

# **GOLDLITE SUPPLIES**

## **GRADE 10 PHYSICS NOTES**

### **SUMMARY OF STRANDS AND SUB STRANDS**

#### **1. MECHANICS AND THERMAL PHYSICS**

- 1.1 Introduction to Physics
- 1.2 Pressure
- 1.3 Mechanical Properties of Materials
- 1.4 Temperature and Thermal Expansion
- 1.5 Moments and equilibrium 15
- 1.6 Energy, Work, Power and Machines

#### **2.0 WAVES AND OPTICS**

- 2.1 Properties of Waves
- 2.2 Radioactivity and Stability of Isotopes

#### **3.0 ELECTRICITY AND MAGNETISM**

- 3.1 Electrostatics
- 3.2 Current Electricity
- 3.3 Introduction to electronics

#### **4.0 ENVIRONMENTAL AND SPACE PHYSICS**

- 4.1 Greenhouse Effect and Climate Change
- 4.2 Introduction to Space Physics

## 1.0 MECHANICS AND THERMAL PHYSICS:

### Sub-Strand 1.1: Introduction to Physics

#### What is Physics?

- ✓ Physics is the science that studies matter, motion, energy, and forces.
- ✓ It aims to understand the fundamental laws of the universe.

#### Branches of Physics:

- ✓ **Mechanics:** Motion and forces (e.g., cars, machines).



- ✓ **Electricity & Magnetism:** Charges, currents, and magnets (e.g., generators, electronics).



- ✓ **Thermodynamics:** Heat and energy (e.g., engines, refrigerators).



- ✓ **Geometrical Optics:** Light and its behavior (e.g., lenses, mirrors).



- ✓ **Waves:** Sound and light waves (e.g., music, communication).



- ✓ **Electronics:** Circuits and devices (e.g., computers, phones).



- ✓ **Modern Physics:** Quantum mechanics, relativity (e.g., atoms, space).



- ✓ **Astronomy:** Celestial objects (e.g., stars, planets).



## **Importance of Physics:**

- ✓ Technology: Phones, computers, internet.
- ✓ Transportation: Cars, planes, trains.
- ✓ Medicine: X-rays, MRI scans.
- ✓ Energy: Power generation, solar panels.
- ✓ Everyday life: cooking, building, weather prediction.
- ✓ Designing Transport Machines like cars, robots

## **Physics and Other Subjects:**

- ✓ **Chemistry:** Atomic structure, reactions.
- ✓ **Biology:** Biomechanics, medical devices.
- ✓ **Mathematics:** Tools for calculations and modeling.
- ✓ **Engineering:** Designing and building.
- ✓ **Geography:** Climate and weather.

Physics, as the study of the fundamental principles governing the universe, has deep and intertwined relationships with numerous other academic disciplines. Here's a look at some key connections:

## **Summary of relationship**

### **1. Mathematics:**

- **The Language of Physics:**
  - ✓ Mathematics provides the essential tools for expressing and analyzing physical laws and theories. Calculus, algebra, geometry, and differential equations are indispensable in physics.
  - ✓ Physics relies on mathematical models to describe phenomena, make predictions, and interpret experimental data.

### **2. Chemistry:**

- **Atomic and Molecular Interactions:**
  - ✓ Physics provides the foundation for understanding atomic structure, chemical bonding, and the behavior of molecules.
  - ✓ Quantum mechanics, a branch of physics, is crucial for explaining chemical reactions and properties of materials.
  - ✓ Thermodynamics, a field of physics, is also vital to the understanding of chemical reactions.

### **3. Biology:**

- **Biophysics:**

- Physics principles are applied to understand biological systems, such as the mechanics of movement, the flow of fluids in the body, and the functioning of the nervous system.
- Medical imaging technologies like X-rays, MRI, and ultrasound rely on physics principles.
- Understanding how light interacts with biological material is also an area of biophysics.

### **4. Engineering:**

- **Applied Physics:**

- Engineering disciplines, such as mechanical, electrical, and civil engineering, heavily rely on physics principles to design and build structures, machines, and devices.
- Physics provides the basis for understanding materials science, thermodynamics, and electromagnetism, which are essential for engineering applications.

### **5. Astronomy:**

- **Astrophysics:**

- Physics is essential for understanding the universe, including the motion of celestial bodies, the formation of stars and galaxies, and the nature of black holes.
- Astrophysicists use physics principles to analyze astronomical observations and develop theories about the cosmos.

### **6. Geology:**

- **Geophysics:**

- Physics principles are applied to study the Earth's structure, including earthquakes, volcanoes, and the Earth's magnetic field.
- Geophysicists use techniques like seismic wave analysis and gravity measurements to explore the Earth's interior.

### **7. Computer Science:**

- **Computational Physics:**

- Physics simulations and modeling rely heavily on computer algorithms and computational power.

- Quantum computing, a rapidly developing field, utilizes principles of quantum mechanics to perform computations.

In essence, physics provides a foundational understanding of the natural world, and its principles are applied across a wide spectrum of scientific and technological fields.

### **Career Opportunities related to study of physics**

#### ❖ **Engineering:**

- ✓ Physics provides the fundamental principles for various engineering disciplines:
  - ✓ **Electrical Engineering:** Designing and developing electrical systems, devices, and power generation.
  - ✓ **Civil Engineering:** Designing and constructing infrastructure like bridges, roads, and buildings.
  - ✓ **Mechanical Engineering:** Designing and manufacturing machinery and mechanical systems.
  - ✓ **Telecommunications Engineering:** Working with communication technologies and networks.

#### ❖ **Technology:**

- ✓ Physics is essential in the development of cutting-edge technologies:
  - ✓ **Computer Science:** Contributing to areas like computer hardware development and software engineering.
  - ✓ **Renewable Energy:** Working on solar, wind, and other sustainable energy solutions.

#### ❖ **Medicine:**

- ✓ Physics plays a crucial role in medical technologies:
  - ✓ **Medical Physics:** Operating and maintaining medical imaging equipment like X-ray and MRI machines.
  - ✓ **Radiology:** Using radiation for medical diagnosis and treatment.

#### ❖ **Meteorology:**

- ✓ Physicists work as meteorologists, analyzing weather patterns and forecasting climate.

#### ❖ **Education:**

- ✓ Physics graduates can become teachers and lecturers, inspiring future generations of scientists.

#### ❖ **Research:**

- ✓ Working in research institutions, conducting experiments, and advancing scientific knowledge.

#### ❖ **Geophysics:**

- ✓ Working within the field of geophysics, to study the earth's physical properties.

### Career Opportunities summary:

- ✓ Physicist (research, teaching).
- ✓ Engineer (electrical, mechanical).
- ✓ Astronaut.
- ✓ Medical physicist.
- ✓ Data Scientist.
- ✓ Physics related field Teacher.

### Key Points:

- Physics helps us understand how things work.
- It is essential for technological advancements.
- Many career paths are available for those with physics knowledge.

## 1.2 Pressure

### 1. Atmospheric Pressure and Its Effects

- **Definition:**
  - ✓ Atmospheric pressure is the force per unit area exerted by the weight of the air in the atmosphere. It decreases with altitude.
  - ✓ It is caused by the gravitational attraction of the Earth on the air molecules.
- **Demonstrating Atmospheric Pressure:**
  - ✓ **Crushing Can Experiment:**
    - ✚ Heat a small amount of water in a metal can until it boils.
    - ✚ Quickly seal the can and cool it with cold water.
    - ✚ The can crushes due to the higher atmospheric pressure outside.
    - ✚ **Explanation:** The boiling water turns to vapor, and displaces the air inside the can. When the can is sealed and cooled, the water vapor condenses, reducing the internal pressure. The external atmospheric pressure then crushes the can.



- ✓ [Image of Crushing can experiment]

✓ **Drinking Straw:**

- ✚ When you suck on a straw, you reduce the air pressure inside the straw.
- ✚ The higher atmospheric pressure on the liquid's surface pushes the liquid up the straw.



- ✓ [Illustration of drinking straw action]

## 2. Factors Affecting Pressure in Liquids

✚ **Depth (h):**

- ✓ Pressure increases with depth. The deeper you go, the more fluid is above you, exerting more weight.
- ✓ **Density ( $\rho$ ):**
  - Denser fluids exert more pressure at the same depth. For example, saltwater exerts more pressure than freshwater.
- ✓ **Acceleration due to Gravity (g):**
  - Pressure is directly proportional to the acceleration due to gravity.

✚ **Experiment:**

- ✓ Use a container with holes at different depths.
- ✓ Observe the distance the water jets travel. The jet from the deepest hole travels the farthest, indicating higher pressure.

**FOR ALL COMPLETE CBE GRADE 10 AND OTHER GRADES NOTES AND SCHEMES OF WORK INBOX US ON 0724351706.**