:

1. Discuss Newton’s Laws of Motion in detail with suitable examples.
2. Explain the importance and applications of scientific inventions in modern society.
3. Derive the formula for kinetic energy and explain its practical applications.
4. Describe Einstein’s General Theory of Relativity and its implications for understanding gravity.
5. Explain the differences between the major branches of science with examples.
6. Discuss the key features and applications of gravitational force.
7. Elaborate on the significance of units of measurement in scientific research and engineering.
8. Describe the contributions of significant scientific discoveries in human life .