

## **PART III**

### **MAINE LEARNING RESULTS** *Applicable to the Lamoine Water Curriculum*

#### **M. Classifying Life Forms**

*Pre k-2*

#1 Identify the differences between living and non-living things

*Grades 3-4*

#3 Describe the different living things within a habitat

*Grades 5-8*

#3 Describe some structural and behavioral adaptations that allow organisms to survive in a changing habitat

*Secondary Grades*

#3 Analyze the basic characteristics of living things, including their need for food water, and gases and the ability to reproduce.

#### **B. Ecology**

*Pre k-2*

#1 Identify ways that living things depend on their environment

#3 Give examples of how one change in a system affects other parts of the system

#5 Describe a familiar local environment

*Grades 3-4*

#4 Investigate the connection between major living and non-living components of a local ecosystem.

*Grades 5-8*

#2 Analyze how the finite resources in an ecosystem limit the types and populations of organisms within it.

#3 Describe succession and other ways that ecosystems can change over time.

#5 Describe various mechanisms found in the natural world for transporting living and non-living matter and the results of such movements.

*Secondary Grades*

#1 Illustrate the cycles of matter in the environment and explain their interrelationships

#3 Analyze the factors that effect population size

#4 Analyze the impact of human and other activities on the type and pace of change in the ecosystem

#### **N. Continuity and Change**

*Pre k-2*

#2 Identify characteristics that help organisms live in their environment

*Grades 3-4*

#3 Explain how adaptations, in response to change over time, may increase a species' chance of survival

*Grades 5-8*

#3 Provide examples of natural and artificial selection and its role in species changes over time

*Secondary Grades*

#3 Explain and document the importance of relatively short term changes( i.e., one generation) on a species survival

**E. Structure of Matter**

*Pre K-2*

NONE

*Grades 3-4*

#1 Describe how the physical properties of objects sometimes change when one object chemically combines with another

#2 Explain how matter changes in both chemical and physical ways

*Grades 5-8*

#1 Predict and test whether objects will float or sink based on qualitative and quantitative understanding of the concepts of density and buoyancy

#2 Describe the evidence that all matter is made up of particles called atoms that are made up of certain smaller particles

*Secondary Grades*

#4 Describe an application of the Law of Conservation of Matter

#5 Describe how atoms are joined by chemical bonding

#6 Compare the physical and chemical characteristics of elements

**O. The Earth**

*Pre k-2*

#3 Observe changes that are caused by water, snow, wind, and ice.

*Grades 3-4*

#4 Illustrate how water and other substances go through a cyclic process of change in the environment

*Grades 5-8*

#2 Describe how soils are formed and why they differ from one place to another

#4 Describe factor that can cause short term and long term changes to the earth.

#6 Describe the many products used by humans that are derived from the materials

in the earth's crust

#7 Demonstrate factors effecting the flow of groundwater

*Secondary Grades*

NONE

## **P. Motion**

### *Secondary Grades ONLY*

- #4 Describe how forces affect fluids (air & water)
- #6 Describe how forces within and between atoms effect their behavior and the properties of matter

## **J. Inquiry and Problem Solving**

*All apply from all grades!*

### *Elementary Grades Pre-K-2*

- #1 Make accurate observations using appropriate tools and units of measure.
- #2 Ask questions and propose strategies and materials to use in seeking answers to questions.
- #3 Use results in a purposeful way, which includes making predictions based on patterns they have observed.
- #4 Identify products which were invented to solve a problem.

### *Grades 3-4*

- #1 Make accurate observations using appropriate tools and units of measure.
- #2 Conduct scientific investigations: make observations, collect and analyze data, and do experiments.
- #3 Use results in a purposeful way: design fair tests, make predictions based on observed patterns, and interpret data to make further predictions.
- #4 Design and build an invention.
- #5 Explain how differences in time, place, or experimenter can lead to different data.
- #6 Explain how different conclusions can be derived from the same data.

### *Grades 5-8*

- #1 Make accurate observations using appropriate tools and units of measure.
- #2 Design and conduct scientific investigations which include controlled experiments and systematic observations. Collect and analyze data, and draw conclusions fairly.
- #3 Verify and evaluate scientific investigations and use the results in a purposeful way.
- #4 Compare and contrast the processes of scientific inquiry and the technological method.
- #5 Explain how personal bias can affect observations.
- #6 Design, construct, and test a device (invention) that solves a special problem.

### *Secondary Grades*

- #1 Make accurate observations using appropriate tools and units of measure.
- #2 Verify, evaluate, and use results in a purposeful way. This includes analyzing and interpreting data, making predictions based on observed patterns, testing solutions against the original problem conditions, and formulating additional questions.
- #3 Demonstrate the ability to use scientific inquiry and technological method with short term and long term investigations, recognizing that there is more than one

way to solve a problem. Demonstrate knowledge of when to try different strategies.

#4 Design and construct a device to perform a specific function, then redesign for improvement (e.g., performance, cost).

## **K. Scientific Reasoning**

*All apply from all grades!*

### *Pre-K-2*

- #1 Examine strengths and weaknesses of simple arguments.
- #2 Distinguish between important and unimportant information in simple arguments.
- #3 Make observations.
- #4 Participate in brainstorming activities.
- #5 Use various forms of simple logic.
- #6 Discover relationships and patterns.

### *Grades 3-4*

- #1 Give alternative explanations for observed phenomena.
- #2 Describe how feelings can distort reasoning.
- #3 Draw conclusions about observations.
- #4 Use various types of evidence (e.g., logical, quantitative) to support a claim.
- #5 Demonstrate an understanding that ideas are more believable when supported by good reasons.
- #6 Practice and apply simple logic, intuitive thinking, and brainstorming.

### *Grades 5-8*

- #1 Examine the ways people form generalizations.
- #2 Identify exceptions to proposed generalizations.
- #3 Identify basic informal fallacies in arguments.
- #4 Analyze means of slanting information.
- #5 Identify stereotypes.
- #6 Support reasoning by using a variety of evidence.
- #7 Show that proving a hypothesis false is easier than proving it true, and explain why.
- #8 Construct logical arguments.
- #9 Apply analogous reasoning.

### *Secondary Grades*

- # 1 Judge the accuracy of alternative explanations by identifying the evidence necessary to support them.
- #2 Explain why agreement among people does not make an argument valid.
- #3 Develop generalizations based on observations.
- #4 Determine when there is a need to revise studies in order to improve their validity through better sampling, controls or data analysis techniques.
- #5 Produce inductive and deductive arguments to support conjecture.
- #6 Analyze situations where more than one logical conclusion can be drawn.

## **L. Communication**

*All apply from all grades!*

### *Pre-K-2*

- #1 Describe and compare things in terms of number, shape, texture, size, weight, color, and behavior.
- #2 Read and write instructions to be followed or instructions which explain procedures.
- #3 Ask clarifying questions.
- #4 Explain problem-solving processes using verbal, pictorial, and written methods.
- #5 Make and read simple graphs.
- #6 Use objects and pictures to represent scientific and technological ideas.

### *Grades 3-4*

- #1 Record results of experiments or activities (e.g., interviews, discussions, field work) and summarize and communicate what they have learned.
- #2 Ask clarifying and extending questions.
- #3 Reflect on work in science and technology using such activities as discussions, journals, and self-assessment.
- #4 Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.
- #5 Gather and effectively present information, using a variety of media including computers (e.g., spreadsheets, word processing, programming, graphics, modeling).
- #6 Cite examples of bias in information sources and question the validity of information from varied sources.
- #7 Function effectively in groups within various assigned roles (e.g., reader, recorder).

### *Grades 5-8*

- #1 Discuss scientific and technological ideas and make conjectures and convincing arguments.
- #2 Defend problem-solving strategies and solutions.
- #3 Evaluate individual and group communication for clarity, and work to improve communication.
- #4 Make and use scale drawings, maps, and three-dimensional models to represent real objects, find locations, and describe relationships.
- #5 Access information at remote sites using telecommunications.
- #6 Identify and perform roles necessary to accomplish group tasks.

### *Secondary Grades*

- #1 Analyze research or other literature for accuracy in the design and findings of experiments.
- #2 Use journals and self-assessment to describe and analyze scientific and technological experiences and to reflect on problem-solving processes.
- #3 Make and use appropriate symbols, pictures, diagrams, scale drawings, and models to represent and simplify real-life situations and to solve problems.

- #4 Employ graphs, tables, and maps in making arguments and drawing conclusions.
- #5 Critique models, stating how they do and do not effectively represent the real phenomenon.
- #6 Evaluate the communication capabilities of new kinds of media (e.g., cameras with computer disks instead of film).
- #7 Use computers to organize data, generate models, and do research for problem solving.
- #8 Engage in a debate, on a scientific issue, where both points of view are based on the same set of information.

## **M. Implications of Science and Technology**

### *Pre K-2*

- #4 Demonstrate some practices for recycling and care of resources.
- #5 Explain how their lives would be different without specific inventions or scientific knowledge.

### *Grades 3-4*

- #1 Explore how cultures have found different technological solutions to deal with similar needs or problems (e.g., construction, clothing, agricultural tools and methods).
- #4 Explain practices for conservation in daily life, based on a recognition that renewable and non-renewable resources have limits.

### *Grades 5-8*

- #3 Discuss the ethical issues surrounding a specific scientific or technological development.
- #4 Describe an individual's biological and other impacts on an environmental system.
- #7 Explain the connections between industry, natural resources, population, and economic development.

### *Secondary Grades*

- #1 Examine the impact of political decisions on science and technology.
- #2 Demonstrate the importance of resource management, controlling environmental impacts, and maintaining natural ecosystems.
- #5 Examine the historical relationships between prevailing cultural beliefs and breakthroughs in science and technology.
- #6 Research issues that illustrate the effects of technological imbalances and suggest some solutions.