Grade 4 Science
Science 4

ESS: Earth's Surface

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 4 OH: ELA & Literacy in History/Social Studies, Science, & Technical Subjects PreK-5

Capacities of the Literate Individual

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

Speaking and Listening

Comprehension and Collaboration 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others ideas and expressing their own clearly and persuasively.

SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others ideas and expressing their own clearly.

SL.4.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.4.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.4.1c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

SL.4.1d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Presentation of Knowledge and Ideas 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

SL.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

SL.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

SL.4.6. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.

Writing

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

W.4.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.4.2c. Link ideas within categories of information using words and phrases (e.g., another, for example, also, because).

W.4.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.4.2e. Provide a concluding statement or section related to the information or explanation presented.

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

W.4.3. Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

W.4.3a. Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally.

W.4.3b. Use dialogue and description to develop experiences and events or show the responses of characters to situations.

W.4.3c. Use a variety of transitional words and phrases to manage the sequence of events.

W.4.3d. Use concrete words and phrases and sensory details to convey experiences and events precisely.

Production and Distribution of Writing 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.4.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 13 above.)

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

W.4.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.

Research to Build and Present Knowledge 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

W.4.8. Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Reading: Informational Text

Key Ideas and Details 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

RI.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

Craft and Structure 4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

RI.4.5. Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

RI.4.9. Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

Range of Reading and Level of Text Complexity 10. Read and comprehend complex literary and informational texts independently and proficiently.

RI.4.10. By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

OH Grade 4 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Earths Surface

Earths surface has specific characteristics and landforms that can be identified.

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of PreK-4 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:

Observe and ask questions about the natural environment;

Plan and conduct simple investigations;

Employ simple equipment and tools to gather data and extend the senses;

Communicate about observations, investigations and explanations

Review and ask questions about the observations and explanations of others.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

The Dignity of Work and the Rights of Workers

Call to Family, Community, and Participation

Option for the Poor and Vulnerable

Solidarity

Care for God's Creation

The Rights of Children

1. THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.

2. THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection, and security.

3. THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.

4. THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.

5. THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION and challenges its members to critical and reflective thinking in their search for truth.

6. THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.

7. THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.

8. THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.

9. THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

10. THE RIGHT TO GUIDANCE FROM THE CHURCH in their development as loving people.

Content

1. **Earth's surface has specific characteristics and landforms that can be identified.**
a. About 70 percent of the Earths surface is covered with water and most of that is the ocean.
b. Only a small portion of the Earths water is freshwater, which is found in rivers, lakes and ground water.

c.. Earths surface can change due to erosion and deposition of soil, rock or sediment.
d.. Catastrophic events such as flooding, volcanoes and earthquakes can create landforms.

1. **Weathering causes changes to the Earth's surface.**
a. Rocks change shape, size and/or form due to water or ice movement, freeze and thaw, wind, plant growth, gases in the air, pollution and catastrophic events such as earthquakes, mass wasting, flooding and volcanic activity.
2. **Erosion and deposition cause changes to the Earth's surface.**

a. Water, wind and ice physically remove and carry (erosion) rock, soil and sediment and deposit the material in a new location.

b. Gravitational force affects movements of water, rock and soil.

Resources

* Ohio Dept. of Education - Science Model Curriculum (<http://education.ohio.gov/Topics/Academic-Content-Standards/Science>)

Skills

Recognize that 70 percent of the Earths surface is water, which is why Earth is known as the Blue Planet.

1. Describe and illustrate how wind, water, and ice shape and reshape Earth's land by eroding rock and soil and depositing them in other areas producing characteristic land forms.

Identify the processes that can change the surface of Earth (e.g., erosion, deposition, volcanic activity, earthquakes, glacial movement and/or weathering).

1. Differentiate between changes on the Earth's surface in terms of slow processes (erosion, weathering, deposition, glacial movement) and rapid process (volcanoes, earthquakes, and land slides).
2. Identify and describe the layers of the earth.
3. Recognize that gravity is a force that pulls objects toward the center of the earth.
4. Investigate theory of plate tectonics.
5. Identify fault lines and describe their role in earthquakes.
6. Identify types and parts of volcanoes.
7. Explain causes of volcanoes and earthquakes.
8. Explain what occurs during volcanic eruptions and earthquakes.
9. Describe how earthquakes are measured.
10. Describe effects of volcanoes and earthquakes.
11. Describe the Ring of Fire.
12. Investigate and determine examples of weathering, erosion, and deposition.
13. Analyze and explain how gravity has a role in erosion.
14. Compare and contrast different landforms (streams, deltas, flood plains, hills, mountains/mountain ranges, valleys, sinkholes, caves, canyons, glacial features, dunes, springs, volcanoes, and islands).
15. Analyze and synthesize information about the processes (weathering, erosion, deposition) that must occur to result in various landforms.
16. Identify weathering as processes that change rock at or near the Earths surface.
17. Recognize that weathering can occur at different rates.
18. Differentiate between weathering and erosion.

Recognize that water, wind, pollution/gases in the air, ice movement, earthquakes, volcanoes, freezing/thawing, and plant action can all weather rock and soil.

1. Distinguish and illustrate the amount of fresh water to the amount of salt water that makes up 70% of the Earth's surface.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Integrate correct scientific terms.
5. Interpret pictures and diagrams.
6. Compare and contrast two texts on the same topic.
7. Utilize various text features (e.g. headings, tables of contents, glossaries, electronic menus, and icon).
8. Distinguish between pictorial and informational text.

**Common Core Writing Content**

1. Formulate arguments focused on discipline-specific content.
2. Compose informative/explanatory text.
3. Produce clear and coherent writing, appropriate to task, purpose, and audience.
4. Edit and revise writing samples.
5. Utilize technology to produce and publish writing.
6. Conduct research projects.
7. Gather relevant sources.
8. Draw conclusions from evidence in text.
9. Write routinely for a range of discipline-specific tasks, purposes, and audiences.

**Common Core Listening and Speaking Skills**

1. Participate in collaborative skills.
2. Follow agreed-upon rules for discussions.
3. Ask and answer clarifying questions.
4. Use background knowledge to describe familiar people, places, things, and events.
5. Add drawings to provide additional details.
6. Speak audibly and express thoughts, feelings and ideas clearly.

Essential Questions

1. To what extent does erosion, weathering, and deposition change the Earth's surface?
2. Why is it important to understand the layers of the earth in relationship to the study of volcanoes and earthquakes?
3. How do volcanoes and earthquakes impact our earth?
4. How are landforms created over time?
5. To what extent does the amount of fresh water versus salt water affect life?

Standards Vocabulary

1. erosion
2. weathering
3. glacier
4. deposition
5. land form
6. sediment
7. moraine
8. glacial grooves
9. dune
10. mechanical weathering
11. chemical weathering
12. runoff
13. soil
14. humus
15. acid rain

Stage 2: Assessment Evidence

Topographic Map Activity

Summative: Cooperative Group Work

Students will observe a topographic map or aerial map and locate an area that has been formed by deposition and erosion. They will explain and illustrate key ideas in a PowerPoint, Prezi, or Podcast and share it with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Landform Activity

Summative: Writing Assignment

At the conclusion of the lesson on landforms, students will summarize their understanding of land forms and how they are formed by illustrating and explaining the process in writing. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Weathering Feature

Summative: Research Project

Working with a partner, students will research a specific weathering feature (sinkhole, cave) in the world. They will investigate the characteristics of the feature and how it was formed. Based on their investigation, they will predict what it would look like in the future and give reasons for their prediction. Finally, they will create a comic strip showing the progression of how the feature was created. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Weathering Experiment

Summative: Lab Assignment

Working in cooperative groups, students will research and create an experiment to compare the different types of weathering. Model and explain to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Water Supply

Formative: Written Assessment

Students will research and illustrate the fresh water supply and the salt water supply in the world. Color code the areas correctly. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Sedimentary Story

Summative: Writing Assignment

Students will write a "sedimentary story" from the point of view of a piece of sediment. Describe where they originally came from, how they specifically eroded (wind, water, or ice) and their journey from erosion to deposition. They will create a Podcast of their story and share it with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Working in cooperative groups, have students use topographic maps or aerial maps to locate areas that have formed through deposition and erosion. Include areas in Ohio that have been impacted by glacial ice or movement. Ask them to explain and illustrate the area and how it was changed by erosion and deposition. Create a Prezi, PowerPoint, or Podcast to share findings with the class.
2. As a class plan, build, and use a model (such as a small stream table) that demonstrates the formation of a land form or feature that formed through contact with water (alluvial fan, sinkhole, mid-channel bar, canyon, valley, deposition islands). Conduct a class discussion on the land form and how it formed by focusing on the following questions:
*a. What factors accelerate the processes?*
*b. What factors must exist for the land form to form?*
3. Working with a partner, have students research a specific weathering feature (sinkhole, cave) in the world. Investigate the characteristics of the feature and how it was formed. Based on their investigation, ask them to predict what it would look like in the future and give reasons for their prediction. Create a comic strip showing the progression of how the feature was created. (Examples: The 12 Apostles of Australia, The Grand Canyon, The Red Rocks of Sedona, Old Man's Cave in Hocking Hills, Ohio, Perry's Cave in Ohio.)
4. Working in cooperative groups, have students plan and implement an experiment to model and compare different types of weathering and/or rates of weathering that can occur. Explain the results of the experiment or the model to the class.
5. Have students research, illustrate, and differentiate between the areas of the world that have salt and fresh water. Color code a map to highlight these areas on a world map handout. Show the closest body of salt water in relation to Ohio.
6. Have students write a "sedimentary story" from the point of view of a piece of sediment. Describe where they originally came from, how they specifically eroded (wind, water, or ice) and their journey from erosion to deposition. Create a Podcast of their story and share it with the class.

Resources

* PBS Learning Media (<http://www.pbslearningmedia.org>)

Resources

Resources

1. iPad Resources
2. Literature Connection
*Erosion: Changing Earth's Surface* by Robin Koontz
*Erosion* by Becky Ollen
*How Land Forms, How It Changes* by Darlene R. Stille
*Mountain Dance* by Thomas Locker
*Stonewall Secrets* by Thomas and Kristen Thorson
*The Pebble in My Pocket* by Meredith Hooper
*Volcanoes* by Franklyn M. Branley
*Earthquakes* by Franklyn M. Branley
*Earth's Changing Surface* by Conrad J. Storad
3. Videos
Bill Nye's *Erosion video*

Resources

* National Geographic (<http://science.nationalgeographic.com/science/earth/the-dynamic-earth/weathering-erosion-article/>)

Grade 4 Science
Science 4

Scientific Process and Inquiry

Stage 1: Desired Results

Catholic Standards

Targeted Standards

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Capacities of the Literate Individual

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Speaking and Listening

Comprehension and Collaboration 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others ideas and expressing their own clearly and persuasively.

SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others ideas and expressing their own clearly.

SL.4.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.4.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.4.1c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

SL.4.1d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Presentation of Knowledge and Ideas 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

SL.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

SL.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

SL.4.6. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.

Writing

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.4.2a. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.4.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.4.2c. Link ideas within categories of information using words and phrases (e.g., another, for example, also, because).

W.4.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.4.2e. Provide a concluding statement or section related to the information or explanation presented.

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

W.4.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.

Research to Build and Present Knowledge 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

W.4.8. Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.4.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.4.9b. Apply grade 4 Reading standards to informational texts (e.g., Explain how an author uses reasons and evidence to support particular points in a text).

Range of Writing 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

W.4.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Reading: Informational Text

Key Ideas and Details 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

RI.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

RI.4.2. Determine the main idea of a text and explain how it is supported by key details; summarize the text.

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

Craft and Structure 4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

RI.4.5. Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

Integration of Knowledge and Ideas 7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

RI.4.9. Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

Range of Reading and Level of Text Complexity 10. Read and comprehend complex literary and informational texts independently and proficiently.

RI.4.10. By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

OH Grade 4 OH: Science (2011)

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of PreK-4 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:

Observe and ask questions about the natural environment;

Plan and conduct simple investigations;

Employ simple equipment and tools to gather data and extend the senses;

Use appropriate mathematics with data to construct reasonable explanations;

Communicate about observations, investigations and explanations

Review and ask questions about the observations and explanations of others.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

The Dignity of Work and the Rights of Workers

Call to Family, Community, and Participation

Option for the Poor and Vulnerable

Solidarity

Care for God's Creation

The Rights of Children

1. THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.

2. THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection, and security.

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9. THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

10. THE RIGHT TO GUIDANCE FROM THE CHURCH in their development as loving people.

Content

1. Scientific process (state the problem, gather information,
formulate a hypothesis, outline procedure, plan experiment,
make observations, derive conclusions, communicate results)
2. Scientific interpretation
3. Scientific tools and equipment
4. Science safety
5. Ethical practices reflecting Catholic Social Justice Teachings

Skills

1. Describe the scientific process in experiments and observations and define steps (state the problem, gather information, create a hypothesis, procedures, experiment, observe, analyze and conclude, communicate results).
2. Make observations and ask questions about objects, organisms and the environment.
3. Seek relevant information in books, magazines, and electronic sources of information.
4. Search the web and locate relevant science information.
5. Hypothesize a solution or reason to a scientific problem or question using prior knowledge.
6. Explain the importance of keeping things the same in an experiment.
7. Analyze a series of events and/or simple daily or seasonal cycles,describe the patterns and infer the next likely occurrence.
8. Employ simple equipment and measuring tools to gather data and extend the senses.
9. Use data to construct reasonable explanations.
10. Analyze, critique, and communicate investigations using words, graphs, and drawings.
11. Communicate ideas about observations, investigations, and explanations to others through a variety of methods (written, oral, or graphic representation).
12. Observe and ask questions about the natural environment.
13. Develop, design, and conduct safe, simple investigations or experiments to answer questions.
14. Explain the importance of keeping conditions the same in an experiment.
15. Describe how comparisons may not be fair when some conditions are not kept the same between experiments.
16. Select the appropriate tools and use relevant safety procedures to measure and record length, weight, volume, temperature, and area in metric and English units.
17. Use mathematics to analyze, interpret, and present data.
18. Review and ask questions about observations and explanations to others.
19. Read and write a variety of fiction and non-fiction science-related texts.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Integrate correct scientific terms.
5. Interpret pictures and diagrams.
6. Compare and contrast two texts on the same topic.
7. Utilize various text features (e.g. headings, tables of contents, glossaries,electronic menus, and icon).
8. Distinguish between pictorial and informational text.

**Common Core Writing Content**

1. Formulate arguments focused on discipline-specific content.
2. Compose informative/explanatory text.
3. Produce clear and coherent writing, appropriate to task, purpose, and audience.
4. Edit and revise writing samples.
5. Utilize technology to produce and publish writing.
6. Conduct research projects.
7. Gather relevant sources.
8. Draw conclusions from evidence in text.
9. Write routinely for a range of discipline-specific tasks, purposes, and audiences.

**Common Core Listening and Speaking Skills**

1. Participate in collaborative skills.
2. Follow agreed-upon rules for discussions.
3. Ask and answer clarifying questions.
4. Use background knowledge to describe familiar people, places, things, and events.
5. Add drawings to provide additional details.
6. Speak audibly and express thoughts, feelings and ideas clearly.

Essential Questions

How do scientists find out about objects, living things, events and phenomena?

How can I organize materials and events to help me make sense of what I observe?

How can I identify problems to solve in science?

How can I investigate a problem we select?

Why is it important to make and follow a written plan or procedure when doing an investigation?

How do I communicate the results of my investigations to others?

Standards Vocabulary

1. scientific method
2. hypothesis
3. data
4. conclude
5. analyze
6. prediction
7. materials
8. procedures

Stage 2: Assessment Evidence

Comparing Nutritional Values

Formative: Cooperative Group Work

Working in cooperative groups, students will research the nutritional value of two or more foods (such as two different cereals) to determine which is the better source of nutrition. They will make a poster of charts and graphs to communicate the comparison and then write a persuasive argument in order to convince their classmates to choose the more nutritional food. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Endangered Animals and Plants

Formative: Research Project

Working with a partner, students will select an endangered plant or animal, collect information from reference books and digital resources, decide whether the plant or animal should be saved or allowed to disappear and why. In formulating their statement they will explain how scientific thinking can be distorted by strong feelings, and explain why and when it is appropriate or necessary to separate emotions from the reasoning process. Students will share their report with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Learning About Scientific Inquiry

Formative: Class Work

Students will participate in activities designed to introduce them to the importance of scientific inquiry and how they will use the scientific process in the science classroom. They will be required to respond to and complete all exercises in the various activities. In addition to the assessments that are part of the activities, what other assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Introduce the importance of scientific inquiry to the class using the model lessons found in the "Doing Science" link. Engage students in
Activity 1: The Mystery Cube
Activity 2: The Biological Box
Activity 3: Thinking About Inquiry
2. Working in cooperative groups, have students research the nutritional value of two or more foods (such as two different cereals) to determine which is the better source of nutrition. Have them make a poster of charts and graphs to communicate the comparison and then write a persuasive argument in order to convince their classmates to choose the more nutritional food.
3. Working with a partner, have students select an endangered plant or animal, collect information from reference books and digital resources, decide whether the plant or animal should be saved or allowed to disappear and why. In formulating their statement have them explain how scientific thinking can be distorted by strong feelings, and explain why and when it is appropriate or necessary to separate emotions from the reasoning process. Have students share their report with the class.

Resources

* ilearn Ohio (<http://ilearnohio.org/teacher/>)

Resources

1. iPad Resources
2. Literature Connection
*Egg Drop Blues* by Jacqueline Turner Banks
*Mythbusters: Don't Try This At Home!* by Mary Packard
*Science is...* by Susan Bosak
*Inch by Inch* by Leo Lionni
*June 29, 1999* by David Wiesner
*Measuring Penny* by Loreen Leedy
*How Big Is a Foot?* by Rolf Myller
*How to Think Like a Scientist: Answering Questions by the Scientific Method* by Stephen P. Kramer
*Investigating the Scientific Method with Max Axiom, Super Scientist* by Donald B. Lemke
*What's Going to Happen?: Making Your Hypothesis* by Paul C. Challen
*What's the Problem?: How to Start Your Scientific Investigation* by Kylie Burns
*What's the Plan?: Designing Your Experiment* by Natalie Hyde
*What's Going On?: Collecting and Recording Your Data* by Kylie Burns
*What Do We Know Now?: Drawing Conclusions and Answering the Question* by Robin Johnson
*We Are Wise, Let's Hypothesize* by Kelly Doudna

Resources

* Classification Lab (<http://bowenpeters.weebly.com/uploads/8/1/1/9/8119969/classification_lab.pdf>)

Grade 4 Science
Science 4

LS: Earth's Living History

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 4 OH: ELA & Literacy in History/Social Studies, Science, & Technical Subjects PreK-5

Capacities of the Literate Individual

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

Speaking and Listening

Comprehension and Collaboration 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others ideas and expressing their own clearly and persuasively.

SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others ideas and expressing their own clearly.

SL.4.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.4.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.4.1c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

SL.4.1d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Presentation of Knowledge and Ideas 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

SL.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

SL.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

SL.4.6. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.

Writing

Text Types and Purposes 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

W.4.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.4.1a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writers purpose.

W.4.1b. Provide reasons that are supported by facts and details.

W.4.1c. Link opinion and reasons using words and phrases (e.g., for instance, in order to, in addition).

W.4.1d. Provide a concluding statement or section related to the opinion presented.

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.4.2a. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.4.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.4.2c. Link ideas within categories of information using words and phrases (e.g., another, for example, also, because).

W.4.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.4.2e. Provide a concluding statement or section related to the information or explanation presented.

Production and Distribution of Writing 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.4.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 13 above.)

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

W.4.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

W.4.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.

Research to Build and Present Knowledge 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

W.4.8. Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.4.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.4.9b. Apply grade 4 Reading standards to informational texts (e.g., Explain how an author uses reasons and evidence to support particular points in a text).

Range of Writing 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

W.4.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Reading: Informational Text

Key Ideas and Details 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

RI.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

RI.4.2. Determine the main idea of a text and explain how it is supported by key details; summarize the text.

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

Craft and Structure 4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

RI.4.5. Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

Integration of Knowledge and Ideas 7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

RI.4.9. Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

Range of Reading and Level of Text Complexity 10. Read and comprehend complex literary and informational texts independently and proficiently.

RI.4.10. By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

OH Grade 4 OH: Science (2011)

Life Science (LS)

Topic: Earths Living History

Changes in an organisms environment are sometimes beneficial to its survival and sometimes harmful.

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of PreK-4 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:

Observe and ask questions about the natural environment;

Plan and conduct simple investigations;

Employ simple equipment and tools to gather data and extend the senses;

Communicate about observations, investigations and explanations

Review and ask questions about the observations and explanations of others.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

The Dignity of Work and the Rights of Workers

Call to Family, Community, and Participation

Option for the Poor and Vulnerable

Solidarity

Care for God's Creation

The Rights of Children

1. THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.

2. THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection, and security.

3. THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.

4. THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.

5. THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION and challenges its members to critical and reflective thinking in their search for truth.

6. THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.

7. THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.

8. THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.

9. THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

10. THE RIGHT TO GUIDANCE FROM THE CHURCH in their development as loving people.

Content

**Changes in an organisms environment are sometimes beneficial to its survival and sometimes harmful.**

a. Ecosystems can change gradually or dramatically.
b. When the environment changes, some plants and animals survive and reproduce and others die or move to new locations.
c. An animals patterns of behavior are related to the environment.

**Fossils can be compared to one another and to present-day organisms according to their similarities and differences.**

a. The concept of biodiversity is expanded to include different classification schemes based upon shared internal and external characteristics of organisms.
b. Most types of organisms that have lived on Earth no longer exist.
c. Fossils provide a point of comparison between the types of organisms that lived long ago and those existing today.

Skills

1. Recognize that ecosystems are based on interrelationships among and between biotic and abiotic factors.
2. Recognize that ecosystems can change rapidly (e.g., volcanoes, earthquakes, or fire) or very slowly (e.g., climate change).
3. Compare and contrast the structures of plants and animals living long ago compared to present day organisms' structures.
4. Explain how changes that occur in the plant and animal populations can impact access to resources for the remaining organisms, which may result in migration or death.

Describe the immediate consequences of rapid ecosystem change for organisms within an ecosystem and describe the consequences this change will have on an ecosystem a decade or more later (e.g., flooding, wind storms, snowfall, volcanic eruptions).

Describe major changes in Ohios environments over time and the organisms supported in each (e.g., oceanic, glacial, wetlands, forests).

1. Use microscopes to investigate microscopic organisms and their characteristics.
2. Classify and differentiate living organisms by gross anatomy, behavior patterns, habitats, and other features (Focus should not be placed on Linnaean Five Kingdom classification system).
3. Investigate and explain why many plant and animal species are extinct and give specific examples for proof.
4. Explain the five life processes (movement, reproduction, response, growth and development, and metabolism, including ingestion, digestion, and excretion) and make connections to species extinction and survival.
5. Differentiate between the advantages and disadvantages of an animal's or plant's environment from long ago compared to today, as it relates to their survival or extinction.
6. Investigate, test, and propose multiple ways that living things can leave fossil evidence.

Explain how a fossil record provides evidence for changes in populations of species.

Identify evidence that can be used to determine the existence of an organism.

Observe fossils and compare them to similar plants and animals that live today, using simple classification schemes.

1. Appreciate the diversity of living and non-living things on our planet.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Integrate correct scientific terms.
5. Interpret pictures and diagrams.
6. Compare and contrast two texts on the same topic.
7. Utilize various text features (e.g. headings, tables of contents, glossaries,electronic menus, and icon).
8. Distinguish between pictorial and informational text.

**Common Core Writing Content**

1. Formulate arguments focused on discipline-specific content.
2. Compose informative/explanatory text.
3. Produce clear and coherent writing, appropriate to task, purpose, and audience.
4. Edit and revise writing samples.
5. Utilize technology to produce and publish writing.
6. Conduct research projects.
7. Gather relevant sources.
8. Draw conclusions from evidence in text.

Write routinely for a range of discipline-specific tasks, purposes, and audiences.

**Common Core Listening and Speaking Skills**

1. Participate in collaborative skills.
2. Follow agreed-upon rules for discussions.
3. Ask and answer clarifying questions.
4. Use background knowledge to describe familiar people, places, things, and events.
5. Add drawings to provide additional details.
6. Speak audibly and express thoughts, feelings and ideas clearly.

Essential Questions

1. To what extent do animals and plants today resemble animals and plants from long ago?
2. How can organisms survive in harsh or changing environments?

Standards Vocabulary

1. fossil
2. exoskeleton
3. habitat
4. structure
5. extinct
6. organism
7. digestion
8. ingestion
9. excretion
10. metabolism
11. reproduction
12. environment
13. classification/classify

Stage 2: Assessment Evidence

Making Fossils

Summative: Research Project

Working in cooperative groups, students will experiment with making fossils to determine some of the necessary (living and nonliving) conditions for making fossils and to determine if similar conditions exist today. They will create a Prezi or PowerPoint presentation describing the results of their investigation and share it with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Ohio Ecosystems

Formative: Research Project

Working with a partner, students will read a firsthand description, view drawings of Ohio ecosystems as first observed by explorers, and compare the historical environmental descriptions to the current environment. They will explain, in writing, the changes that occurred in the biotic and abiotic components of the ecosystem. Have them share their report with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Comparing Fossils to Current Organisms

Summative: Written Assessment

Working in cooperative groups, students will observe fossils and compare them to similar plants and animals that live today, using simple classification schemes. (See link in resources for more information) They will create a T-chart which contains images of a fossil with a current animal or plant that resembles one another. Finally, they will write a persuasive essay to convince the class that their images are alike using specific characteristics to support their argument. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Science Careers

Summative: Written Assessment

Students will choose a recent disaster to explore (e.g., hurricane, earthquake, oil spill, tsunami) and identify the immediate and long-term consequences including the interactions and relationships among the Earths surface, ecosystem, and plant and animal populations. Through exploring the impact, they will address the types of careers involved in addressing the issues. They will create a poster about the career and the ways persons in that career help the environment. Share their posters with the class.

Resources

Stage 3: Learning Plan

Learning Experiences

1. Class Activity. Introduce this unit of study by using "Life Has a History" found in the Links. Engage students in a discussion of the material presented in order to give them a foundation for what they will learn.
2. Working in cooperative groups, have students experiment with making fossils to determine some of the necessary (living and nonliving) conditions for making fossils and to determine if similar conditions exist today. (Materials used should include clay, dough, sand, mud, etc.) Conditions should include moist, wet, and dry. Representations of living organisms used should include those with hard body parts (exoskeletons, bones) and those with soft body parts (plants).) Create a Prezi or PowerPoint presentation describing the results of their investigation. (Lab group or partners)
3. Working with a partner, have students read a firsthand description, view drawings of Ohio ecosystems as first observed by explorers, and compare the historical environmental descriptions to the current environment. Ask them to explain, in writing, the changes that occurred in the biotic and abiotic components of the ecosystem. Have them share their report with the class.
4. Working in cooperative groups, have students observe fossils and compare them to similar plants and animals that live today, using simple classification schemes. (See link in resources for more information.) Have them create a T-chart which contains images of a fossil with a current animal or plant that resembles one another. Finally, have them write a persuasive essay to convince the class that their images are alike using specific characteristics to support their argument.
5. Have students choose a recent disaster to explore (e.g., hurricane, earthquake, oil spill, tsunami) and identify the immediate and long-term consequences including the interactions and relationships among the Earths surface, ecosystem, and plant and animal populations. Through exploring the impact, have them address the types of careers involved in addressing the issues. (This may include performance tasks, such as relocating organisms, rebuilding habitats, rescuing or rehabilitating organisms.) Ask them to create a poster about the career and the ways persons in that career help the environment. Share their posters with the class.

Resources

* Science Resources (<http://www.lauracandler.com/filecabinet/science.php>)

Resources

1. iPad Resources
2. Literature Connection
*Fossils Tell of Long Ago* by Aliki
*Linking Science Literacy in the K-8 Classroom* Edited by Rowena Douglas, Michael P. Klentschy, and Karen Worth, with Wendy Binder
*New Dinos* by Shelley Tanaka
*A Golden Guide from St. Martins Press: Fossils* by Frank H.T. Rhodes, Herbert S. Zim, and Paul R. Shaffer

*Childrens Atlas of Earth Through Time* by Rand McNally.
*Great Big Dinosaur Dig* by Bill Nye
*What Do You Do With a Tail Like This* by Steven Jenkins and Robin Page
*The Beast in You: Activities and Investigations to Explore Evolution* by Marc McCutcheon
*Dinosaur Bones* by Aliki
*The Dinosaurs of Waterhouse Hawkins* by Barbara Kerley
*Frightful's Daughter by* Jean Craighead George

Videos
*Dinosaurs and Fossil* videos by Bill Nye

Resources

* neok12-fossils (<http://www.neok12.com/Fossils.htm>)

Grade 4 Science
Science 4

PS: Electricity, Heat, and Matter

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 4 OH: ELA & Literacy in History/Social Studies, Science, & Technical Subjects PreK-5

Capacities of the Literate Individual

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

Speaking and Listening

Comprehension and Collaboration 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others ideas and expressing their own clearly and persuasively.

SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others ideas and expressing their own clearly.

SL.4.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.4.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.4.1c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

SL.4.1d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

Presentation of Knowledge and Ideas 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

SL.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

SL.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

SL.4.6. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.

Writing

Text Types and Purposes 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

W.4.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.4.1a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writers purpose.

W.4.1b. Provide reasons that are supported by facts and details.

W.4.1c. Link opinion and reasons using words and phrases (e.g., for instance, in order to, in addition).

W.4.1d. Provide a concluding statement or section related to the opinion presented.

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.4.2a. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.4.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.4.2c. Link ideas within categories of information using words and phrases (e.g., another, for example, also, because).

W.4.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.4.2e. Provide a concluding statement or section related to the information or explanation presented.

Production and Distribution of Writing 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.4.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 13 above.)

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

W.4.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

W.4.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.

Research to Build and Present Knowledge 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.

Range of Writing 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

W.4.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Reading: Informational Text

Key Ideas and Details 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

RI.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

Craft and Structure 4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

Integration of Knowledge and Ideas 7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Range of Reading and Level of Text Complexity 10. Read and comprehend complex literary and informational texts independently and proficiently.

RI.4.10. By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

OH Grade 4 OH: Science (2011)

Physical Science (PS)

Topic: Electricity, Heat and Matter

The total amount of matter is conserved when it undergoes a change.

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of PreK-4 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:

Observe and ask questions about the natural environment;

Plan and conduct simple investigations;

Employ simple equipment and tools to gather data and extend the senses;

Use appropriate mathematics with data to construct reasonable explanations;

Communicate about observations, investigations and explanations

Review and ask questions about the observations and explanations of others.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

The Dignity of Work and the Rights of Workers

Call to Family, Community, and Participation

Option for the Poor and Vulnerable

Solidarity

Care for God's Creation

The Rights of Children

1. THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.

2. THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection, and security.

3. THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.

4. THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.

5. THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION and challenges its members to critical and reflective thinking in their search for truth.

6. THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.

7. THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.

8. THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.

9. THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

10. THE RIGHT TO GUIDANCE FROM THE CHURCH in their development as loving people.

Content

1. **The total amount of matter is constant when it undergoes a change.**
a. When an object is broken into smaller pieces, when a solid is dissolved in a liquid or when matter changes state (solid, liquid, gas), the total amount of matter remains constant.

**Energy can be transformed from one form to another or can be transferred from one location to another.**

a. Energy transfers from hot objects to cold objects as heat, resulting in a temperature change.

b. Electric circuits require a complete loop of conducting materials through which an electrical energy can be transferred.

c. Electrical energy in circuits can be transformed to other forms of energy, including light, heat, sound and motion.

d. Electricity and magnetism are closely related.

Skills

1. Describe and cite evidence that some properties of objects may stay the same even when other properties change.
2. Explain how parts of an object or material may be assembled in different configurations, but the mass remains the same.

Recognize that the sum of all of the parts in an object equals the mass of the object.

Cite evidence that when a solid is dissolved in a liquid, the mass of the mixture is equal to the sum of the masses of the liquid and solid.

1. Compare and contrast characteristics of simple physical and chemical change.
2. Classify objects by properties of the materials from which they are made.
3. Explain how the addition of heat may increase the temperature of an object and removal of heat may decrease the temperature of an object.
4. Compare ways that the temperature of an object can be changed (rubbing, heating, and bending of metal).
5. Recognize that there are materials in which the entire object becomes hot when one part of the object is heated and that there are other objects in which parts of the object remain cool even when another part of the object is heated.
6. Explain that electrical conductors are materials through which electricity can flow easily.
7. Demonstrate how electricity introduced to one part of the object spreads to other parts of the object.
8. Explain that electrical insulators are materials through which electricity cannot flow easily.

Contrast electrical conductors and electrical insulators.

1. Describe how electricity can be transformed to other forms of energy, including heat, light, sound, and motion.
2. Test different combinations of electrical components.

Measure the temperature of water.

Recognize that an increase in temperature indicates an increase in heat energy and a decrease in temperature indicates a decrease in heat energy.

1. Trace how thermal energy can transfer from one object to another.
2. Define and compare temperature as a measure of thermal energy and describe the way it is measured. (Celsius and Fahrenheit)
3. Identify the basic forms of energy (light, sound, heat, electrical, and magnetic).
4. Recognize that electricity in circuits requires a complete loop through which an electrical current can pass, and that electricity can produce light, heat, and sound.
5. Identify and classify objects and materials that conduct electricity and that are insulators of electricity.
6. Test and draw conclusions to determine materials that are electrical conductors and insulators.

Contrast thermal conductors and thermal insulators.

1. Compare and contrast electricity and magnetism.
2. Create an electrical circuit loop (conductor, insulator, energy source, light bulbs, switch) in which energy can be transferred successfully.

Identify different types of energy conversions within an electrical circuit.

1. Recognize that magnets have poles that repel and attract each other.
2. Identify and classify objects and materials that a magnet will and will not attract.
3. Explain how electromagnets can be made, and give examples of how they can be used.
4. Appreciate the presence of the Divine in the natural world.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Integrate correct scientific terms.
5. Interpret pictures and diagrams.
6. Compare and contrast two texts on the same topic.
7. Utilize various text features (e.g. headings, tables of contents, glossaries,electronic menus, and icon).
8. Distinguish between pictorial and informational text.

**Common Core Writing Content**

1. Formulate arguments focused on discipline-specific content.
2. Compose informative/explanatory text.
3. Produce clear and coherent writing, appropriate to task, purpose, and audience.
4. Edit and revise writing samples.
5. Utilize technology to produce and publish writing.
6. Conduct research projects.
7. Gather relevant sources.
8. Draw conclusions from evidence in text.
9. Write routinely for a range of discipline-specific tasks, purposes, and audiences.

**Common Core Listening and Speaking Skills**

1. Participate in collaborative skills.
2. Follow agreed-upon rules for discussions.
3. Ask and answer clarifying questions.
4. Use background knowledge to describe familiar people, places, things, and events.
5. Add drawings to provide additional details.
6. Speak audibly and express thoughts, feelings and ideas clearly.

Essential Questions

1. How and why does energy change?
2. To what extent are matter and energy conserved?

How can energy be transferred from one form to another?

How do circuits complete a pathway to produce light, heat or sound?

What are magnetic fields?

What materials or objects can attract or repel a magnet?

How is magnetism transformed to electricity?

Standards Vocabulary

1. circuit
2. insulators
3. physical change
4. chemical change
5. magnetism
6. electricity
7. thermal energy
8. Celsius
9. Fahrenheit
10. mass
11. volume
12. gram
13. milliliter

Stage 2: Assessment Evidence

Physical and Chemical Change

Summative: Lab Assignment

Working in cooperative groups, students will investigate what happens to the total amount of mass during various types of changes. They will create a graph or table showing results and analyze and synthesize the results and propose reasons for any differences in the final mass. Finally they will write an informative essay describing results and explaining reasons for any differences in mass. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Force Activity

Summative: Performance

Working in cooperative groups, students will design a device that causes a small cart to roll and involves energy transfer from four objects. They will describe the process and reasons in science journal. Finally, they will demonstrate the device to the class and explain the process. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Circuit Lab

Summative: Lab Assignment

Working with a partner, students will create a circuit that contains two light bulbs. They will present their circuit to the class and explain how it was built, the difference between a working circuit and a nonworking circuit, and why their circuit was successful. Partners will journal their efforts (successful and unsuccessful attempts) during the experimental time. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Circuits

Formative: Cooperative Group Work

Working in one of four cooperative groups, students will prepare a digital presentation on an assigned activity that they will share with the class. (See #5 in Learning Experiences.) What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

How Long Will It Last?

Summative: Project

Working on a class project, students will evaluate research data providing information about the decomposition time for paper, glass, plastic, and aluminum. They will propose a sustainable plan that might be adopted by a larger population of citizens for minimizing waste products and reserving more space in our landfills. Students will collaboratively develop a presentation that could be for an outside audience with the authority to implement the plan within a community. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Stage 3: Learning Plan

Learning Experiences

1. Working in cooperative groups, have students investigate what happens to the total amount of mass during many types of changes (ex: ice melting, salt dissolving, paper tearing, candle burning, Alka-Seltzer in water). Have them create a graph or table that displays the results of each experiment. Then have them analyze and synthesize the results and propose reasons for any differences in the final mass in an opinion essay.
2. Independent work. Have students place a glass of water on a window sill for an extended period of time. Ask them to observe what happens to the water and explain why the volume of water decreases when placed in an open container and left to sit for an extended period of time.
3. Working in cooperative groups, have students design and construct a device that causes a small cart to roll and involves energy transfers between four objects (ex: push a ball off a table so it falls on an object that releases a rubber band). Describe results and provide explanations in science journal. Demonstrate device to the class and/or teacher and provide evidence of energy transfer in explanation.
4. Working with a partner, have students build a circuit that contains two light bulbs. Present findings and working circuit and supply evidence and reasoning for the successful circuit. Have them illustrate the progression of the circuit creation, journal their attempts and reasoning for each step. Analyze the differences between working and nonworking circuits and identify why certain outcomes were reached. Finally, have them formulate a conceptual model of a working circuit based upon the trends in the experimental evidence.
5. Divide the class into four cooperative groups. Assign one of the following activities to each group and have them prepare a digital presentation they will share with the class.

a. Pictorially represent ways to assemble the circuit and note which are able to light the bulbs and which are not.

b. Compare and contrast circuits that light the bulbs with circuits that do not light the bulbs.

c. Outline the functions of the components of a simple electric circuit (conductor, insulator, energy source, light bulb, switch).

d. Pictorially represent the flow of energy in a circuit in which a battery is used to light a bulb.

Class Project. Working as a class, have students evaluate research data providing information about the decomposition time for paper, glass, plastic, and aluminum. Propose a sustainable plan that might be adopted by a larger population of citizens for minimizing waste products and reserving more space in our landfills. Collaboratively develop a presentation that could be for an outside audience with the authority to implement the plan within a community.

Resources

* Graphic Organizers (<http://mrswarnerarlington.weebly.com/graphic-organizers1.html>)

Resources

1. iPad Resources
2. Literature Connection
*Electricity* by Carol Levine
*Electricity* by Peter Riley
*Poles Apart* by Patricia Walsh
*Electricity and Magnetism* by Kim Fields
*Big Blast of Science* by Bill Nye
*Flick a Switch: How Electricity Gets to Your Home* by Barbara Sueling
*Flicker Flash* by Joan Bransfield Graham
Thunder Cak*e* by Patricia Palacco
*The Paper Airplane Book* by Bryon Barton
*What Does a Wheel Do?* by Jim Pipe

Resources

* Circuits (<http://resources.woodlands-junior.kent.sch.uk/revision/science/electricity.htm>)