

## State Standards – Science – 8<sup>th</sup> Grade Standards Placemat

The six strands and five unifying concepts are interwoven into a fabric of science. Strands 1, 2, and 3 are designed to be explicitly taught *and* embedded *within* each of the content Strands 4, 5, and 6, and are not intended to be taught in isolation. The processes, skills, and content of the first three strands are designed to “umbrella” and complement the content of Life Science, Physical Science, and Earth and Space Science.

### Strand 1: Inquiry Process

#### **Concept 1: Observations, Questions, and Hypotheses**

- PO 1. Formulate questions based on observations that lead to the development of a hypothesis.*
- PO 2. Use appropriate research information, not limited to a single source, to use in the development of a testable hypothesis.
- PO 3. Generate a hypothesis that can be tested.

#### **Concept 2: Scientific Testing (Investigating and Modeling)**

- PO 1. Demonstrate safe behavior and appropriate procedures in all science inquiry.*
- PO 2. Design a controlled investigation to support or reject a hypothesis.
- PO 3. Conduct a controlled investigation to support or reject a hypothesis.
- PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).*
- PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.*

#### **Concept 3: Analysis and Conclusions**

- PO 1. Analyze data obtained in a scientific investigation to identify trends.*
- PO 2. Form a logical argument about a correlation between variables or sequence of events.*
- PO 3. Interpret data that show a variety of possible relationships between two variables, including: positive relationship, negative relationship, and no relationship.
- PO 4. Formulate a future investigation based on the data collected.
- PO 5. Explain how evidence supports the validity and reliability of a conclusion.
- PO 6. Identify the potential investigational error that may occur
- PO 7. Critique scientific reports from periodicals, television, or other media.

*PO 8. Formulate new questions based on the results of a previous investigation.*

#### **Concept 4: Communication**

- PO 1. Communicate the results of an investigation.
- PO 2. Choose an appropriate graphic representation for collected data: line graph, double bar graph, stem and leaf plot, and histogram.*
- PO 3. Present analyses and conclusions in clear, concise formats.
- PO 4. Write clear, step-by-step instructions for conducting investigations or operating equipment (without the use of personal pronouns).
- PO 5. Communicate the results and conclusion of the investigation.*

### Strand 2: History and Nature of Science

#### **Concept 1: History of Science as a Human Endeavor**

- PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.*
- PO 2. Evaluate the effects of the following major scientific milestones on society: Mendelian Genetics and Newton’s Laws.
- PO 3. Evaluate the impact of a major scientific development occurring within the past decade.
- PO 4. Evaluate career opportunities related to life and physical sciences.

#### **Concept 2: Nature of Scientific Knowledge**

- PO 1. Apply the following scientific processes to other problem solving or decision making situations: Observing, questioning, communicating, comparing, measuring, classifying, predicting, organizing data, inferring, generating hypotheses, and identifying variables.*
- PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.*
- PO 3. Defend the principle that accurate record keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society.
- PO 4. Explain why scientific claims may be questionable if based on very small samples of data, biased samples, or samples for which there was no control.

### Strand 3: Science in Personal and Social Perspectives

#### **Concept 1: Changes in Environments**

- PO 1. Analyze the risk factors associated with natural, human induced, and/or biological hazards, including: waste disposal of industrial chemicals and greenhouse gases.
- PO 2. Analyze possible solutions to address the environmental risks associated with chemicals and biological systems.

#### **Concept 2: Science and Technology in Society**

- PO 1. Propose viable methods of responding to an identified need or problem.*
- PO 2. Compare solutions to best address an identified need or problem.*
- PO 3. Design and construct a solution to an identified need or problem using simple classroom materials.*
- PO 4. Compare risks and benefits of the following technological advances: radiation treatments, genetic engineering, and airbags.

### Strand 4: Life Science

#### **Concept 2: Reproduction and Heredity**

- PO 1. Explain the purposes of cell division: growth and repair, and reproduction.
- PO 2. Explain the basic principles of heredity using the human examples of: eye color, widow’s peak, and blood type.
- PO 3. Distinguish between the nature of dominant and recessive traits in humans.

#### **Concept 4: Diversity, Adaptation, and Behavior**

- PO 1. Explain how an organism’s behavior allows it to survive in an environment.
- PO 2. Describe how an organism can maintain a stable internal environment while living in a constantly changing external environment.
- PO 3. Determine characteristics of organisms that could change over several generations.
- PO 4. Compare the symbiotic and competitive relationships in organisms within an ecosystem.
- PO 5. Analyze the following behavioral cycles of organisms: hibernation, migration, and dormancy (plants).
- PO 6. Describe the following factors that allow for the survival of living organisms: protective coloration, beak design, seed dispersal, and pollination.

### Strand 5: Physical Science

#### **Concept 1: Properties and Changes of Properties in Matter**

- PO 1. Identify different kinds of matter based on the following physical properties: states, density, boiling point, melting point, and solubility.
- PO 2. Identify different kinds of matter based on the following chemical properties: reactivity, pH, and oxidation (corrosion).
- PO 3. Identify the following types of evidence that a chemical reaction has occurred: formation of a precipitate, generation of gas, color change, and absorption or release of heat.
- PO 4. Classify matter in terms of elements, compounds, or mixtures.
- PO 5. Classify mixtures as being homogeneous or heterogeneous.
- PO 6. Explain the systematic organization of the periodic table.
- PO 7. Investigate how the transfer of energy can affect the physical and chemical properties of matter.

#### **Concept 2: Motion and Forces**

- PO 1. Demonstrate velocity as the rate of change of position over time.
- PO 2. Identify the conditions under which an object will continue in its state of motion (Newton’s 1<sup>st</sup> Law of Motion).
- PO 3. Describe how the acceleration of a body is dependent on its mass and the net applied force (Newton’s 2<sup>nd</sup> Law of Motion).
- PO 4. Describe forces as interactions between bodies (Newton’s 3<sup>rd</sup> Law of Motion).
- PO 5. Create a graph devised from measurements of moving objects and their interactions, including: position-time graphs, and velocity-time graphs.

### Strand 6: Earth and Space Science

There are no performance objectives at this grade level

#### **Underlying all of the science standard strands are the five unifying concepts:**

- Systems, Order, and Organization
- Evidence, Models, and Explanation
- Constancy, Change, and Measurement
- Evolution and Equilibrium
- Form and Function