

## Physical Science

### I. Enduring Understanding:

There are laws that govern the motion of all objects in the universe.

#### Essential Questions:

How do you describe, predict, and represent motion?

How do you identify the forces acting on an object?

How do forces affect motion?

#### Student Outcomes: Students will:

- A. Understand motion *can be described using the concepts of position, speed, and velocity.*
  - 1. *Measure one-dimensional motion of an object using time and position.*
- B. Understand equations and graphs can be used to describe, predict, and represent the motion of an object.
  - 1. Calculate position, time, velocity, and change in velocity using equations.
  - 2. *Graph the motion of an object using position, time, and velocity.*
  - 3. *Describe the motion of an object using a position vs time graph and a velocity vs time graph.*
  - 4. Predict the position or velocity of an object given a motion graph.
- C. Understand *paired forces are interactions between objects.*
  - 1. *Calculate an object's change in position during freefall.*
  - 2. Determine the relationship between mass and weight.
  - 3. Collect data and graph how distance affects non-contact forces.
  - 4. *Given a situation, identify the forces/interactions between two or more objects.*

### II. Enduring Understanding:

Energy cannot be created or destroyed, but can exist in different forms and undergo various transformations.

#### Essential Questions:

What are some different forms of energy?

How do you describe, predict, and represent energy transformations through a system?

#### Students Outcomes: Students will:

- A. *Understand energy can exist as kinetic, potential, or thermal and is transferred through the process of work.*

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1. Identify types of energy present in a system through the position or speed of the objects.
  2. Determine the energy added or removed from a system knowing the distance over which a force is exerted.
  3. Calculate the mechanical advantage of a simple machine.
  4. Explain that simple machines are used to adjust the way energy is transferred.
- B. *Understand the law of conservation of energy explains how energy transfers through a system.*
1. Explain how energy transfers through writing and graphing.

### III. Enduring Understanding:

All matter is made of tiny moving particles, and because of these particles, matter behaves in predictable ways.

#### Essential Questions:

How can we explain the three states of matter using Kinetic Theory?

What is the basic structure of all atoms?

How do atoms combine and form bonds with other atoms?

How is matter classified?

#### Student Outcomes: Students will:

- A. Understand the Kinetic Theory explains particle behavior and the interactions of matter.
1. *Identify and predict the pressure, volume, and temperature changes using the Kinetic Theory.*
  2. *Determine the effect of changing state on temperature.*
- B. Understand atoms are made of specifically located protons, neutrons, and electrons.
1. *Use the periodic table to determine the mass and number of subatomic particles in an atom.*
  2. *Create a visual representation of an atom.*
  3. *Describe the process and the product of radioactive decay and nuclear reactions.*
- C. Understand atoms combine through attractive interaction in the form of ionic or covalent bonds.
1. *Visually represent atomic bonding.*
  2. *Use periodic properties to predict how atoms combine.*
  3. *Differentiate between ionic and covalent bonding.*
  4. *Represent bonded atoms in a compound as a formula.*
- D. The combining of atoms can be explained and predicted through balanced equations.

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1. *Demonstrate the Law of Conservation of Mass through balanced chemical equations.*
  2. *Classify chemical reactions given the reactants and products.*
- E. Matter is broken down into substances and mixtures.
1. Classify matter as a substance or mixture.
  2. Interpret a solubility curve.
- F. *Solutions have acidic or basic properties.*
1. Utilize indicators to determine if a solution is an acid or base.

### IV. Enduring Understanding:

Science is a process.

#### Essential Questions:

What does it take to communicate and report data like a scientist?

What do scientists consider when designing an experiment?

What are the steps that scientists follow to solve a problem?

#### Student Outcomes: Students will:

- A. Understand *lab reports, graphs, and data tables are ways that scientists report information.*
1. Create data tables, graph, and report for their designed experiment.
- B. Understand in every lab experiment, there are independent, dependent, and controlled variables.
1. *Design an experiment to answer a scientific problem.*
- C. Understand enough data must be taken to identify a pattern in an experiment.
1. *Design an experiment to answer a scientific problem.*
- D. Understand *the Scientific Method is the process used by scientists to solve a problem.*
1. Form a hypothesis, conduct an experiment, and report results following the steps of the Scientific Method.