Unit 1: Engineering Principles

Unit 1 is an externally assessed unit and you will be studying the unit content from September in Year 12 until the following June when you will be taking the exam.

The exam papers consist of three sections: Section A covers Applied Mathematics, Section B covers Mechanical Principles, while Section C covers Electrical/Electronic Principles.

Performance in the exam is graded as Pass, Merit or Distinction and you have to gain at least a pass to pass the course.

There are **5 Assessment outcomes** for this externally assessed unit:

- AO1 Recall basic engineering principles and mathematical methods and formulae
  Command words: calculate, describe, explain, identify, name

- AO2 Perform mathematical procedures to solve engineering problems
  Command words: calculate, convert, find, solve

- AO3 Demonstrate an understanding of electrical, electronic and mechanical principles to solve engineering problems
  Command words: find, calculate, describe, draw, explain

- AO4 Analyse information and systems to solve engineering problems
  Command words: calculate, draw

- AO5 Integrate and apply electrical, electronic and mechanical principles to develop an engineering solution
  Command words: calculate, draw, explain

The above assessment outcomes are covered through the following essential content which you will cover throughout the year:

- A Algebraic and trigonometric mathematical methods

- B Static engineering system

- C Dynamic engineering systems

- D Fluid engineering systems

- E Static and direct current electricity and circuits

- F Magnetism and electromagnetic induction

- G Single-phase alternating current

TASKS

1. Research and produce a table to show the laws of indices.

2. With reference to static engineering systems, explain the following terms: (Use diagrams where necessary): Concurrent Forces, Non-concurrent Forces, Coplanar forces, Magnitude, Direction, Sense, Resultant force.

3. Research and explain the following terms: (Use diagrams where necessary): Stress, Strain, Modulus of Elasticity, Modulus of Rigidity, Tensile strength, Shear strength.

4. Explain the difference between shear stress and direct stress, use a sketch to illustrate each case and aldo try to sketch a system in which a component is in both direct and shear stress.

5. The relationship between the kinematic parameters that describe the motion of an object are defined using a set of equations that are based on the definitions of displacement, velocity and acceleration. These are often referred to as the "SUVAT" equations from the letters used to represent the variables involved. Explain the following terms: Displacement (s), Initial Velocity (u), Final Velocity(v) Acceleration (a) and Time (t)

6. Leading on from task 5 and in dynamic engineering systems what are the 4 "SUVAT" equations?

7. Describe the principles of an electromagnetic field.

8. Describe the principles and applications of electromagnetic induction. Give 3 common uses in engineering.