SCIENCE Grades: 1-2

A school's curriculum will address these outcomes over this 2 year span. Science instruction will most often be integrated with other subjects, for example, learning about the characteristics of groups of living things (II.5) while reading various books about animals. Art projects include the use of tools (like scissors) and the differences among materials. These activities along with the use of various manipulatives contribute to achieving age-appropriate technology/engineering standards. Emphasis is placed on encouraging children's natural curiosity while developing their scientific inquiry skills such as making observations and sharing them with others, asking questions, and finding patterns.

As were the original guidelines released in 2006, these revised Diocesan Science Curriculum Guidelines reflect primarily content standards drawn from the *National Science Education Standards* (NSES), the *Benchmarks for Science Literacy* and the Massachusetts *Science and Technology/ Engineering Curriculum Framework*. The outcomes have been left in grade-bands to give a school maximum flexibility when designing its individual science curriculum: allowing it to take advantage of local assets and/or programs or activities already in place; or to seek out and exploit the links to its existing curricula. The outcomes are generally the same as in the original guidelines but have been re-ordered and grouped around essential questions that a school may or may not choose to use when mapping its Science curriculum. A school should also look to include the NSES "Science as Inquiry" standards as it designs its curriculum and develops its teaching/learning strategies. These inquiry standards should not be viewed as secondary to the content standards, but rather, collectively, as a primary goal of science education with the content being the context within which these skills are learned.

NSES: Abilities Necessary to Do Scientific Inquiry

Grades K–4

- Ask a question about objects, organisms, and events in the environment
- Plan and conduct a simple investigation
- Employ simple equipment and tools to gather data and extend the senses
- Use data to construct a reasonable explanation
- Communicate investigations and explanations

Grades 5–8

- Identify questions that can be answered through scientific investigations.
- Design and conduct a scientific investigation.
- Use appropriate tools and techniques to gather, analyze, and interpret data.
- Develop descriptions, explanations, predictions, and models using evidence.
- Think critically and logically to make relationships between evidence and explanations.
- Recognize and analyze alternative explanations and predictions.
- Communicate scientific procedures and explanations.
- Use mathematics in all aspects of scientific inquiry.

NSES Changing Emphases to Promote Inquiry

LESS EMPHASIS ON	MORE EMPHASIS ON
Activities that demonstrate and verify science content	Activities that investigate and analyze science questions
Investigations confined to one class period	Investigations over extended periods of time

Process skills out of context	Process skills in context
Emphasis on individual process skills such as observation or inference	Using multiple process skills— manipulation, cognitive, procedural
Getting an answer	Using evidence and strategies for developing or revising an explanation
Science as exploration and experiment	Science as argument and explanation
Providing answers to questions about science content	Communicating science explanations
Individuals and groups of students analyzing and synthesizing data without defending a conclusion	Groups of students often analyzing and synthesizing data after defending conclusions
Doing few investigations in order to leave time to cover large amounts of content	Doing more investigations in order to develop understanding, ability, values of inquiry and knowledge of science content
Concluding inquiries with the result of the experiment	Applying the results of experiments to scientific arguments and explanations
Management of materials and equipment	Management of ideas and information
Private communication of student ideas and conclusions to teacher	Public communication of student ideas and work to classmates

Although the Massachusetts Technology/Engineering standards are not explicitly included in the Diocesan outcomes, some are integrated within Suggested Teaching/Learning Strategies. Schools are encouraged to include as many of the Technology/Engineering standards as possible.

As has been more consistently recognized in subjects other than K-8 science, it is not possible to learn, beyond a mere recitation of facts and "factoids", without "doing." For example, no one would consider a mathematics class satisfactory if it consisted solely of students reading about other people "doing" math and watching the teacher "doing" math. We fully accept that students must be given the opportunity to "do" math. So too, it is with science. Students must be given the opportunity to "do" science. While gaining a better understanding of the workings of the world around them, students will be able to more fully appreciate the wonders of creation as well as their role as stewards.

Learning Outcomes	**Teaching / Learning Strategies & Assessments**
Additional outcomes from the Diocesan Health Curriculum Guidelines will also be included unless they are included elsewhere. 1. The student can use basic tools including a ruler, thermometer, magnifier and balance (commercial or self-made) ***I. Why do we need the sun ?*** The student can (in words and/or in pictures):	➢ Make some simple weather instruments such as a rain gauge, windsock, and barometer. Have students keep a weather journal. Maintain a class

I.1. Describe the sun as a source of heat and light and as necessary for living things I.2. Demonstrate/illustrate that light can pass through some objects and is blocked by others causing a shadow I.3. Describe the effects of the sun's light on objects such as warming, color change/fading, melting I.4. Describe the weather (including temperature, wind and precipitation.) I.5. Describe/illustrate how the weather changes from day to day and from one season to the next. I.6. Recognize the repeating patterns of day/night, the seasons and the 4 major phases of the moon.	graph of daily measurements. Students write or discuss one or two differences or similarities with the previous day or previous week/month. ➢ Have students keep a journal of moon observations for a month or longer. Students should observe, draw their observations, and add the date and time of day for each observation. Discuss observations along with facts about the moon.
II. How do living things change over time ?	
II.1. Describe/illustrate all living things as growing, reproducing and needing food, air and water. II.2. Describe the earth's surface as including rocks, soil, water and living things. II.3. List ways that an organism's habitat meets its basic needs. II.4. Describe/illustrate changes in a living thing during its life cycle. II.5. Identify the characteristics that living things grouped together share (for example, fur-mammals, birds-feathers, scales-fish) II.6. Compare how many living things closely resemble their parents II.7. Identify things that help plants and animals live in their environment such as using their senses and/or having special characteristics. II.8. Describe some of the changes plants and animals go through as the seasons change II.9. Recognize fossils as the remains of living things that can tell us about the earth in the past	➢ Maintain a classroom fish tank with male & female fish. Students share responsibilities for caring for the fish. Students can make observations of fish growth and reproduction; water temperature; food and/or maintenance needed. ➢ Plant a seed and record over time: its appearance, height, when it was watered, etc. ✓ On a paper divided into four sections the student will draw four different stages of plant growth starting from seed and ending with plant (stem, leaves, etc.). On backside of paper, student must draw fully grown plant. For example: full grown tree, sunflower, etc. ✓ Similar assessment can be used for the life cycle of a frog or butterfly
III. How can non-living things change ?	
II.10. Distinguish between the 3 states of matter and describe a solid as having a definite shape, and liquids and gases as taking the shape of their containers II.11. Predict how an object's motion will change if a force is applied	➢ Observe ice cubes change from solid to liquid to evaporated gas. ➢ Have students guess where rolled ball will go if nothing is in its path, if a book placed at an angle is in its path, etc.

Resources

Rulers, thermometers (including outdoor,) magnifiers

Teaching Science With Favorite Picture Books: Grades 1-3
by Ann Flagg, Mary Ory, Teri Ory

NSTA Elementary Resources:
http://www.nsta.org/elementaryschool/?lid=hp

Magic School Bus (series)

I. The Moon Book by Gail Gibbons
Twinkle, Twinkle, Little Star by Jane Taylor (Scholastic)
The Tiny Star by Arthur Ginolfi (Checkboard Press)
Happy Birthday, Moon by Frank Asch (Scholastic)
Moondance by Frank Asch (Scholastic)
Postcards from Jupiter by Loreen Leedy (Scholastic)

Snowballs by Lois Ehlert (Scholastic)
The Little Cloud by Eric Carle (Scholastic)
Sadie and the Snowman by Allen Morgan (Scholastic)
The Jacket I Wear in the Snow by Shirley Neitzel (Scholastic)

II. *Birds' Nests* by Eileen Curran (Troll Associates)
Note: Take pictures of the "birds in their backyard" and show them to the children

The Very Busy Spider by Eric Carle (Scholastic)
The Honeybee and the Robber by Eric Carle (Scholastic)
The Very Hungry Caterpillar by Eric Carle (Scholastic)
The Very Lonely Firefly by Eric Carle (Scholastic)
The Very Clumsy Click Beetle by Eric Carle (Scholastic)
www. insectlore.com

Fossils Tell of Long Ago (Let's-Read-and-Find-Out Science 2)
by Aliki
Dinosaur Roar by Paul & Henrietta Strickland (Scholastic)
A Boy Wants a Dinosaur by Hiawyn Oram
Dinosaurrumpus! by Tony Mitten (Scholastic)
My Dinosaur by Mark Alan Weatherby (Scholastic)

The Mitten by Jan Brett (Scholastic)
The Hat by Jan Brett (Scholastic)

Going on a Whale Watch by Bruce McMillan (Scholastic)
The Whale's Song by Dyan Sheldon (Scholastic)
Swimmy by Leo Lionni (Scholastic)
Mr. Seahorse by Eric Carle (Scholastic)

The Apple Pie Tree by Zoe Hall (The Blue Sky Press)
Fall Leaves Fall! by Zoe Hall (Scholastic)
Autumn Leaves by Ken Robbins (Scholastic)
Leaf Man by Lois Elhert (Harcourt, Inc.)

Pumpkin, Pumpkin by Jeanne Titherington (Scholastic)
The Tiny Seed by Eric Carle (Scholastic)
Diary of a Sunflower by Carol Pugliano (Scholastic)

Suppliers to consider:
hatchearlychildhood.com lakeshorelearning.com basicsciencesupplies.com enasco.com/science
deltaeducation.com scientificsonline.com YoungExplorers.com etacuisenaire.com insectlore.com