

Subject Area: Science

Grade Level 4

Mission Statement: It is the mission of the Elba Central School District to actualize the phrase “Elba Equals Educational Excellence for Everyone.” We are committed to providing both quality and equity. Every student will have the opportunity to develop to the best of his/her ability.

Elba Standards: In addition to the knowledge and basic skills they need in order to participate in society, graduates of Elba Central School will develop:

1. Empowering skills: decision making, goal setting, creative thinking and problem solving abilities;
2. Communication and social interaction skills;
3. Technological literacy;
4. Total wellness (social, physical, emotional health and self-esteem);
5. The values necessary to participate in society.

As a result of achieving these outcomes, our students will embrace lifelong learning.

National Standards:

(from National Academy of Sciences, 1995)

Physical Science Standards

- Properties of objects and material
- Position and motion of objects
- Light, heat, electricity and magnetism

Life Science Standards

- Characteristics of organisms
- Life cycles of organisms
- Organisms and environments

Earth and Space Science Standards

- Properties of earth materials
- Objects in the sky
- Changes in earth and sky

Science and Technology Standards

- Abilities to distinguish between natural objects and objects made by humans
- Abilities of technological design
- Understanding about science and technology

Science in Personal and Social Perspectives

- Personal health
- Characteristics and changes in populations
- Types of resources
- Changes in environments
- Science and technology in local challenges

History and Nature of Science Standards

- Science as a human endeavor

Unifying Concepts and Processes

- Systems, order, and organization
- Evidence, models, and explanation
- Change, constancy and measurement
- Evolution and equilibrium
- Form and function

Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

New York State Standards

Standard 1: Analysis, Inquiry, and Design

Math Analysis, Scientific Inquiry and Engineering Design

Math Analysis

- Abstraction and symbolic representation are used to communicate mathematically
- Deductive and inductive reasoning are used to reach mathematical conclusions.

- Critical thinking skills are used in the solution of mathematical problems.

Scientific Inquiry

- The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.
- Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.
- The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Engineering Design

- Engineering design is an iterative process involving modeling and optimization (finding the best solution within given constraints); this process is used to develop technological solutions to problems within given constraints.

Standard 2 –Information Systems

- Information technology is used to retrieve, process, and communicate information and as a tool to enhance learning.
- Knowledge of the impacts and limitations of information systems is essential to its effectiveness and ethical use.
- Information technology can have positive and negative impacts on society, depending upon how it is used.

Standard 6 –Interconnectedness: Common Themes

- Systems Thinking – Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.
- Models – Models are simplified representations of objects, structure, or systems, used in analysis, explanation, or design.
- Magnitude and Scale – The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect behavior and design of systems.
- Equilibrium and Stability – Equilibrium is a state of stability due either to a lack of changes (static equilibrium) or a balance between opposing forces (dynamic equilibrium).

- Patterns of Change—Identifying patterns of change is necessary for making predictions about future behavior and conditions.
- Optimization—In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs.

Standard 7—Interdisciplinary Problem Solving

- Connections—The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.
- Strategies—Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among common themes of mathematics, science, and technology; and presenting results.

Standard 4—Science

Physical Setting Key Ideas	Performance Indicators
1. The Earth and celestial phenomena can be described by principles of relative motion and perspective.	1A. describe patterns of daily, monthly, and seasonal changes in their environment
2. Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.	2A. describe the relationships among air, water, and land on Earth
3. Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	3A. observe and describe properties of materials using appropriate tools
	3B. describe chemical and physical changes, including changes in states of matter
4. Energy exists in many forms, and when these forms change energy is conserved.	4A. describe a variety of forms of energy (heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy
	4B. observe the way one form of energy can be transformed into another form of energy present in common situations (mechanical to heat energy, mechanical to electrical)

	energy, chemical to heat energy)
5. Energy and matter interact through forces that result in changes in motion.	5A. describe the effects of common forces (pushed and pulls) on objects, such as those caused by gravity, magnetism and mechanical forces

Living Environment Key Ideas	Performance Indicators
1. Living things are both similar to and different from each other and nonliving things.	1A. describe the characteristics of and variations between living and nonliving things
	1B. describe the life processes common to all living things
2. Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.	2A. recognize the traits of living things are both inherited and acquired or learned
	2B. recognize that for humans and other living things there is genetic continuity between generations
3. Individual organisms and species change over time.	3A. describe how the structures of plants and animals complement the environment of the plant or animal
	3B. observe that differences within a species may give individuals an advantage in surviving and reproducing
4. The continuity of life is sustained through reproduction and development	4A. describe the major stages in the life cycles of selected plants and animals
	4B. describe evidence of growth, repair, and maintenance, such as nails, hair, and bone, and the healing of cuts and bruises
5. Organisms maintain a dynamic equilibrium that sustains life	5A. describe basic life functions of common living specimens (guppy, mealworm, gerbil)
	5B. describe some survival behaviors of common living specimens
	5C. describe the factors that help promote good health and growth in humans

6. Plants and animals depend on each other and their physical environment.	6A. describe how plants and animals, including humans, depend upon each other and the nonliving environment
	6B. describe the relationship of the sun as an energy source for living and nonliving cycles
7. Human decisions and activities have had a profound impact on the physical and living environment	7A. identify ways in which humans have changed their environment and the effects of those changes

Scope and Sequence Grade 4

Scope:

In the investigation of physical setting, fourth grade studies weather and climate, as well as, magnetism and electricity. In the investigation of the living environment, fourth grade studies animals, plants, and the body's delivery systems. Scientific inquiry is integral in all the content areas studied.

Sequence:

What content knowledge (what should students know and understand?) is taught for each unit of study?

Unit	Content Knowledge
Weather and Climate	<ul style="list-style-type: none">- Know the content and value of Earth's atmosphere- Know the effects of changes in the air on weather- Know weather patterns and how they are used for weather predictions- Know about the changes and climate of seasonal weather
Magnetism and Electricity	<ul style="list-style-type: none">- Know the properties of magnets- Know the forms of electrical energy- Know how electric circuits work- Know the sources of electrical current- Know how electric current is changed into useful energy-
Plants	<ul style="list-style-type: none">- Know the parts of flowering plants- Know the parts of plant cells- Know plant processes (photosynthesis and respiration)- Know the classification of plants- Know structural adaptations
Animals	<ul style="list-style-type: none">- Know the basic needs of animals

	<ul style="list-style-type: none"> - Know that adaptations help animals meet their needs - Know the classification of living things - Know the characteristics of different animal groups
Body's Delivery Systems	<ul style="list-style-type: none"> - know the organs and functions of the respiratory, circulatory and excretory systems - know that health measures help prevent or fight disease - know the harmful effects of nicotine, alcohol, and other drug

BEST PRACTICES:

- Use of cooperative learning while conducting experiments
- Use of manipulatives for hands-on activities and experiments
- Use of science text to emphasize reading in the content area

ASSESSMENT:

- Responses in classroom discussions
- Participation in experiments
- Open book chapter tests
- Projects
- 75% of students receiving a passing grade on the New York State ESPET.