MSIT Academy

Erindale College

UNIT OUTLINE

Year: 2021 **Accreditation: T**

Timetable Period: Semester 1

Classroom Teacher: James Hall **Executive Teacher: Debbie O'Brien**

Course Title	**Physics integrating Australian Curriculum**	Course Code	2172
Semester Unit	Unit 1: Linear Motion and Waves	Unit Code/Value	21368 / 1.0
Term Unit (a)	Unit 1a: Linear Motion and Waves	Unit Code/Value	21444 / 0.5
Term Unit (b)	Unit 1b: Linear Motion and Waves	Unit Value/Code:	21445 / 0.5

Specific Unit Goals:

This unit should enable students to:

- understand that Newton's Laws of Motion describe the relationship between the forces acting on an object and its motion
- understand that waves transfer energy and that a wave model can be used to explain the behaviour of sound and light
- understand how scientific models and theories have developed and are applied to improve existing, and develop new, technologies
- use science inquiry skills to design, conduct and analyse safe and effective investigations into linear motion and wave phenomena, and to communicate methods and findings
- use algebraic and graphical representations to calculate, analyse and predict measurable quantities associated with linear and wave motion
- evaluate, with reference to evidence, claims about motion, sound and light-related phenomena and associated technologies
- communicate physics understanding using qualitative and quantitative representations in appropriate modes and genres.

Content Summary:

Science Inquiry Skills

- Identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes
- Design investigations, including the procedure to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics
- Conduct investigations, including the manipulation of devices to measure motion and the direction of light rays, safely, competently and methodically for the collection of valid and reliable data
- Represent data in meaningful and useful ways, including using appropriate SI units and symbols; organise and analyse data to identify trends, patterns and relationships;

identify sources of random and systematic error and estimate their effect on measurement results; identify anomalous data and calculate the measurement discrepancy between the experimental results and a currently accepted value, expressed as a percentage; and select, synthesise and use evidence to make and justify conclusions

- Interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments
- Select, construct and use appropriate representations, including text and graphic representations of empirical and theoretical relationships, vector diagrams, free body/force diagrams, wave diagrams and ray diagrams, to communicate conceptual understanding, solve problems and make predictions
- Select, use and interpret appropriate mathematical representations, including linear and non-linear graphs and algebraic relationships representing physical systems, to solve problems and make predictions
- Communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports

Science as a Human Endeavour

- Science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility
- Development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines
- Advances in science understanding in one field can influence other areas of science, technology and engineering
- The use of scientific knowledge is influenced by social, economic, cultural and ethical considerations
- The use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences
- Scientific knowledge can enable scientists to offer valid explanations and make reliable predictions
- Scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability

Science Understanding

- Uniformly accelerated motion is described in terms of relationships between measurable scalar and vector quantities, including displacement, speed, velocity and acceleration
- Representations, including graphs and vectors, and/or equations of motion, can be used qualitatively and quantitatively to describe and predict linear motion
- Vertical motion is analysed by assuming the acceleration due to gravity is constant near Earth's surface
- Newton's Three Laws of Motion describe the relationship between the force or forces acting on an object, modelled as a point mass, and the motion of the object due to the application of the force or forces

- Momentum is a property of moving objects; it is conserved in a closed system and may be transferred from one object to another when a force acts over a time interval
- Energy is conserved in isolated systems and is transferred from one object to another when a force is applied over a distance; this causes work to be done and changes to kinetic and/or potential energy of objects
- Collisions may be elastic and inelastic; kinetic energy is conserved in elastic collisions
- Waves are periodic oscillations that transfer energy from one point to another
- Longitudinal and transverse waves are distinguished by the relationship between the direction of oscillation relative to the direction of the wave velocity
- Waves may be represented by time and displacement wave diagrams and described in terms of relationships between measurable quantities, including period, amplitude, wavelength, frequency and velocity
- Mechanical waves transfer energy through a medium; mechanical waves may oscillate the medium or oscillate the pressure within the medium
- The mechanical wave model can be used to explain phenomena related to reflection and refraction (for example, echoes, seismic phenomena)
- The superposition of waves in a medium may lead to the formation of standing waves and interference phenomena, including standing waves in pipes and on stretched strings
- A mechanical system resonates when it is driven at one of its natural frequencies of oscillation; energy is transferred efficiently into systems under these conditions
- Light exhibits many wave properties; however, it cannot be modelled as a mechanical wave because it can travel through a vacuum
- A ray model of light may be used to describe reflection, refraction and image formation from lenses and mirrors
- A wave model explains a wide range of light-related phenomena including reflection, refraction, total internal reflection, dispersion, diffraction and interference; a transverse wave model is required to explain polarisation
- The speed of light is finite and many orders of magnitude greater than the speed of mechanical waves (for example, sound and water waves); its intensity decreases in an inverse square relationship with distance from a point source

Cost of Materials:

Students are expected to come to class with the following equipment:

- Pens and pencils
- A notebook
- A calculator
- A ruler
- A electronic device

Other stationary may be required from time to time.

During laboratory sessions, closed, sturdy footwear is required to be worn. Loose hair may need to be restrained.

Assessment:

TASK	DUE DATE	WEIGHTING
Energy Assignment	Week 7	20 %
Test 1	Week 8	30 %
Sound Assignment	Week 15	20 %
Test 2	Week 17	30 %

NOTE THERE IS NO WEEK 10 IN THIS RECKONING

SPECIFIC ENTRY & EXIT REQUIREMENTS FOR TERM UNITS:

This is a Semester Unit; students wishing to enter or exit after the end of term must have the change approved by the Academy Executive Leader and need to complete 50% of the assessment

ASSESSMENT CRITERIA FOR ASSESSMENT AND REPORTING OF STUDENT ACHIEVEMENT

Students will be assessed on the degree to which they demonstrate:

- an ability to respond critically to texts and logically justify viewpoint
- an ability to evaluate and synthesise material to make meaning
- imagination and originality
- competent and effective use of language for a range of purposes and audiences
- control of appropriate medium.

Attendance and Participation

It is expected that students will attend and participate in all scheduled classes/contact time/structured learning activities for the units in which they are enrolled, unless there is due cause and adequate documentary evidence is provided. Any student whose attendance falls below 90% of the scheduled classes/contact time or 90% participation in structured learning activities in a unit, without having due cause with adequate documentary evidence will be deemed to have voided the unit. However, the principal has the right to exercise discretion in special circumstances if satisfactory documentation is supplied.

Completion of Assessment Items

Students are expected to substantially complete and submit all assessment items. Exemption from an item and/or alternative assessment without penalty is available to students providing adequate documentary evidence. To meet the minimum assessment requirements of a unit, a student must substantially complete and submit at least 70% of the total assessment. However, the principal has the right to exercise discretion in the award of a grade or score in special circumstances where satisfactory documentation is supplied.

Late Submission of Assessment Items

Students are encouraged to submit work on time as this is a valuable organisational skill. Students are also encouraged to complete work even if it is late as there are educational benefits in so doing. The following policy is to ensure equity for all students:

- All assessment tasks are expected to be submitted by the specified due date
- Where marks are awarded for assessment tasks, a late penalty will apply unless an extension is granted. The penalty for late submission is 5% of possible marks per calendar day late, including weekends and public holidays, until a notional zero is reached. If an item is more than 7 days late, it receives the notional zero. Submission on weekends or public holidays is not acceptable. Calculation of a notional zero is based on items submitted on time or with an approved extension (Refer to Notional Zeros)
- Where marks are not awarded, and a grade only is given for an assessment task, teachers will take into account the extent to which students have demonstrated their ability to complete and submit the task by the due date (taking into account any extensions granted) in awarding the grade
- Unless there are exceptional circumstances, students must apply for an extension to the specified due date in advance, providing due cause and adequate documentary evidence for late submission

• It may not be possible to grade or score work submitted late after marked work in a unit has been returned to other students • The principal has the right to exercise discretion in the application of the late penalty in special circumstances where satisfactory documentation has been provided.

Notional Zeros

Where students fail to hand in assessment items for which marks are awarded, they will be awarded a notional zero for that assessment item. The notional zero will be a score, which lies between 0.1 of a standard deviation below the lowest genuine score for that item and zero. Note: if the lowest genuine score is zero, the notional zero is zero.

Cheating and Dishonest Practice

The integrity of the College's assessment system relies upon all involved acting in accordance with the highest standards of honesty and fairness. Plagiarism is the copying, paraphrasing or summarising of work, in any form, without acknowledgement of sources, and presenting this as a student's own work. Examples of plagiarism could include, but are not limited to:

- submitting all or part of another person's work with/without that person's knowledge
- submitting all or part of a paper from a source text without proper acknowledgement
- copying part of another person's work from a source text, supplying proper documentation, but leaving out quotation marks
- submitting materials which paraphrase or summarise another person's work or ideas without appropriate documentation
- submitting a digital image, sound, design, photograph or animation, altered or unaltered, without proper acknowledgement of the source.

Right to Appeal

The ACT system operates a hierarchy of reviews and appeals:

- Student seeks review from teacher regarding assessment task mark/grade, unit score, unit grade, course score
- Student seeks review from head of department, if required following review by teacher
- Student appeals to her/his college principal for a review of college assessment relating to assessment task grade/mark, unit grade, unit score, course score, penalty imposed for breach of discipline in relation to assessment
- Student, who has been through the college appeal process, may appeal to the Board against the college procedures by which the appeal decision was reached.

Further information on relevant BSSS policies can be found here:

http://www.bsss.act.edu.au/The_Board/policy_and_procedures_manual