

Charyl Stockwell Academy

Navigator Benchmarks and Grade Level Expectations

(benchmarks are in normal font, GLCEs are in italics)

Science

Revised January, 2008

SCIENCE PROCESSES:

Constructing New Scientific Knowledge:

- Generate questions about the world based on observation
- Develop solutions to problems through reasoning, observation, and investigations
- Manipulate simple devices that aid observation and data collection
- Use simple measurement devices to make measurements in scientific investigations
- Develop strategies and skills for information gathering and problem solving with teacher assistance
- Construct charts and graphs and prepare summaries of observations with teacher assistance

Reflecting on Scientific Knowledge:

- Develop an awareness of the need for evidence in making decisions scientifically (fact vs. opinion)
- Show how science concepts can be illustrated through creative expression such as language arts and fine arts
- Describe ways in which technology is used in everyday life (cars, radios, telephones, calculators, etc.)
- Develop an awareness of and sensitivity to the natural world
- Develop an awareness of contributions made to science by people of diverse backgrounds and cultures
- ***Inquiry Process:***
 - ***Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation***
 - *Make purposeful observation of the natural world using appropriate senses*
 - *Generate questions based on observations*
 - *Plan and conduct simple investigations*
 - *Manipulate simple tools (for example: hand lens, pencils, rulers, thermometers, rain gauges, balances, non-standard objects for measurement, meter stick, measuring cups) that aid observation and data collection*
 - *Make accurate measurements with appropriate (non-standard and standard (meter, centimeter)) units for the measurement tool*

- *Construct simple charts and graphs from data and observations with teacher assistance*
- ***Inquiry Analysis and Communication:***
 - ***inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations***
 - *Share ideas about science through purposeful conversation*
 - *Communicate and present findings of observations*
 - *Develop research strategies and skills for information gathering (ask an expert, use a book, make observations, conduct simple investigations, and watch a video, technology tools)*
- ***Reflection and Social Implications:***
 - ***reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science through history***
 - *Recognize that science investigations are done more than one time*
 - *Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities*
 - *Recognize that when a science investigation is done the way it was done before, similar results are expected*
 - *Use evidence when communicating scientific ideas*
 - *Identify technology used in everyday life*

LIFE SCIENCE:

- ***Organization of Living Things:***
 - ***Life Requirements: organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.***
 - *Identify the needs of plants*
 - *Identify the needs of animals*
 - ***Life Cycles: plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.***
 - *Describe the life cycle of animals including the following stages: egg, young, adult; egg, larva, pupa, adult*
 - *Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit*
 - ***Heredity: Observable characteristics: plants and animals share many, but not all, characteristics of their parents***
 - *Identify characteristics (for example: body coverings, beak shape, number of legs, body parts) that are passed on from parents to young*
 - *Classify young animals based on characteristics that are passed on from parents (for example: dogs/puppies, cats/kittens, cows/calves, chicken/chicks)*
 - *Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parents to young*

Animals and Plants; the characteristics, needs, and development of living things

- Explain characteristics and functions of observable body parts in a variety of animals
- Use observations to generate reasonable questions about animal characteristics
- Give evidence that characteristics are passed from parents to young
- Ask appropriate questions about offspring to determine their parents
- Compare and classify familiar organisms on the basis of observable physical characteristics
- Describe life cycles of familiar organisms
- Develop research skills by gathering information on plant or animal growth, classification, or basic needs
- Explain functions of selected seed plant parts (roots, stems, leaves, flowers, seed coat, cotyledon)
- Explain how fossils provide evidence about the nature of ancient life
- Explain how physical and behavioral characteristics of animals help them to survive in their environments
- Describe the basic requirements for all living things to maintain their existence
- Design systems that encourage growing of particular plants or animals

PHYSICAL SCIENCE:

Materials and Mixtures; Matter—its properties and changes

- Identify properties of materials that make them useful
- Classify common objects and substances according to observable attributes/properties
- Describe common physical changes in matter through investigation (size, shape, melting, freezing)
- **Properties of Matter:**
 - **Physical Properties: all objects and substances have physical properties that can be measured**
 - Demonstrate the ability to sort objects according to observable attributes such as color, shape, size, sinking or floating
 - Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating)
 - Measure the length of objects using rulers (centimeters) and meter sticks (meters)
 - Measure the volume of liquids using common measuring tools (measuring cups, measuring spoons)
 - Compare the weight of objects using balances
 - **Material Composition: some objects are composed of a single substance, while other objects are composed of more than one substance**
 - Classify objects as single substances (ice, silver, sugar, salt) or mixtures (salt and pepper, mixed dry beans)

- **States of Matter:** *matter exists in several different states: solids, liquids, and gases. Each state of matter has unique physical properties. Gases are easily compressed but liquids and solids do not compress easily. Solids have their own particular shapes, but liquids and gases take the shape of the container.*
 - *Demonstrate that water as a solid that keeps its own shape (ice)*
 - *Demonstrate that water as a liquid that takes on the shape of various containers*
- **Magnets:** *magnets can repel or attract other magnets. Magnets can also attract certain non-magnetic objects at a distance*
 - *Identify materials that are attracted by magnets*
 - *Observe that like poles of a magnet repel and unlike poles of a magnet attract*

Physics: Electricity; Sound; Motion of Objects

- Describe possible electrical hazards to be avoided at home and at school
- Construct checklists of electrical safety observations
- Describe sound in terms of pitch and volume
- Construct charts or graphs about sound and prepare summaries of observations
- Show how sound can be made into music through creative expression
- Explain how different sounds are made
- Describe or compare motions of common objects in terms of speed and direction
- Explain how forces (pushes or pulls) are needed to speed up, slow down, stop, or change the direction of a moving object
- Describe patterns of interaction of magnetic materials with other magnetic and non-magnetic materials
- Identify and use simple machines and describe how they change effort

EARTH SCIENCE:

- **Earth Systems:**
 - **Solar Energy:** *the sun warms the land, air and water and helps plants grow*
 - *Identify the sun as the most important source of heat which warms the land, air, and water of the Earth*
 - *Demonstrate the importance of sunlight and warmth in plant growth*
 - **Weather:** *weather changes from day to day and over the seasons*
 - *Compare daily changes in the weather related to temperature (cold, hot, warm, cool); cloud cover (cloudy, partly cloudy, foggy; precipitation (rain, snow, hail, freezing rain); wind (breezy, windy, calm)*
 - *Describe and compare weather related to the four seasons in terms of temperature, cloud cover, precipitation, and wind*
 - *Describe severe weather events*

- Describe precautions that should be taken for human safety during severe weather conditions (thunderstorms, lightning, tornadoes, high winds, blizzards, hurricanes)
 - **Weather Measurement: scientists use tools for observing, recording, and predicting weather changes**
 - Identify the tools that might be used to measure temperature, precipitation, cloud cover and wind
 - Observe and collect data of weather conditions over a period of time
- **Solid Earth:**
 - **Earth Materials: Earth materials that occur in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Some Earth materials have properties which sustain plant and animal life.**
 - Describe how Earth materials contribute to the growth of plant and animal life
 - **Surface Changes: the surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering, and some are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.**
 - Describe the major landforms of the surface of the Earth (mountains, plains, plateaus, valleys, hills)
- **Fluid Earth:**
 - **Water: water is a natural resource and is found under the ground, on the surface of the Earth, and in the sky. It exists in three states (liquid, solid, gas) and can go back and forth from one form to another.**
 - Identify water sources (wells, springs, lakes, rivers, oceans)
 - Identify household uses of water (drinking, cleaning, food preparation)
 - Describe the properties (visible, flowing, melting, dew) of water as a liquid (lakes, rivers, streams, oceans)
 - Describe the properties (hard, visible, freezing, ice) of water as a solid (ice, snow, iceberg, sleet, hail)
 - **Water movement: water moves in predictable patterns**
 - Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground
 - Describe the major bodies of water of the Earth's surface (lakes, ponds, oceans, rivers, streams)

Earth Science: what's on the surface; Water, Water, Everywhere; Weather and Seasons

- Describe major features of the earth's surface
- Develop observation skills by gathering information about the features of the earth
- Demonstrate how the earth's surface features can be represented through the creation of models
- Describe major surface water features of the earth
- Describe how water exists on earth in two of the three states (solid and liquid)
- Identify sources of water and its uses
- Show how water and surface water can be illustrated through drawing, models, and other creative expression
- Describe weather conditions

- Describe seasonal changes in Michigan's weather
- Explain appropriate safety precautions during severe weather
- Manipulate simple weather measurement devices (e.g., thermometer, windsock, and rain gauge) that aid observation and data collection
- Show how weather and seasons can be illustrated through drawings, models, and other creative expressions