

Archdiocese of Philadelphia



Science Guidelines

Grade 4

2006

GENERAL SCIENCE OBJECTIVES – Grades 1 to 8

At the conclusion of the science program prescribed for the elementary school in the Archdiocese of Philadelphia, students should have achieved the skills enumerated in the following six categories of objectives:

Knowledge

To read and state the meaning of certain scientific facts and concepts. When a problem situation is stated requiring application of some scientific principles, a child has learned that he/she should be able to apply the principle.

Instrumental Skills

To manipulate basic science equipment, interpret and prepare maps, graphs, charts, and tables appropriate to problems.

Problem-Solving Skills

To demonstrate problem-solving skills such as observing, inferring, sensing and defining problems, making hypotheses, outlining scientific procedures to test hypotheses, carrying out an investigation, controlling and manipulating variables, formulating models, making valid conclusions, recognizing and using space and time relationships, recognizing and using number relationships, classifying, measuring, communicating, and making operational definitions.

Scientific Attitudes

To demonstrate such scientific attitudes as open-mindedness by being willing to consider new facts in making judgments, withholding conclusions until all available facts are in, using controls, generalizing with sufficient evidence.

Appreciation

To describe the uses, benefits, and limitations of science to society.

Interest

To demonstrate interest in science by reading, collecting, studying, or becoming involved in some scientific activity as a leisure time pursuit.

SCIENTIFIC PROCESS SKILLS

Science education involves process as well as content. The content learned helps the students understand and interpret their environment. The process involves using diverse skills to solve different problems. This leads to effective ways of working and provides experience in thinking critically and creatively. The process skills with expectations for each grade are found below. It is hoped that teachers will develop these skills through hands-on experiences.

Introduce, Reinforce, Master	K	1	2	3	4	5	6	7	8
1. <u>Observing</u> : ability to identify properties, structures, etc. through use of all the senses	I	R	R	M					
2. <u>Classifying</u> : ability to group, match, compare by commonality	I	R	R	M					
3. <u>Identifying</u> : ability to describe and interpret sensory and qualitative aspects of learning		I	R	R	R	M			
4. <u>Questioning</u> : ability to ask pertinent questions regarding experiences		I	R	R	R	M			
5. <u>Measuring</u> : ability to find quantitative differences, to estimate, calculate, etc. (metric)	I	R	R	R	R	M			
6. <u>Recording</u> : ability to collect, record, and tabulate data meaningfully				I	R	R	R	M	
7. <u>Predicting</u> : ability to guess outcomes on basis of previous experiences				I	R	R	R	M	
8. <u>Formulating Models</u> : ability to represent cognitive data graphically					I	R	R	M	
9. <u>Formulating a Hypothesis</u> : to predict and generalize from experiences/data; to make an educated assumption as to the possible outcomes of an experiment					I	R	R	M	
10. <u>Interpreting</u> : ability to analyze data validly (similarities, dissimilarities, cause/effect)						I	R	R	M

11. <u>Designing Investigations</u> : ability to control variables, record and interpret data, summarize data, graph						I	R	R	M
12. <u>Inferring</u> : ability to make conclusions referring to causes, effects, etc.				I	R	R	M		
13. <u>Generalizing</u> : ability to sum up experiences into some kind of conclusion						I	R	R	M
14. <u>Experimenting</u> : to try something out to see whether or not it works			I	R	R	R	M		
15. <u>Manipulating Variables</u> : to identify and selectively change experimental conditions such as time, intervals, temperature, distance					I	R	R	R	M
16. <u>Handling Equipment</u> : to know the purpose for and manner of using lab resources and equipment for the purpose of experimentation			I	R	R	R	M		
17. <u>Using Space-Time Relationships</u> : ability to consider position and motions from vantage points other than the child's own						I	R	R	M
18. <u>Communication</u> : ability to verbally relate experiences, information, and procedures with clarity	I	R	R	R	M				
19. <u>Recognizing Problem Areas</u> : ability to be aware of areas where alternative solutions are possibilities					I	R	R	R	M
20. <u>Researching</u> : ability to seek additional information, sources, conditions, personnel, events			I	R	R	R	M		
21. <u>Interdisciplinary Skills</u> : to be able to identify those areas of science which are interrelated to other disciplines such as math, English, and social studies	I	R	R	R	M				

SCIENTIFIC PROCESS SKILLS

Science education involves process as well as content. The content learned helps the students understand and interpret their environment. The process involves using diverse skills to solve different problems. This leads to effective ways of working and provides experience in thinking critically and creatively. A blank process skills chart has been provided for teachers to use as a work in progress: identify which skills your students should have mastered, record dates of when skills were introduced or used. Feel free to duplicate this form.

<u>I</u>n<u>tr</u>o<u>d</u>u<u>c</u>e, <u>R</u>e<u>i</u>n<u>f</u>o<u>r</u>c<u>e</u>, <u>M</u>a<u>s</u>t<u>e</u>r									
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SCIENTIFIC METHOD

(Expectations by Grade Level)

Primary – Observe and Inquire: Grades One to Three

1. Ask questions and make observations.
2. State the problem.
3. Identify the materials.
4. Follow the procedures to conduct the investigation.
5. Tell what was learned as a result of the investigation.

Elementary – Hypothesize and Experiment: Grades Four to Six

1. Ask questions and make observations.
2. Recognize and state the problem.
3. Formulate a hypothesis based on content, research and previous experience.
4. Identify the materials.
5. Follow the procedures to conduct the investigation.
6. Collect data and record the results.
7. State a conclusion based on the data collected; include applications to everyday life.

Middle School – Analyze and Extend: Grades Seven and Eight

1. Ask questions and make observations.
2. Recognize and state the problem.
3. Formulate a hypothesis based on content, research and previous experience.
4. Identify the materials.
5. Follow and/or design the procedures to conduct the investigation.
6. Collect data and record the results making use of maps, charts, and graphs as well as tables and drawings.
7. State a conclusion based on the data collected; include applications to everyday life as well as suggestions for extended investigations.

PSS	Content	Suggested Activities and Assessments
	EARTH SCIENCE	
	Unit One – Oceanography – the science, which deals with the study and exploration of the ocean.	
4.6.4.B.	<p>I. What is Ocean Water?</p> <p>A. It is a part of the water cycle. It is formed when some of the precipitation collects in the rivers that feed into the oceans. Some precipitation falls directly back into the oceans.</p> <p>B. Ocean water is a mixture of water and many dissolved solids. Most of these solids are salts.</p>	<p>MODEL: The composition of ocean water using water and salt. Observe the evaporation of the water.</p> <p>SOCIAL STUDIES: Use a wall map of the world to investigate where one ocean begins and ends.</p>
3.5.4.D.	<p>II. How does Ocean Water Move?</p> <p>A. <u>Currents</u>: water that moves in a certain direction; the river like flow of water in the oceans.</p> <ol style="list-style-type: none"> 1. <u>Surface currents</u>: currents at the top layer of the ocean caused by winds. 2. <u>Deep currents</u>: currents near the ocean bottom caused by differences in water temperature. Warm water from the equator moves towards the poles, while the cold water from the poles moves towards the equator. <ol style="list-style-type: none"> a. The Gulf Stream affects weather and climate in the Eastern United States and Europe. b. El Nino affects warm water current in the Pacific and changes weather around the world, but especially the Western United States. 	<p>OBSERVE: The interaction of colored hot and cold water to demonstrate what happens when warm and cold currents meet.</p>

	<p>B. <u>Tides</u>: The regular rise and fall of the water at the ocean shore.</p> <ol style="list-style-type: none"> 1. Tides are caused by either the gravitational attraction between the earth and the moon, or 2. The gravitational attraction between the earth and the sun as the earth rotates. <p>C. <u>Waves</u>: the up and down movement of ocean water caused by the wind.</p> <ol style="list-style-type: none"> 1. Height of wave depends on: <ol style="list-style-type: none"> a. The strength of the wind b. The amount of time the wind blows c. The size of the area over which the wind blows 2. During a hurricane the strong gusty winds can create a storm surge which can cause damage along the shore. 	
		<p>WRITING: Compare and contrast high and low tides of the Delaware River between Philadelphia and Trenton.</p>
3.5.4.A.	<p>III. What are the features on the Ocean Floor?</p> <p>A. <u>Shore zone</u>: The place where the land and the ocean meet.</p> <ol style="list-style-type: none"> 1. The <u>continental shelf</u> is the part of a continent that extends under the ocean from the shoreline. 2. The <u>continental slope</u> is farther from the shore; the ocean floor drops sharply at the continental slope. 	<p>MODEL: Construct a model of the ocean floor on poster board or using clay.</p> <p>ORAL PRESENTATION: Act as a tour guide on a journey through the ocean.</p>

	<p>B. <u>Open ocean zone</u> contains many other features:</p> <ol style="list-style-type: none"> 1. The <u>ocean basin</u> (abyssal plain) is the floor at the deep part of the ocean, It is covered with sediments of clay, silt, sand, and rock carried into the ocean from the continents. 2. An <u>ocean trench</u> is a deep, narrow valley in the ocean floor. 3. A <u>mid-ocean ridge</u> is the highest part of a long chain of mountains found in some parts of the ocean basin. 4. The ocean also contains underwater volcanoes. <p>C. Exploring the Ocean Floor</p> <ol style="list-style-type: none"> 1. In the 1950s scientist used SONAR, or sound waves, to map the ocean floor. 2. Today, they also use satellites to map the oceans features. 3. Scientists also use special underwater vehicles to explore the ocean floor, including the JASON project and the Deep Flight Project. 	
		TECHNOLOGY: Explore the JASON project through use of the internet.

Unit Two – Earth’s Atmosphere		
3.5.4.C.	<p>I. How do we measure the changes in air temperature?</p> <p>A. Air temperature is measured using a <u>thermometer</u>, a tube with liquid inside. When the air around the liquid gets warmer; the liquid gets warmer and expands.</p> <p>B. Temperature is measured by degrees Celsius or Fahrenheit. Scientists use the Celsius scale.</p> <p>C. How does sunlight affect air temperature?</p> <ol style="list-style-type: none"> 1. When sunlight warms the solids and liquids on earth, those solids and liquids warm the air above them. Therefore, the further away from Earth the colder it is. 2. Direct sunlight, at noon on a summer day will cause the highest temperature, while the early morning sun in the winter will not cause the temperature to rise very much. 3. The length of the day will also affect the temperature of the air. When the day is longer it can warm the solids and liquids on Earth to a higher temperature. 	<p>MATH: Record and graph the temperature of the air outside the classroom for a specific length of time.</p> <p>SOCIAL STUDIES: Assign groups of students a city. For one week, students should track the high and low temperatures for that city and create a line graph that can be compared to those of other students. Have students summarize the results.</p> <p>INQUIRY: With a flashlight and a globe, investigate the amount of light that shines on North America during the four seasons. Don't forget to incorporate the tilt of the Earth's axis as well as its relative distance from the Sun.</p>
3.5.4.C.	<p>II. What causes air pressure and how do we measure it?</p> <p>A. Air is matter and has mass. The pressing down of the air is called <u>air pressure</u>.</p> <p>B. Air pressure on the Earth changes:</p> <ol style="list-style-type: none"> 1. Low-pressure area is a place where warm air rises and pushes down on the Earth's surface with less pressure. 	<p>DEMONSTRATION: Use a plumber's plunger to demonstrate air pressure by creating suction on the blackboard with the plunger.</p> <p>MODEL: Assign individuals various aspects of weather to measure (temperature, air pressure, wind, rain, etc.). They should build an instrument that measures that weather factor.</p>

	<ol style="list-style-type: none"> 2. High-pressure area is a place where cool air sinks and pushes down on the Earth's surface with more pressure. 3. Air pressure can be measured using a tool called a <u>barometer</u>. <ol style="list-style-type: none"> a. One type of barometer is an upside-down tube filled with mercury. As the air pressure gets higher it causes the mercury to rise in the tube. b. Another type of barometer has a circular dial in a sealed box. The outside of the box moves slightly as the air pressure changes. This causes the pointer on the dial to move. 	<p>PREDICT: Have weather instruments displayed so that all students can predict which will be more accurate then test their predictions.</p> <p>WRITING: Write a poem to describe how weather affects your life.</p>
3.5.4.D.	<p>III. What causes the wind and how do we measure its speed and direction?</p> <ol style="list-style-type: none"> A. When the air moves from an area of high pressure to an area of low pressure it causes <u>wind</u>. B. Wind direction is measured using weather tools <ol style="list-style-type: none"> 1. A <u>wind vane</u> rotates on tope of a pole the tail of the vane is pushed by the wind and an arrow on the opposite end of the vane points into the wind. 2. A <u>wind sock</u> is another tool that will show wind direction. It can also indicate how strong the wind is blowing. B. The exact speed of the wind is measured using a tool called an <u>anemometer</u>. An anemometer has three or four cups attached to the top of a pole. The wind causes this part of the anemometer to spin. The number of turns per minute tells the wind speed. 	

	III. PHYSICAL SCIENCE	
	Unit One - Matter	
3.4.4.A.	<p>I. What is matter?</p> <p>A. <u>Matter</u> is anything that takes up space and has mass</p> <ol style="list-style-type: none"> 1. Air 2. Water 3. Wood 4. Human beings. <p>B. <u>Mass</u> is the amount of matter that makes up an object, for example, two pennies have more mass than one penny.</p> <p>C. <u>Space</u> is measured as volume, for example two pennies take up more space that one penny.</p>	<p>DEMONSTRATION: Capture student attention by pouring various (food colored) liquids so that their differences in density will allow layers to be created. Drop small items such as paper clip, piece of Styrofoam, and rubber band and watch how far they sink.</p>
3.4.4.A.	<p>II. What are the state of matter?</p> <p>A. <u>Solids</u> – a solid has a shape of its own. It has a definite shape and takes up a definite amount of space. The particles in a solid are arranged in a neat, regular order that gives the solid its definite shape.</p> <p>B. <u>Liquids</u> – a liquid is matter that takes the shape of its container and yet takes up a definite amount of space. The particles in a liquid can slip and slide around each other. They can easily move from place to place.</p> <p>C. <u>Gases</u> – a gas is matter that has no definite shape and takes up no definite amount of space. Like particles in liquids, the particles in gases are not arranged in any pattern. Unlike particles in liquids, gas particles do not stay close together.</p>	<p>CLASSIFY: Present various items for students to classify into the states of matter.</p> <p>INVESTIGATE: How does water change states? Measure the height of water in a plastic cup in millimeters. Measure the temperature. Put it into a freezer overnight. Measure again both height and temperature. Measure a third time when it melts. Continue to measure for three more days.</p>

3.4.7.A.	<p>III. What are the physical and chemical properties of matter?</p> <p>A. The <u>physical properties</u> are characteristics of matter that can be observed and that tell you what the substance is. Physical characteristics would include:</p> <ol style="list-style-type: none"> 1. Whether it is a solid, liquid, or gas. 2. Whether it will float in water (density). 3. What can be observed using the senses. 4. Magnetic attraction <p>B. The <u>chemical properties</u> are characteristics of matter that tell how one substance reacts with another substance. Chemical characteristics would include:</p> <ol style="list-style-type: none"> 1. How a substances reacts with oxygen, i.e., iron rusts 2. How a substances reacts with an acid, i.e., vinegar and baking soda react to produce carbon dioxide. 	<p>OBSERVING: Record all the physical characteristics of your given peanut (apple, other object). Put all the class items back together and try to find your own based on the physical description you wrote.</p> <p>INVESTIGATE: Create a mystery substance that includes things like sugar, baking soda, salt, flour, pepper, iron filings. In groups, have students try to describe the physical characteristics. Have them place small samples on Petri dishes and note any chemical reactions they notice.</p> <p>QUESTIONING: Have students create a list of questions they have about how to identify the mystery substance components.</p>
3.4.7.A.	<p>IV. What are physical and chemical changes of matter?</p> <p>A. <u>Physical Change</u> is a change in matter that changes the physical properties, but does not produce a different kind of matter. For example:</p> <ol style="list-style-type: none"> 1. When a state of matter is changed: <ol style="list-style-type: none"> a. adding heat to solid matter causes it to melt b. if liquid matter is cooled, it will reach its freezing point and become solid 2. Wood is chopped; wood remains wood, but it is in smaller pieces. 3. A magnet loses its magnetism, but the magnet is still the same metal, just no longer magnetic. 	<p>HYPOTHESIZING: Students should create hypotheses to predict what effect adding or removing heat will have on the mystery substance.</p>

B. Chemical Change is a change in matter that produces a different kind of matter. For example:

1. Baking cookies will cause chemical changes, sugar will caramelize and the baking powder will cause gas bubbles to be formed.
2. Rusting steel wool, oxygen reacts with iron.
3. Tarnishing pennies, oxygen reacts with copper.
4. Burning a candle, paraffin wax reacts with oxygen to produce carbon, carbon dioxide gas, heat and light are given off.

INQUIRY: Test equal amounts of cornstarch, baking powder, baking soda, and salt with water, vinegar, and iodine. Record the results and identify whether or not any chemical changes have taken place.

HYPOTHESIZE: Create an experiment to see if it is possible to prevent rust.

CRITICAL THINKING: Which are easier to reverse chemical or physical changes?

	LIFE SCIENCE	
	Unit One - Human Body Systems	
3.3.4.B.	<p>I. How does the digestive system work?</p> <p>A. The job of the digestive system is to provide your body with <u>nutrients</u>, substances that the body uses for energy, growth, and repair of your body.</p> <p>B. The organs involved in the digestive system include:</p> <ol style="list-style-type: none"> 1. <u>The Mouth</u> – The teeth tear, cut and grind food. Saliva is added to the food to help break down the food and to help swallow it. 2. <u>The Esophagus</u> – The muscles in the esophagus contract and relax to push swallowed food down toward the stomach. 3. <u>The Stomach</u> – The stomach is a baglike organ with muscular walls. The stomach muscles squeeze and mix food with digestive juice made in the stomach's lining. The juice changes the food, which stays in the stomach for two to four hours. When the food leaves the stomach it is a thick liquid. 4. <u>The Small Intestines</u> – The small intestine is an organ of the digestive system in which most digestion takes place. The juices in the small intestine change the food into nutrients. These nutrients pass through the thin wall of blood vessel in the intestinal lining. Blood carries the nutrients to body cells. 5. <u>The Large Intestines</u> – the parts of food that cannot be digested are moved to the large intestine. The large intestine removes much of the liquid and stores the solid waste until it leaves the body in ten to twenty-four hours. 	<p>OBSERVE AND RECORD: Give each student a saltine. Have them place the cracker in the front of the mouth. They should allow the cracker to break down on its own and they should not swallow until they notice change from starchy to sweet.</p> <p>PREDICT: Will a crushed sugar cube dissolve faster or slower than a whole cube in water? This is a model of the advantage to digestion if we chew our food.</p> <p>WRITING: Create a play about the journey of a piece of food through the digestive system.</p>

<p>3.3.4.B.</p>	<p>II. How does the circulatory system work?</p> <p>A. The job of the circulatory system is to transport nutrients, oxygen, and water to all your body's cells.</p> <p>B. The organs involved in the circulatory system include:</p> <ol style="list-style-type: none"> 1. <u>The Blood</u> <ol style="list-style-type: none"> a. <u>Plasma</u> is the watery part of the blood. Nutrients, wastes, and blood cells float in plasma. b. <u>Red blood cells</u> give blood its color and they carry oxygen to your body's cells. c. <u>White blood cells</u> protect you from sickness. Some surround and destroy germs. d. <u>Platelets</u> are tiny parts of cells that help to stop bleeding. 2. <u>The Blood Vessels</u> <ol style="list-style-type: none"> a. An <u>Artery</u> is a blood vessel that carries blood away from the heart. b. <u>Capillaries</u> are tiny blood vessel with thin walls. The capillaries receive blood from the smallest arteries. Oxygen, nutrients, and wastes pass through the thin walls of the capillaries. c. A <u>vein</u> is a blood vessel that carries blood from the capillaries back to the heart. 3. <u>The Heart</u> – the heart is a four-chambered, hollow, muscular organ that pumps blood every minute of every day. <ol style="list-style-type: none"> a. The heart has two chambers called <u>atria</u> Which receive blood from the veins. 	<p>MEASURE: Have students measure their pulse after being at rest and then after completing some physical task such as running up and down a flight of steps or running in place. Graph the class data and discuss the results. Compare the data to health charts that describe how hard your cardiovascular system should work during exercise.</p> <p>WRITING: Write a persuasive paragraph to convince others that a particular blood cell is the most important.</p> <p>DEMONSTRATION: Show how platelets stop bleeding by forming clots. Put beads in a jar, tape the open end and turn the jar over. The tape is acting as the platelets.</p>
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	<p>b. The heart has two chambers called <u>ventricles</u> which pump blood out of the heart through arteries.</p>	<p>MODEL: Demonstrate how hard the heart works by attempting to empty one bowl of water into another using a measuring cup. Attempt to complete the activity 80 times in one minute to simulate the heart's work.</p>
<p>3.3.4.B.</p>	<p>III. How does the nervous system work?</p> <p>A. The job of the nervous system is to send and receive messages for the body and to control the activities of the body.</p> <p>B. The parts of the nervous system include:</p> <ol style="list-style-type: none"> 1. <u>The Brain</u> <ol style="list-style-type: none"> a. The control center of the nervous system. b. The center for reasoning and logic. c. Stores memories and information. d. It is protected by the skull. 2. <u>The Sense Organs</u> <ol style="list-style-type: none"> a. Body parts that have special nerve cells that gather information about the surroundings. b. The sense organs include: eyes, ears, nose, tongue, and skin 3. <u>Nerve Cell</u> <ol style="list-style-type: none"> a. A cell that gathers and carries information in the body b. Nerve cells, called <u>neurons</u>, have a special shape which contains tiny branches called nerve endings. 4. <u>Spinal Cord</u> <ol style="list-style-type: none"> a. The spinal cord is a bundle of nerves that connects your brain with nerves throughout 	<p>ART: Make a comic strip using talk balloons to show what happens when messages reach and leave the brain.</p>

	<p>your body.</p> <p>b. The spinal cord is protected by your backbone.</p>	
	Unit Two – Plant and Animal Structure	
3.3.4.A.	I. Plant Structure and Life Cycle	
	<p>A. <u>Parts of a Plant</u></p> <p>1. <u>Roots</u> - grow downward in the soil</p> <p>a. Root functions:</p> <ol style="list-style-type: none"> 1) Roots absorb water from the soil. 2) Roots also absorb nutrients from the soil. 3) Roots hold the plants in place. 4) Roots in some plants store food, i.e., carrots and radishes. <p>b. Types of roots</p> <ol style="list-style-type: none"> 1) Taproots have one large root, i.e., dandelions, carrots, and parsnips. 2) Fibrous roots spread out and no one root is larger or more important than the others, i.e., grass, trees, 3) Root hairs, threadlike cells on a root that take in water and minerals. Most roots have root hairs. <p>2. <u>Stems</u> – grow above ground.</p> <p>a. Stem functions:</p> <ol style="list-style-type: none"> 1) Stems carry water, minerals and nutrients from the roots to the leaves. 2) Stems support leaves and flowers. <p>b. Types of stems</p> <ol style="list-style-type: none"> 1) Woody stems are found in larger plants to give the plant extra support, i.e., trees and rose bushes. 	<p>SOCIAL STUDIES: Research state flowers and design a collage of photographs, silk flowers, and dried flowers.</p> <p>TECHNOLOGY: Research experiments done on plants in space.</p> <p>DEMONSTRATION: Place white carnations in colored water and observe what happens overnight. Have students explore color combinations to observe how stems work.</p> <p>EXPERIMENT: Predict what would happen if leaves were covered. Create procedures and</p>

	<p>2) Soft, green stems are found in smaller plants, i.e., strawberry plant and daisies.</p> <p>3. <u>Leaves</u> – the main food-making part of the plant.</p> <p>a. Parts of a leaf</p> <ol style="list-style-type: none"> 1) <u>Veins</u> are bundles of tubes that carry water to the leaf and food from the leaf to the stem and roots. 2) <u>Epidermis</u> is the protective layer that keeps the leaf from losing water and drying out. 3) <u>Chlorophyll</u> is a green substance which traps the sun's energy which is used to make food. 4) Stomata are tiny openings on the bottom side of the leaf which allows gas and water vapor pass in and out of the stomata (transpiration). <p>b. Types of leaves.</p> <ol style="list-style-type: none"> 1) Pinnate leaves have parallel veins, i.e., grass, corn, tulips, and onions. 2) Palmate leaves have veins that branch out from the center of the leaf, i.e., maple leaf, rose leaf, impatiens, and poinsettia. 	<p>follow them to see whether or not covered leaves will stay green.</p>
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	<p>B. Life Cycle of a flowering plant.</p> <ol style="list-style-type: none"> 1. <u>Seeds</u> – an undeveloped plant with stored food sealed in a protective covering, seed coat. A coconut and poppy seeds are two very different seeds. 2. <u>Seedlings</u> – the germination of a seed sprouting into a new, young plant. 3. <u>Mature plant</u> – a plant that has grown enough to produce its own seeds. 4. <u>Flowers</u> – the mature plant will produce flowers that will be pollinated by an insect or the wind. 5. <u>Fruit</u> - the ovary of some flowers will grow into a fruit which surrounds the new seed, i.e., apples, peaches, and strawberries. 6. <u>Seed</u> - the ovary of some flowers become seeds or seed pods, i.e, corn, peas, and beans. 	
3.3.4.A.	II. Animal Structure and Life Cycle	
	<p>A. Characteristics of Animals</p> <ol style="list-style-type: none"> 1. made of cells 2. they reproduce 3. they move 4. they eat food 5. they grow and change 	MATH: Create a graph that compares the size of animals to the number of young they bear.
	<p>B. The major difference in animals</p> <ol style="list-style-type: none"> 1. <u>Vertebrates</u> – animals with a backbone <ol style="list-style-type: none"> a. Warm-blooded animals - their body temperature doesn't change much. <ol style="list-style-type: none"> 1) <u>Mammals</u> – furry or hairy, give birth to live young and feed milk to their young. 2) <u>Birds</u> – feathered and lay eggs. 	<p>ART: Research one category of vertebrates and create a poster to show its unique characteristics.</p> <p>CLASSIFY: Given a group of photographs of various animals, the student will be able to come up with a classification systems and be able to explain it to the class.</p>

	<p>b. Cold-blooded animals - their body temperature changes with the surroundings.</p> <ol style="list-style-type: none"> 1) <u>Fish</u> – live in water; most fish are covered with scales and breathe through gills. 2) <u>Amphibians</u> – live in water after hatching from an egg, but the adults can live on land; i.e, tadpoles to frogs. 3) <u>Reptiles</u> – live on land and have a dry, scaly skin. Most reptiles lay eggs. <p>2. <u>Invertebrates</u> – animals without backbones make up most of the animals of the world. The invertebrates include: insects, spiders, lobsters, worms, snails, sponges, and jellyfish.</p>	
	<p>B. Life cycles of Animals – animals have a variety of life cycles, depending on the species.</p>	

ROLE OF THE SCHOOL SCIENCE COORDINATOR

In order to provide for articulation in the science curriculum and to make science an important and functional learning situation, the principal should appoint a science coordinator. This coordinator should be an experienced teacher (if possible), but above all one who is interested in science and is familiar with the latest books and programs. The coordinator must be aware of innovations and new methods and be willing to implement them.

Responsibilities of the Science Coordinator

1. To work with the principal and teachers to define the curriculum for each grade level and to make sure that the archdiocesan curriculum guidelines are adapted for the school.
2. To be responsible for keeping the texts or programs up to date and to prepare orders for additional texts and workbooks to be used for the next school year.
3. To consult with the principal about providing equipment and materials so that investigative science can be performed in the school.
4. To inform teachers of the availability of materials and equipment for their level.
5. To hold periodic meetings with the teachers to discuss the implementation of the science program and to provide for a sharing of ideas and methods.
6. To assist the teacher whenever needed and to encourage science experimentation.
7. To acquaint new staff members with curriculum guidelines and to see that the teachers have a copy; to offer any help needed by teachers in the implementation of the science program.
8. To present interesting articles and new ideas in the field of science through periodicals, books, workshops, etc.
9. To attend workshops or meetings provided by the archdiocese or any other seminars provided by professionals.
10. To plan and organize a science fair.
11. To keep the principal informed of meetings and any new developments in classroom science