**Energy, Matter, & Change**

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| **Big Idea** | **Access Point** | **Emerging** | **Developing** | **Proficient** | **Extending** |
| The behaviour of matter can be explained by the kinetic molecular theory and atomic theory | Identifies the three states of matter | Describes basic movement patterns across the three states  Reproduces the basic structure of an atom | Describes bonding forces within an atom (nuclear vs. electromagnetic) | Critically analyzes how the behavior of matter may be explained by kinetic molecular theory and atomic theory | Connect atomic theory to macroscopic world (environment, industry, lifestyle) |
| Conducts experiment collaboratively with others, and records findings in a variety of ways | Defines dependent and independent variables, and identifies them in experiments | Explains the importance of both types of data for scientific discovery and understanding of our natural world  Critically analyzes data, and the methods used to gather it, for reliability and validity | Defends a stance related to scientific validity of an environmental issue, considers multiple knowledges, suggests a course of action | Proposes an innovative solution to an environmental issue, communicates in creative and powerful ways |
| Energy can be transferred as both a particle and a wave | Identifies types and sources of energy | Recognize that light is a type of energy and that it can be transferred | Identify the different types of electromagnetic energy found on the electromagnetic spectrum | Differentiates between particle and wave transfer, connects to local environment | Can apply electromagnetic energy to everyday life, industrial operations, medical institutions, etc. |
| The electronic arrangement of atoms impacts their chemical nature | Sorts materials by categories and attributes (e.g. metals, non-metals) | Recognize the common types of electron arrangements found in the world (e.g. ionic and covalent) | Models different arrangements of electrons to determine the compounds formed by elements. | Evaluates patterns represented in the periodic table | Constructs models of electrons to create elements. |
| Electric current is the flow of electric charge | Illustrates the flow of an electric current and describes safety issues related to electricity | Observes how energy flows through electric currents | Explains how energy flows through electric currents | Connects knowledge of Ohms law to solving problems related to the natural environment or social issues, considers cause and effect | Proposes inventions or creative theories based on how energy flows through electric currents. |
| Energy change is required as atoms rearrange in chemical processes | Sorts materials into metals and non-metals | Recognizes the different groups of the periodic table | Describes the physical and chemical characteristics groups based on their periodicity | Compares electron arrangement of elements to infer position on periodic table and determine characteristics | Assembles an explanation as to how the anatomy of individual elements produce observed characteristics related to their position in the periodic table. |
| Identifies atoms as pieces that make up all matter | Recognizes that the arrangement of electrons determines the compounds formed by elements (ionic vs covalent) | Explains how atom movement results in different types of chemical reactions | Analyzes the movement of atom during chemical reactions to infer reaction type | Interprets patterns that describe how and why atoms rearrange in predictable ways |
| Understands that atoms join together to make larger objects | Recognizes how elements, compounds, and reactions can be represented as models (bohr diagrams/Lewis dot diagrams), words, or formulas | Identify types of bonds (ionic vs. covalent), and chemical reactions based on models | Compares balanced and unbalanced equations and applies understanding of law of conservation of mass | Synthesises appropriate models of chemical reactions and energy change based on given information. |
| Energy is conserved, and its transformation can affect living things and the environment | Understands that things change but the pieces are still there (conservation) | Identifies ways in which energy is transformed | Applies knowledge of conservation of energy to draw conclusions from experiments related to the transformation of energy | Analyzes how energy transformation impacts living things and the environment | Debates the ethics of controversial uses of energy and its transformation (e.g. nuclear) |