BIG IDEAS

Genes are the foundation for the diversity of living things.	Chemical processes require energy change as atoms are rearranged.	Energy is conserved and its transformation can affect living things and the environment.	The formation of the universe can be explained by the big bang theory.

Learning Standards

Curricular Competencies

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 interest
- Make observations aimed at identifying their own questions, including increasingly complex 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 and those of others
- Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- Ensure that safety and ethical guidelines are followed in their investigations

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 (dependent and independent) and identifying inconsistencies
- Construct, analyze, and interpret graphs (including interpolation and extrapolation), models, and/or diagrams
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Analyze cause-and-effect relationships

Content

Students are expected to know the following:

- DNA structure and function
- genes and chromosomes
- **simple patterns of inheritance**
- mechanisms for the diversity of life:
  - **mutation** and its impact on evolution
  - **natural** and **artificial selection**
- **applications of genetics** and **ethical considerations**
- rearrangement of atoms in chemical **reactions**
- acid-base chemistry
- law of conservation of mass
- **energy change** during chemical reactions
- **practical applications and implications** of chemical processes, including First Peoples perspectives
- law of conservation of energy
- **transformation** of **potential** and **kinetic** energy
- local and global **impacts of energy transformations** from technologies

Learning Standards (continued)

Curricular Competencies	Content
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 the 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 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 and to evaluate claims in secondary sources • Consider social, ethical, and environmental implications of the findings from their own and others' investigations • Critically analyze the validity of information in secondary sources and evaluate the approaches used to solve problems **Applying and innovating** • Contribute to care for self, others, community, and world through individual or collaborative approaches • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving • Contribute to finding solutions to problems at a local and/or global level through inquiry • Consider the role of scientists in innovation **Communicating** • Formulate physical or mental theoretical models to describe a phenomenon • Communicate scientific ideas, claims, 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**	• **First Peoples perspectives on energy** • nuclear energy and **radiation**: – fission versus fusion – **technologies and applications**, and **implications** • formation of the universe: – big bang theory – **components of the universe over time** – **astronomical data and collection methods**