**Area of Learning: SCIENCE — Physics Grade 12**

**BIG IDEAS**

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| **Measurement of motion** depends on our frame of reference. |  | Forces can cause **linear and circular motion**. |  | Forces and energy interactions occur within **fields**. |  | **Momentum** is conserved within a closed and isolated system. |

**Learning Standards**

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| **Curricular Competencies** | **Content** |
| *Students are expected to be able to do the following:*  Questioning and predicting   * Demonstrate a sustained intellectual curiosity about a scientific  topic or problem of personal, local, or global interest * Make observations aimed at identifying their own questions,  including increasingly abstract ones, about the natural world * Formulate multiple hypotheses and predict multiple outcomes   Planning and conducting   * Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments,  to collect reliable data (qualitative and quantitative) * Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods * Use appropriate SI units and appropriate equipment, including  digital technologies, to systematically and accurately collect  and record data   Apply the concepts of accuracy and precision to experimental procedures and data:   * + significant figures   + uncertainty   scientific notation | *Students are expected to know the following:*   * frames of reference * relative motion within a stationary reference frame * postulates of special relativity * **relativistic effects** within a moving reference frame * **static equilibrium**   **uniform circular motion:**   * + centripetal force and acceleration   **changes to apparent weight**   * **First Peoples knowledge and applications of forces  in traditional technologies** * **gravitational field** and Newton’s law of universal gravitation * gravitational potential energy * **gravitational dynamics and energy relationships** * **electric field** and Coulomb’s law * electric potential energy, electric potential, and electric potential difference * **electrostatic dynamics and energy relationships** * **magnetic field** and **magnetic force** * **electromagnetic induction** * **applications of electromagnetic induction** * **impulse** and momentum * conservation of momentum and energy in **collisions** * **graphical methods** in physics |

**Area of Learning: SCIENCE — Physics Grade 12**

**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Processing and analyzing data and information   * Experience and interpret the local environment * Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information * Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies * Construct, analyze, and interpret graphs, models, and/or diagrams * Use knowledge of scientific concepts to draw conclusions that are consistent with evidence * Analyze cause-and-effect relationships   Evaluating   * Evaluate their methods and experimental conditions, including identifying sources of error  or uncertainty, confounding variables, and possible alternative explanations and conclusions * Describe specific ways to improve their investigation methods and the quality of their data * Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled * Demonstrate an awareness of assumptions, question information given, and identify bias  in their own work and in primary and secondary sources * Consider the changes in knowledge over time as tools and technologies have developed * Connect scientific explorations to careers in science * Exercise a healthy, informed skepticism and use scientific knowledge and findings  to form their own investigations to evaluate claims in primary and secondary sources * Consider social, ethical, and environmental implications of the findings from their own  and others’ investigations * Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems * Assess risks in the context of personal safety and social responsibility |  |

**Area of Learning: SCIENCE — Physics Grade 12**

**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Applying and innovating   * Contribute to care for self, others, community, and world through individual  or collaborative approaches * Co-operatively design projects with local and/or global connections and applications * Contribute to finding solutions to problems at a local and/or global level  through inquiry * Implement multiple strategies to solve problems in real-life, applied, and conceptual situations * Consider the role of scientists in innovation   Communicating   * Formulate physical or mental theoretical models to describe a phenomenon * Communicate scientific ideas and information, and perhaps a suggested course  of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations * Express and reflect on a variety of experiences, perspectives, and worldviews through **place** |  |