**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 statesReproduces 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 worldCritically 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) |