

GRADE 4 SCIENCE OVERVIEW

The Fourth Grade elementary science program emphasizes a hands-on and minds-on approach to learning. This approach will allow students to practice problem-solving skills, develop positive science attitudes, learn new science content and increase their scientific literacy. Ongoing assessments will test students' ability to explain, analyze and interpret scientific processes and phenomena more than their ability to recall specific facts. The units will include:

1. Batteries and Bulbs
2. Colored Solutions
3. Plants
4. Bones
5. Growing and Changing
6. Measurement
7. Crayfish

The NYS PETS (New York State Program Evaluating Test in Science) review materials are available to fourth grade teacher prior to the assessment. The activities review K-4 elementary science concepts, skills, knowledge and understandings.

BATTERIES AND BULBS

Physical Setting

Performance Indicator 3.1 Observe and describe properties of materials using appropriate tools.

- 3.1e** The material(s) an object is made up of determines some specific properties of the object (**conductivity, magnetism**). Properties can be observed or measured with tools such as **magnets** and **circuit testers**.

Performance Indicator 4.1 Describe a variety of forms of energy (e.g. heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy.

- 4.1a** Energy exists in various forms: heat, electric, sound, chemical, mechanical, light.
- 4.1b** Energy can be transferred from one place to another.
- 4.1c** Some materials transfer energy better than others (heat and electricity).
- 4.1d** Energy and matter interact (a bulb is lighted by means of **electrical current**).
- 4.1e** Electricity travels in a **closed circuit**.
- 4.1g** Interactions with forms of energy can either be helpful or harmful.

Performance Indicator 4.2 Observe the way one form of energy can be transferred into another form of energy present in common situations (e.g., mechanical to electrical energy).

- 4.2b** Humans utilize interactions between matter and energy.
- Chemical to electrical, light and heat: battery and bulb.

Performance Indicator 5.1 Describe the effects of common forces (pushes and pulls) of objects, such as those caused by magnetism.

- 5.1e** Magnetism is a force that may attract or **repel** certain materials.

SCIENTIFIC INQUIRY

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Students:

- Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.
- Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.
- Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.

This is evident, for example, when students:

- Observe a variety of objects that either sink or float when placed in a container of water. Working in groups, they propose an explanation of *why objects sink or float*. After sharing and discussing their proposed explanation, they refine it and submit it for assessment. The explanation is rated on clarity and plausibility.

2. 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.

Students:

- Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.
- Share their research plans with others and revise them based on their suggestions.
- Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).

This is evident, for example, when students:

- Are asked to develop a way of testing their explanation of *why objects sink or float when placed in a container of water*. They tell what procedures and materials they will use and indicate what results will support their explanation. Their plan is critiqued by others, they revise it, and submit it for assessment. The plan is rated on clarity, soundness in addressing the issue, and feasibility. After the teacher suggests modifications, the plan is carried out.

3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Students:

- Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.
- Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- Share their findings with others and actively seek their interpretations and ideas.
- Adjust their explanations and understandings of objects and events based on their findings and new ideas.

This is evident, for example, when students:

- Prepare tables or other representations of their observations and look for evidence which supports or refutes their explanation of *why objects sink or float when placed in a container of water*. After sharing and discussing their results with other groups, they prepare a brief research report that includes methods, findings, and conclusions. The report is rated on its clarity, care in carrying out the plan, and presentation of evidence supporting the conclusions.

GROWING AND CHANGING

Living Environment

Performance Indicator 1.2 Describe the **life processes** common to all living things.

1.2a Living things grow, take in nutrients, breathe, **reproduce**, **eliminate waste**, and die.

Performance Indicator 2.1 Recognize that traits of living things are both **inherited** and **acquired** or learned.

2.1a Some **traits** have been inherited.

2.1b Some **characteristics** result from an individual's **interactions** with the environment and cannot be inherited by the next **generation**.

Performance Indicator 2.2 Recognize that for humans and other living organisms there is a genetic continuity between generations.

2.2a Plants and animals **resemble** their parents and other individuals in their **species**.

2.2b Plants and animals can **transfer** specific traits to their **offspring** when they reproduce.

Performance Indicator 4.1 Describe the major stages in the life cycles of selected plants and animals.

4.1a Plants and animals have **life cycles**. These may include beginning of a life, developing into an adult, reproduction as an adult, and eventually death.

4.1f Each kind of animal goes through its own stages of growth and development during its life span.

4.1g The length of time from an animal's birth to its death is called its life span. Life spans of different animals vary.

Performance Indicator 4.2 Describe evidence of growth, **repair**, and maintenance, such as nails, hair, and bone, and the healing of cuts and bruises.

4.2a Growth is the process by which plants and animals increase in size.

4.2b Food supplies the energy and materials necessary for growth and repair.

Performance Indicator 5.1 Describe the basic **life functions** of common living specimens.

5.1a All living things grow, take in nutrients, breathe, reproduce and eliminate waste.

Performance Indicator 5.2 Describe some survival behaviors of common living specimens.

5.2b Animals respond to change in their environments (e.g., **perspiration**, heart rate, breathing rate, eye blinking, **shivering**, and **salivating**).

5.2f Some animal behaviors are influenced by environmental conditions.

5.2g The health, growth, and development of organisms are affected by the environmental conditions such as the availability of food, air, water, space, shelter, heat, and sun.

Performance Indicator 5.3 Describe the factors that help **promote** good health and growth in humans.

5.3a Humans need a variety of healthy foods, exercise, and rest in order to grow and maintain good health.

5.3b Good health habits include hand washing and personal cleanliness: avoiding **harmful substances** (including alcohol, tobacco, illicit drugs); eating a balanced diet; **engaging in** regular exercise.

PLANT STUDY

Living Environment

Performance Indicator 1.1 Describe the characteristics of and variations between living and nonliving things.

- 1.1a Animals need air, water, and food in order to live and **thrive**.
- 1.1b Plants require air, water, **nutrients**, and light in order to live and thrive.
- 1.1c Nonliving things do not live and thrive.
- 1.1d Nonliving things can be **human-created** or **naturally occurring**.

Performance Indicator 1.2 Describe the **life processes** common to all living things.

- 1.2a Living things grow, take in nutrients, breathe, **reproduce**, **eliminate waste**, and die.

Performance Indicator 2.1 Recognize that traits of living things are both **inherited** and **acquired** or learned.

- 2.1a Some **traits** of living things have been inherited (e.g., color of flowers and number of limbs of animals).

Performance Indicator 2.2 Recognize that for humans and other living organisms there is genetic continuity between generations.

- 2.2a Plants and animals closely **resemble** parents and other individuals in their **species**.
- 2.2b Plants and animals can **transfer** specific traits to their **offspring** when they reproduce.

Performance Indicator 3.1 Describe how the **structures** of plants and animals **compliment** the environment of the plant or animal.

- 3.1b Each plant has different structures that serve different functions in growth, survival, and reproduction.
 - Leaves help plants **utilize** sunlight to make food for the plant.
 - Seeds contain stored food that aids in **germination** and the growth of young plants.
- 3.1c In order to survive in their environment, plants must be **adapted** to that environment.
 - Seeds **disperse** by a plant's own mechanism and/or in a variety of ways that can include wind, water, and animals.
 - Leaf, flower, stem, and root **adaptations** may include **variations** in size, shape, thickness, color, smell, and texture.

Performance Indicator 4.1 Describe the major stages in life cycles of selected plants and animals.

- 4.1a Plants and animals have life cycles. These may include beginning of a life, developing into an adult, reproduction as an adult, and eventually death.
- 4.1b Each kind of plant goes through its own stages of growth and development that may include see young plant, and mature plant.
- 4.1c The length of time from beginning of development to death of the plant is called its **life span**.
- 4.1d Life cycles of some plants include changes from seed to mature plant.

Performance Indicator 4.2 Describe the evidence of growth, **repair**, and **maintenance**, such as nails, hair, and bone and the healing of cuts and bruises.

- 4.2a Growth is the process by which plants and animals increase in size.
- 4.2b Food supplies the energy and materials necessary for growth and repair.

Performance Indicator 5.1 Describe basic **life functions** of common living **specimens**.

- 5.1a All living things grow, take in nutrients, breathe, reproduce, and eliminate waste.
- 5.1b An **organism's external physical features** can enable it to carry out life functions in its particular environment.

Performance Indicator 5.2 Describe some survival behaviors of common living **specimens**.

- 5.2a Plants **respond** to changes in their environment. For example, the leaves of some green plants change positions as the direction of light changes; the parts of some plants undergo seasonal changes that enable them to grow; seeds germinate, and leaves form and grow.

Performance Indicator 6.1 Describe how plants and animals, including humans, depend upon each other and the nonliving environment.

- 6.1a Green plants are producers because they provide the **basic food supply** for themselves and animals.
- 6.1b All animals depend on plants. Some animals (predators) eat other animals (prey).
- 6.1c Animals that eat plants for food may in turn become food for other animals. This sequence is called the **food chain**.
- 6.1d **Decomposers** are living things that play a vital role in recycling nutrients.
- 6.1e An organism's **pattern of behavior** is related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and other resources, and the physical characteristics of the environment.

Performance Indicator 6.2 Describe the relationship of the Sun as an **energy source** for living and nonliving cycles.

6.2a Plants **manufacture** food for **utilizing** air, water, and energy from the Sun.

6.2b The Sun's energy is transferred on Earth from plants to animals through the food chain.

6.2c **Heat energy** from the Sun powers the water cycle (see Physical Science Key Idea 2)

SCIENTIFIC INQUIRY

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Students:

- Ask “why” question in attempts to seek greater understanding concerning objects and events they have observed and heard about.
- Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.
- Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.

This is evident, for example, when students:

- Observe a variety of objects that either sink or float when placed in a container of water. Working in groups, they propose an explanation of *why objects sink or float*. After sharing and discussing their proposed explanation, they refine it and submit it for assessment. The explanation is rated on clarity and plausibility.

2. 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.

Students:

- Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.
- Share their research plans with others and revise them based on their suggestions.
- Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).

This is evident, for example, when students:

- Are asked to develop a way of testing their explanation of *why objects sink or float when placed in a container of water*. They tell what procedures and materials they will use and indicate what results will support their explanation. Their plan is critiqued by others, they revise it, and submit it for assessment. The plan is rated on clarity, soundness in addressing the issue, and feasibility. After the teacher suggests modifications, the plan is carried out.

3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Students:

- Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.
- Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- Share their findings with others and actively seek their interpretations and ideas.
- Adjust their explanations and understandings of objects and events based on their findings and new ideas.

This is evident, for example, when students:

- Prepare tables or other representations of their observations and look for evidence which supports or refutes their explanation of *why objects sink or float when placed in a container of water*. After sharing and discussing their results with other groups, they prepare a brief research report that includes methods, findings, and conclusions. The report is rated on its clarity, care in carrying out the plan, and presentation of evidence supporting the conclusions.

CRAY FISH

Living Environment

Performance Indicator 1.1 Describe the characteristics of and variations between living and nonliving things.

1.1a Animals need air, water, and food in order to live and **thrive**.

Performance Indicator 1.2 Describe the life processes common to all living things.

1.2a Living things grow, take in nutrients, breathe, **reproduce, eliminate waste,** and die.

Performance Indicator 3.1 Describe how the structures of plants and animals compliment the environment of the plant or animal.

3.1a Each animal has different structures that serve different **functions** in **growth, survival,** and reproduction.

3.1c In order to survive in their environment, plants and animals must be **adapted** to that environment.

Performance Indicator 3.2 Observe that differences within a species may give individuals an advantage in surviving and reproducing.

3.2a Individuals within a species may compete each other for food, mates, space, water, and shelter in their environment.

3.2b All individuals have **variations**, and because of these variations, individuals of a species may have an **advantage** in surviving and reproducing.

Performance Indicator 5.1 Describe the basic life functions of common living specimens (e.g., guppies, mealworms, gerbils).

5.1b An **organism's external physical features** can enable it to carry out life functions in its particular environment.

Performance Indicator 5.2 Describe some survival behaviors of common living specimens.

5.2b Animals respond to change in their environment (e.g., **perspiration,** heart rate, breathing rate, eye blinking, **shivering** and **salivating**).

Performance Indicator 6.1 Describe how plants and animals, including humans, depend upon each other and the nonliving environment.

6.1b All animals depend on plants. Some animals (predators) eat other animals (prey).

SCIENTIFIC INQUIRY

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Students:

- Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.
- Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.
- Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.

This is evident, for example, when students:

- Observe a variety of objects that either sink or float when placed in a container of water. Working in groups, they propose an explanation of why objects sink or float. After sharing and discussing their proposed explanation, they refine it and submit it for assessment. The explanation is rated on clarity and plausibility.

2. Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

Students:

- Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.
- Share their research plans with others and revise them based on their suggestions.
- Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).

This is evident, for example, when students:

- Are asked to develop a way to testing their explanation of why objects sink or float when placed in a container of water. They tell what procedures and materials they will use and indicate what results will support their explanation. Their plan is critiqued by others, they revise it, and submit it for assessment. The plan is rated on clarity, soundness in addressing the issue, and feasibility. After the teacher suggests modifications, the plan is carried out.

3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Students:

- Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.
- Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- Share their findings with others and actively seek their interpretations and ideas.
- Adjust their explanations and understandings of objects and events based on their findings and new ideas.

This is evident, for example, when students:

- Prepare tables or other representations of their own observations and look for evidence which supports or refutes their explanation of *why objects sink or float when placed in a container of water*. After sharing and discussing their results with other groups, they prepare a brief research report that includes methods, findings, and conclusions. The report is rated on its clarity, care in carrying out the plan, and presentation of evidence supporting the conclusions.

ANIMAL STUDY (BONES)

Living Environment

Key Idea 3: Individual organisms and species change over time.

Performance Indicator 3.1 Describe how the structures of plants and animals compliment the environment of the plant or animal.

3.1a Each animal has different **structures** that serve different **functions** in **growth, survival,** and reproduction.

- Wings, legs, or fins enable some animals to seek shelter and to escape **predators**.
- The mouth, including teeth, jaws, and tongue, enables some animals to eat and drink.
- Claws, shells, spines, feathers, fur, scales, and color of body covering enable them to **obtain** food.

3.1c In order to survive in their environment, plants and animals must be **adapted** to that environment.

- Animal **adaptations** include: **coloration** for **warning** or **attraction**, **camouflage**, **defense mechanisms**, movement, **hibernation**, and migration.

Performance Indicator 3.2 Observe the differences within a species may give individuals an advantage in surviving and reproducing.

3.2b All individuals have **variations**, and because of these variations individuals of a species may have an **advantage** in surviving and reproducing.

Performance Indicator 5.1 Describe the basic **life functions** of common living **specimens** (e.g., guppies, mealworms, gerbils).

5.1b An **organism's external physical features** can enable it to carry out life functions in its particular environment.

Performance Indicator 5.2 Describe some survival behaviors of common living **specimens**.

5.2d Some animals, including humans, move from place to place to meet their needs.

SCIENTIFIC INQUIRY

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Students:

- Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.
- Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.
- Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.

This is evident, for example, when students:

- Observe *a variety of objects that either sink or float when placed in a container of water*. Working in groups, they propose an explanation of *why objects sink or float*. After sharing and discussing their proposed explanation, they refine it and submit it for assessment. The explanation is rated on clarity and plausibility.

2. 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.

Students:

- Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.
- Share their research plans with others and revise them based on their suggestions.
- Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).

This is evident, for example, when students:

- Are asked to develop a way of testing their explanation of *why objects sink or float when placed in a container of water*. They tell what procedures and materials they will use and indicate what results will support their explanation. Their plan is critiqued by others, they revise it, and submit it for assessment. The plan is rated on clarity, soundness in addressing the issue, and feasibility. After the teacher suggests modifications, the plan is carried out.

3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Students:

- Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.
- Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- Share their findings with others and actively seek their interpretations and ideas.
- Adjust their explanations and understandings of objects and events based on their findings and new ideas.

This is evident, for example, when students:

- Prepare tables or other representation of their observations and look for evidence which supports or refutes their explanation of *why objects sink or float when placed in a container of water*. After sharing and discussing their results with other groups, they prepare a brief research report that includes methods, findings, and conclusions. The report is rated on its clarity, care in carrying out the plan, and presentation of evidence supporting the conclusions.

MEASUREMENT

Performance Indicator 3.1 Observe and describe properties of materials using appropriate tools.

- 3.1a** Matter takes up space and has **mass (weight)**. Two objects cannot occupy the same place at the same time.
- 3.1c** Objects have properties that can be observed, described, and/or measured: length, width, **volume**, size, shape, mass or weight, **temperature**, texture, reflectiveness of light.
- 3.1e** The material(s) an object is made up of determine some specific properties of the object (sink/float, conductivity, **magnetism**). Properties can be observed or measured with tools such as **hand lenses, metric rulers, thermometers, balances, magnets, circuit testers, and graduated cylinders**.

SCIENTIFIC INQUIRY

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Students:

- Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.
- Question the explanations they hear from others and read about, seeking clarification and comparing them with their own understandings.
- Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.

This is evident, for example, when students:

- Observe *a variety of objects that either sink or float when placed in a container of water*. Working in groups, they propose an explanation of *why objects sink or float*. After sharing and discussing their proposed explanation, they refine it and submit it for assessment. The explanation is rated on clarity and plausibility.

2. 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.

Students:

- Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.
- Share their research plans with others and revise them based on their suggestions.
- Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).

This is evident, for example, when students:

- Are asked to develop a way of testing their explanation of *why objects sink or float when placed in a container of water*. They tell what procedures and materials they will use and indicate what results will support their explanation. Their plan is critiqued by others, they revise it, and submit it for assessment. The plan is rated on clarity, soundness in addressing the issue, and feasibility. After the teacher suggests modifications, the plan is carried out.

3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Students:

- Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.
- Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- Share their findings with others and actively seek their interpretations and ideas.
- Adjust their explanations and understandings of objects and events based on their findings and new ideas.

This is evident, for example, when students:

- Prepare tables or other representations of their observations and look for evidence which supports or refutes their explanation of *why objects sink or float when placed in a container of water*. After sharing and discussing their results with other groups, they prepare a brief research report that includes methods, findings, and conclusions. The report is rated on its clarity, care in carrying out the plan, and presentation of evidence supporting the conclusions.

COLORED SOLUTIONS

Performance Indicator 3.1 Observe and describe properties of materials using appropriate tools.

3.1a Matter takes up space and has **mass** (weight).

3.1b **Matter** has properties that can be observed through the senses.

3.1c Objects have **properties** that can be observed, described, and/or measured.

3.1e The material(s) an object is made up of determine some specific properties of the object (i.e. sink/float). Properties can be observed with tools such as **graduated cylinders**.

SCIENTIFIC INQUIRY

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Students:

- Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.
- Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.
- Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.

This is evident, for example, when students:

- Observe a variety of objects that either sink or float when placed in a container of water. Working in groups, they propose an explanation of why objects sink or float. After sharing and discussing their proposed explanation, they refine it and submit it for assessment. The explanation is rated on clarity and plausibility.

2. 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.

Students:

- Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.
- Share their research plans with others and revise them based on their suggestions.
- Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).

This is evident, for example, when students:

- Are asked to develop a way of testing their explanation of why objects sink or float when placed in a container of water. They tell what procedures and materials they will use and indicate what results will support their explanation. Their plan is critiqued by others, they revise it, and submit it for assessment. The plan is rated on clarity, soundness in addressing the issue, and feasibility. After the teacher suggests modifications, the plan is carried out.

3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods provide new insights into phenomena.

Students:

- Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.
- Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- Share their findings with others and actively seek their interpretations and ideas.
- Adjust their explanations and understandings of objects and events based on their findings and new ideas.

This is evident, for example, when students:

- Prepare tables or other representations of their observations and look for evidence which supports or refutes their explanation of why objects sink or float when placed in a container of water. After sharing and discussing their results with other groups, they prepare a brief research report that includes methods, findings, and conclusions. The report is rated on its clarity, care in carrying out the plan, and presentation of evidence supporting the conclusions.

GRADE 4 SCIENCE VOCABULARY

Crayfish

thrive
reproduce
eliminate waste
functions
growth
survival
adapted
variations
advantage
organism's external and physical
features
perspiration
shivering
salivating

Colored Solutions

mass
density
matter
properties
graduated cylinders

Batteries and Bulbs

conductivity
magnetism
conductors
magnets
circuit testers
electrical current
closed circuit
repel/attract

Measurement

mass
weight
volume
temperature
magnetism/magnets
hand lenses
metric ruler
balances
circuit testers
graduated cylinders

Growing and Changing

life process
reproduce
eliminate waste
inherited
acquired
traits
characteristics
interactions
generation
resemble
species
transfer
offspring
life cycles
repair
life functions
specimens
perspiration
shivering
salivating
promote
harmful substances
engaging in

Animal Studies (Bones)

structures
functions
growth
survival
predators
obtain
adapted/adaptation
coloration
warning
attraction
camouflage
defense mechanisms
hibernation
variations
advantage
life functions
specimens
organism's external physical features

Plant Study

thrive

nutrients

non-living

human-created

naturally occurring

life processes

reproduce

eliminate waste

inherited

acquired

traits

resemble

species

transfer

offspring

compliment

utilize

germination

structures

adapted/adaptations

disperse

variations

life cycles

life span

repair

mature

maintenance

basic food supply

food chain

decomposers

energy source

manufacture

heat energy

pattern of behavior

INQUIRY AND PROCESS SKILLS BASED ON ALL STANDARDS

It should be a goal of the instructor to foster the development of science process skills. The application of these skills allows students to investigate important issues in the world around them.

Inquiry-based units will include many or most of the following process skills. These process skills should be incorporated into students' instruction as developmentally appropriate.

Classifying – arranging or distributing objects, events, or information representing objects or events in classes according to some method or system

Communicating – giving oral and written explanations or graphic representations of observations

Creating models – displaying information, using multisensory representations

Gathering and organizing data – collecting information about objects and events which illustrate a specific situation

Generalizing – drawing general conclusion from particulars

Identifying variables – recognizing the characteristics of objects or factors in events that are constant or change under different conditions

Inferring – drawing a conclusion based on prior experiences

Interpreting data – analyzing data that have been obtained and organized by determining apparent patterns or relationships in the data

Making decisions – identifying alternatives and choosing a course of action from among the alternatives after basing the judgement for the selection on justifiable reasons

Manipulating materials – handling or treating materials and equipment safely, skillfully, and effectively

Measuring – making quantitative observations by comparing to a conventional or nonconventional standard

Observing – becoming aware of an object or event by using any of the senses (or extensions of the senses) to identify properties

Predicting – making a forecast of future events or conditions expected to exist.