Government of **Western Australia**
School Curriculum and Standards Authority

Physics General Course Year 12

Selected Unit 3 syllabus content for the

Externally set task 2017

This document is an extract from the *Physics General Course Year 12 syllabus*, featuring all of the content for Unit 3. The content that has been highlighted in the document is the content on which the Externally set task (EST) for 2017 will be based.

All students enrolled in the course are required to complete an EST. The EST is an assessment task which is set by the Authority and distributed to schools for administering to students. The EST will be administered in schools during Term 2, 2017 under standard test conditions. The EST will take 50 minutes.

The EST will be marked by teachers in each school using a marking key provided by the Authority. The EST is included in the assessment table in the syllabus as a separate assessment type with a weighting of 15% for the pair of units.

Unit 3 – Moving

Unit description

The focus of this unit is the behaviour of moving bodies. Students explore the effect of forces in generating movement and the transfer of energy.

Students apply physics concepts to their understanding of how people and objects move in sport, fun parks and vehicle safety.

Students use science inquiry skills to explore the behaviour of objects, collecting data using a variety of methods, analysing data and drawing evidence-based conclusions. They relate data and apply principles to real situations. Practical activities offer students valuable opportunities to plan investigations, make careful observations, operate equipment in a safe and organised manner and work with others.

Unit content

An understanding of the Year 11 content is assumed knowledge for students in Year 12.

This unit includes the knowledge, understandings and skills described below.

Science Inquiry Skills

- identify, research, construct and refine questions for investigation; propose hypotheses; and predict possible outcomes
- plan, select and use appropriate investigation methods, including preliminary trials, laboratory experimentation and controlling variables to collect reliable data
- assess risk and address ethical issues associated with these methods
- work collaboratively and individually to conduct investigations using appropriate measuring devices, safely, competently and methodically for the collection of valid and reliable data
- organise and clearly represent data in tables and appropriate graphs to identify trends, patterns and relationships
- describe sources of experimental error
- use appropriate SI units and symbols
- use evidence to make and justify conclusions
- evaluate conclusions by considering the quality of available evidence and make recommendations for improving experimental method
- communicate scientific ideas and information using appropriate scientific language, conventions and representations

Science as a Human Endeavour

- data used to describe motion can be collected using a range of technologies
- principles of physics can be applied to understand movement in sport

- traffic accidents can be investigated to determine how road and weather conditions, driver reaction times and speed affect the severity of vehicle collisions
- the principles behind safety measures, such as crash barriers, seatbelts, crumple zones
- the effects of friction in everyday life

Science Understanding

- displacement, velocity, speed , distance, momentum
- acceleration is the rate of change of velocity
- solve simple problems using the equations:

$$v = \frac{s}{t}, \quad a = \frac{v-u}{t}, \quad s = ut + \tfrac{1}{2}at^2, \quad v^2 = u^2 + 2as, \quad p = mv$$

- uniform motion in one dimension can be represented graphically
- forces and their effects, including pushes and pulls
- contact forces, including friction; and non-contact forces, including gravity
- forces have magnitude and direction
- free body diagrams show the forces acting on objects in one or two dimensions
- Newton's First Law (also called the law of inertia)
- Newton's Second Law explains the relationship between force and rate of change in momentum according to the equation $Ft = \Delta p = m(v-u)$
- Newton's Second Law also relates force and acceleration according to the equation *F = ma*
- the relationships above can be used to explain behaviour of objects in practical situations
- Newton's Third Law of motion
- the force of gravity causes objects close to the Earth to accelerate at the same rate
- distinguish between mass and weight. This will include applying the relationship:

$$F_{weight} = mg$$

- objects in free fall due to gravity experience apparent weightlessness
- work done is equal to energy transferred. This will include applying the relationship:

$$W = Fs$$

- kinetic energy is the energy of motion
- gravitational potential energy is the energy of position
- conservation of energy