Year: 11	**Topic: 6.2 Newtons laws**

Knowledge and Understanding to be developed:

This topic introduces the concepts of inertia, mass and weight and the relationship between them. The relationship between force, mass and acceleration is developed.
Newton's laws of motion are used to explain the behaviour of objects moving through the air, and the concept of terminal speed.
There are a number of opportunities for the development of mathematical skills in this topic. These include applying the relationship between resultant force, mass and acceleration; calculating the weight of a mass in a given gravitational field. These topics afford learners the opportunity to recognise and use expressions in decimal form; to recognise expressions in standard form; to use ratios, fractions and percentages; to change the subject of an equation; to substitute numerical values into algebraic equations using appropriate units for physical quantities.

Key Terms to be learned this topic:

inertia   motion

speed   unbalanced

acceleration   force

weight   mass

newtons   Gravitational field

Learning Objectives and Outcomes:
Students should be able to :

(a) the concept of inertia, that mass is an expression of the inertia of a body
(b) Newton's first law of motion and be able to state it
(c) how unbalanced forces produce a change in a body's motion and that the acceleration of a body is directly proportional to the resultant force and inversely proportional to the body's mass
(d) Newton's second law of motion, and be able to state it, in the form:
resultant force = mass $\times$ acceleration; $F = ma$
(e) the distinction between the weight and mass of an object, the approximation that the weight of an object of mass 1 kg is 10 N on the surface of the Earth and use data on gravitational field strength in calculations involving weight ($W = mg$) and gravitational potential energy
weight (N) = mass (kg) $\times$ gravitational field strength (N/kg)
(f) forces and their effects to explain the behaviour of objects moving through the air, including the concept of terminal speed
(g) Newton's third law of motion and be able to state it
SPECIFIED PRACTICAL WORK
• Investigation of the terminal speed of a falling object