Grade 6 Science  
Science 6

Scientific Process and Inquiry

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.6.1b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

SL.6.1c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

SL.6.1d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

SL.6.2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric.

SL.6.3. Delineate a speakers argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

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.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Science Inquiry and Application

Theme: Order and Organization This theme focuses on helping students use scientific inquiry to discover patterns, trends, structures and relationships that may be described by simple principles. These principles are related to the properties or interactions within and between systems. During the years of grades 5-8 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:

Identify questions that can be answered through scientific investigations;

Design and conduct a scientific investigation;

Use appropriate mathematics, tools and techniques to gather data and information;

Analyze and interpret data;

Develop descriptions, models, explanations and predictions;

Think critically and logically to connect evidence and explanations;

Recognize and analyze alternative explanations and predications; and

Communicate scientific procedures and explanations.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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.

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

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

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.

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.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

Assess how point of view or purpose shapes the content and style of a text.

RST.6-8.6. Analyze the authors purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

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

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in 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.

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Read and comprehend complex literary and informational texts independently and proficiently.

RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 68 text complexity band independently and proficiently.

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.1. Write arguments focused on discipline-specific content.

WHST.6-8.1a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.

WHST.6-8.1b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

WHST.6-8.1c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

WHST.6-8.1d. Establish and maintain a formal style.

WHST.6-8.1e. Provide a concluding statement or section that follows from and supports the argument 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.

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.2a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

WHST.6-8.2b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

WHST.6-8.2c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

WHST.6-8.2e. Establish and maintain a formal style and objective tone.

WHST.6-8.2f. Provide a concluding statement or section that follows from and supports 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.

WHST.6-8.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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

WHST.6-8.5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

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

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

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

WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

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

WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.

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.

WHST.6-8.10. Write routinely over extended time frames (time for 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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

**Understanding about scientific inquiry and the ability to conduct inquiry essential for living in the 21st century.**

1. Scientific method
2. Experimental ethnology
3. Formulate a hypothesis
4. Make observations
5. Predict outcomes
6. Create data
7. Make inferences
8. Analyze and interpret data
9. Communicate results
10. Experimental Variables
11. Draw conclusions from scientific investigations

Skills

Use the Scientific Method to test a hypothesis.

Review general concepts/skills.

State and follow safety procedures in the classroom and the laboratory.

Use science equipment such as a metric ruler, double pan balance, graduated cylinder, thermometer, spring scale, and voltmeter.

Use appropriate tools and techniques to gather, organize, analyze, and interpret data.

1. Demonstrate proper safety procedures when completing scientific experiments.
2. Explain that there are not fixed procedures for guiding scientific investigations.
3. Develop and demonstrate the formulation of a hypothesis.
4. Design and conduct open-ended scientific investigations.

Synthesize information to determine cause and effect relationships between evidence and explanations.

1. Identify the experimental variables.
2. Distinguish between observation and inference.
3. Communicate scientific findings through a variety of methods.

Read graphs (line, scatter, plot graphs), graph information, develop charts.

Interpolate and extrapolate information from graphs.

1. Interpret and translate data in a table, graph, or diagram.
2. Implement appropriate math functions and formulas to express scientific findings.
3. Use evidence from a data set to determine cause and effect relationships that explain phenomenon.
4. Draw conclusions that establish a cause and effect relationship supported by evidence.
5. Review an experimental design to determine possible sources of bias or error, state alternative explanations, and identify questions for further investigation.
6. Identify a faulty interpretation of data that is due to bias or experimental error.
7. Design a method to explain the results of an investigation using descriptions, explanations, or models.
8. Describe how scientific developments have positive and negative effects on everyday life and society.
9. Interact with living things in the environment in ways that promote respect.
10. Acknowledge and respect living things in their natural environment.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. Why are scientific investigations not fixed procedures?

What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?

1. How do we decide which scientific claims to believe?
2. In what ways are science and math interconnected?
3. How might advances in science and technology affect society?

How do science concepts, engineering skills, and applications of technology improve the quality of life?

How can we use the scientific method to find answers to problems?

How can models help us to predict the nature of objects and systems that we cannot see?

What procedures must be followed for good lab safety?

How can potential hazards be minimized?

Standards Vocabulary

1. scientific inquiry
2. hypothesis
3. variables
4. observation
5. inference
6. interpret
7. independent variables
8. dependent variables
9. controlled variables
10. density
11. mass
12. metric system
13. U.S. Customary System
14. analyze
15. data
16. communicate
17. experiment
18. scientific method
19. technology
20. bias
21. unbiased

Common Core

1. read closely
2. textual evidence
3. central ideas
4. structure of text
5. author's purpose
6. quantitative
7. technical information
8. arguments
9. informative
10. explanatory
11. relevant sources

Stage 2: Assessment Evidence

Scientific Method

Formative: Lab Assignment

Working with a partner, students will research, plan, and implement a valid scientific investigation utilizing the scientific method while including formulating a hypothesis and controlling variables. Students will write a report detailing the plan for the experiment and the results of their investigation. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Observation/Inference/Prediction

Formative: Comparative Study

Using a photograph of a happening or event, students will make observations, inferences, and predictions. They will explain three observations, write about what experiences or knowledge they used to make the inferences, and provide evidence from the photograph for the basis of their prediction. Students will share their work 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. Class Activity. Using various strategies, have students review the science safety rules and the proper use of scientific equipment. Create a science safety contract with the students, have them share the contract with their parents, and ask parents and students to sign the contract.
2. Scientific Investigation. Working with a partner, have students research, plan, and implement a valid (carry out three times) scientific investigation utilizing the scientific method while including formulating a hypothesis and controlling variables (example: Is a ball's bounce affected by the height at which it is dropped?). Have students write a report detailing the plan for the experiment and the results of their investigation.
3. Using a photograph of a happening or event, have students make observations, inferences, and predictions. Have them explain three observations, write about what experiences or knowledge they used to make the inferences, and provide evidence from the photograph for the basis of their prediction. Have students share their work with the class.

Resources

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

Resources

1. iPad Resources  
   iPad - Graphs
2. Literature Connection  
   *Duck Rabbit* by Amy Krauss Rosenthal and Tom Lichtenfeld Skill: How we construct knowledge  
   *No David* by David Shannon - Skill: observations, inferences and predictions  
   *Measuring Penny* by Loreen Leedy Skill: Measuring  
   *How Long, How Wide* by Brian Cleary Skill: Measuring  
   *Babar Visits Another Planet* by Laurent de Brunhoff - Skill: Asking questions  
   *Egg Drop* by Mini Grey Skill: Planning and carrying out investigation  
   *Why Mosquitoes Buzz in People's Ears* by Verna Aardema Skill: Finding evidence

Resources

* Web 2.0 Tools (<http://edjudo.com/web-2-0-teaching-tools-links>)

Grade 6 Science  
Science 6

ESS: Minerals

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

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SL.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Rocks, Minerals and Soil

Minerals have specific, quantifiable properties.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.

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

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.1b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

WHST.6-8.1e. Provide a concluding statement or section that follows from and supports the argument 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.

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

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

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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.

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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

**Minerals have specific, quantifiable properties.**

a. Minerals are naturally occurring, inorganic solids that have a defined chemical composition.  
b. Minerals have properties that can be observed and measured.  
c. Minerals form in specific environments.

Resources

Skills

1. Explain that most rocks are composed of one or more minerals.
2. Identify the different processes and/or environments in which minerals can form.
3. Recognize that minerals have measurable properties that can be used for identification and/or classification.
4. Explain that the properties that can be used for testing minerals include luster, hardness, cleavage, streak, magnetism, fluorescence and/or crystal shape.
5. Identify the common rock-forming minerals.
6. identify common minerals by conducting tests using tools such as the Mohs hardness scale.
7. Make a dichotomous key, using mineral properties, to use in testing and identifying minerals.
8. Explain that minerals present in rocks can help identify the rocks correctly.
9. Explain how minerals indicate the type of environment in which the rock and/or mineral formed.

Identify the different processes and/or environments in which minerals can form (e.g., evaporation, chemical processes, sedimentary, igneous or metamorphic).

Compare and contrast rocks and minerals.

Recognize that technology can provide identification information and research materials to assist in mineral investigations.

1. Appreciate God's awesome design of our Earth and space systems.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. In what ways is evidence used to identify minerals and how is that evidence justified?
2. How is the formation of minerals related to their characteristics?
3. In what ways do minerals have practical use in today's society?

Standards Vocabulary

1. mineral
2. luster
3. hardness
4. cleavage
5. streak
6. magnetism
7. fluorescence
8. crystal shape
9. Moh's hardness scale
10. halite
11. gypsum
12. calcite
13. feldspar
14. magnetite
15. quartz
16. epidote
17. corundum
18. topaz
19. classification
20. chalk
21. kaolinite
22. talc
23. micas
24. dolomite
25. environmental conditions
26. evaporation
27. chemical properties
28. dichotomous key
29. igneous environment
30. metamorphic environment

Stage 2: Assessment Evidence

Mineral Lab

Summative: Lab Assignment

Working with a partner, students will determine the best mineral to use to solve a problem or serve a specific function by responding to the following questions.a. What is the best mineral or rock to use to neutralize acidic soil?b. What is the best rock to use to make a statue?c. What is the best mineral to use for sandpaper?They will evaluate the results of their investigation and use the data to draw a conclusion. Finally, they will explain their findings and conclusions in class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Halite/Gypsum Lab

Summative: Lab Assignment

Working in cooperative groups, students will simulate the formation of halite or gypsum in the Lake Erie area through an evaporation simulation scientific experiment. Using data from the experiment have students analyze the data and predict how long it took to form the existing formations found in Lake Erie. Students will share their predictions with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Research Project Halite

Summative: Research Project

Student groups will research and document the environmental conditions that existed when halite and gypsum formed in the Lake Erie area of Ohio. They will present their research to the class through a Prezi presentation, PowerPoint presentation, Podcast or other digital means. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Dichotomous Key

Summative: Performance

Working with a partner, students will identify the different processes and/or environments in which minerals can form. Using the information, they will make a dichotomous key in order to identify and classify minerals. Share the dichotomous key 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. Scientific Investigation: Working with a partner, have students determine the best mineral to use to solve a problem or serve a specific function. Ask them to respond to the following questions.  
   a. What is the best mineral or rock to use to neutralize acidic soil?  
   b. What is the best rock to use to make a statue?  
   c. What is the best mineral to use for sandpaper?  
   Have them evaluate the results of their investigation and use the data to draw a conclusion. Have them explain their findings and conclusions in class.
2. Working in cooperative groups, have students simulate the formation of halite or gypsum in the Lake Erie area through an evaporation simulation scientific experiment. Using data from the experiment, have students work with a partner to analyze the data and predict how long it took to form the existing formations found in Lake Erie.
3. As a follow-up to the above experiment, have the student groups research and document the environmental conditions (select Silurian Period) that existed when halite and gypsum formed in the Lake Erie area of Ohio. Have students present their research to the class through a Prezi presentation, PowerPoint presentation, Podcast or other digital means.
4. Working with a partner, have students identify the different processes and/or environments in which minerals can form. Using this information, make a dichotomous key, using mineral properties, in order to identify and classify minerals. Share the dichotomous key with the class.
5. Working in cooperative groups, have students explore the uses of mineral properties across various careers. Have a class discussion in which students will identify the careers and roles involved, such as:  
   a. Geologist: person who studies rocks, minerals, and composition  
   b. Machine Operator: the person who operates equipment  
   c. Site Manager: oversees each role and responsibility on the job site  
   d. Environmentalist: concerned with the environmental impact of projects  
   e. Engineer: understand and design the process, which includes the types of materials used.  
   Host a career speaker who represents one of the roles involved in the process. Ask the speaker to share his/her responsibilities and how he/she interacts with others to complete a project.

Resources

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

Resources

Resources

1. iPad Resources
2. Literature Connection  
   *The Complete Book of Rocks and Minerals* by Chris Pellant *Smithsonian Handbooks: Rocks Minerals* by Chris Pellant *If You Find a Rock* by Peggy Christian  
   *Rocks in His Head* by Carol Otis Hurst  
   *Experiments With Rocks Minerals* by Salvatore Tocci  
   *National Geographic Kids Everything Rocks and Minerals: Dazzling Gems of Photos and Info That Will Rock Your World* by Steve Tomecek

Resources

* The Dynamic Earth (<http://www.mnh.si.edu/earth/>)

Grade 6 Science  
Science 6

ESS: Rocks

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.6.1b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

SL.6.1c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

SL.6.1d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

SL.6.2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric.

SL.6.3. Delineate a speakers argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

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.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Rocks, Minerals and Soil

Minerals have specific, quantifiable properties.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.

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

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in 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.

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.1. Write arguments focused on discipline-specific content.

WHST.6-8.1a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.

WHST.6-8.1b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

WHST.6-8.1c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

WHST.6-8.1e. Provide a concluding statement or section that follows from and supports the argument 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.

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

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

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

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.

WHST.6-8.10. Write routinely over extended time frames (time for 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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. **Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.**  
   a. Most rocks are composed of one or more minerals, but there are a few types of sedimentary rocks that contain organic material, such as coal.  
   b. The composition of the rock, types of mineral present, mineral arrangement, and/or mineral shape and size can be used to identify the rock and to interpret its history of formation, breakdown (weathering) and transport (erosion).

**Igneous, metamorphic and sedimentary rocks form in different ways.**

a. Magma or lava cools and crystallizes to form igneous rocks.  
b. Heat and pressure applied to existing rock forms metamorphic rocks.  
c. Sedimentary rock forms as existing rock weathers chemically and/or physically and the weathered material is compressed and then lithifies.  
d. Each rock type can provide information about the environment in which it was formed.

Skills

1. Recognize that each type of rock has a unique history based on environmental conditions in which its formed.
2. Identify the main components of the rock cycle.
3. Make a chart, table or key to use in the classification of common rocks within each division of rock (sedimentary, igneous, metamorphic).
4. Use the rock cycle to describe the formation of igneous, sedimentary, metamorphic rocks.
5. Identify the main components of the rock cycle.
6. When given several samples of rocks, identify the best use based on their characteristics.
7. Illustrate how types of geologic structures and features help identify the types of rock that may be found in specific areas.
8. Determine what types of rocks are present based on a geologic map.
9. Apply the concepts of environmental conditions for a rock to determine the types of rock present in your area.
10. Recognize that the purpose of rock identification must be related to understanding the environment in which the rock formed.
11. Explain how rocks allow geologists to interpret Earth's history.
12. Describe the properties of the interior of the Earth.
13. Compare and contrast rocks and minerals.
14. Appreciate God's awesome design of our Earth and space systems.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. Do we need rocks in our lives?
2. How do Earth's processes form different types of rocks?
3. Why are some rocks/minerals valuable and others not?
4. In what ways are rocks and minerals related?
5. How are rocks used in today's society?
6. In what ways would the world be different without rocks and minerals?

Standards Vocabulary

1. rock identification
2. rock classification
3. mineral arrangement
4. rock cycle
5. environmental conditions
6. rock formation
7. geologic map
8. manufactured minerals

**Igneous**

granite

rhyolite

basalt

obsidian

pumice

andesite

**Metamorphic**

schist

gneiss

slate

marble

anthracite

phyllite

**Sedimentary**

limestone

sandstone

shale

conglomerate

breccia

Stage 2: Assessment Evidence

Rock and Mineral Uses

Summative: Lab Assignment

Working in cooperative groups students will determine, using a scientific experiment, the best mineral or rock to use to solve a problem or serve a specific function. They will evaluate the results and use the data to draw a conclusion, prepare a lab report and share findings with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Local Rock and Mineral Uses

Summative: Lab Assignment

Working in cooperative groups, students will analyze the characteristics of rocks used locally. Using their findings, groups will present an argument for which characteristics will allow the rocks to work well/not work well in the various environment. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Geologic Map

Summative: Performance

Working with a partner, students will make a geologic map of the local community. They will use existing geologic data, historic (geologic) data and field exploration to analyze types of formations that are present and use the finished map to evaluate possible land and resource uses. They will present the map and recommendations to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Research Geologic Map Local

Summative: Research Project

Working in cooperative groups, students will use a geologic map of a region of the United States to determine what types of rocks are represented (igneous, sedimentary, metamorphic). Based on the environment required for these rock types to form, they will develop a hypothesis regarding the geologic history of the region. Students will research the actual geologic history of the region and compare to findings. Finally, they will discuss reasons for the similarities and differences 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. Scientific Investigation: Working in cooperative groups, determine, using a scientific experiment, the best mineral or rock to use to solve a problem or serve a specific function. In doing the experiment ask and answer the following questions:  
   a. *What is the best mineral or rock to use to neutralize acidic soil?*  
   *b. What is the best rock to use to make a statue?*  
   *c. What is the best mineral to use for sandpaper?* Evaluate the results and use the data to draw a conclusion. Prepare a lab report and share findings with the class.
2. The unique characteristics of rocks can be used to determine how the rock formed or how the rock can be used. Scientific Investigation: Working in cooperative groups, have students analyze the characteristics of rocks used locally (e.g., in landscape projects, buildings, floors, statues, gravestones, patios/walls). Using their findings, ask groups to present an argument for which characteristics will allow the rocks to work well/not work well in the various environment.
3. Working with a partner, have students make a geologic map of the local community. Have them use existing geologic data, historic (geologic) data and field exploration to analyze types of formations that are present. Use the finished map to evaluate possible land and resource uses. Have them present the map and recommendations to the class.
4. Working in cooperative groups, have students use a geologic map of a region of the United States to determine what types of rocks are represented (igneous, sedimentary, metamorphic). Based on the environment required for these rock types to form, have students develop a hypothesis regarding the geologic history of the region. Have them research the actual geologic history of the region and compare to findings. Finally, have them discuss reasons for the similarities and differences with the class.

Resources

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

Resources

Resources

1. iPad Resources
2. Literature Connection  
   *The Pebble In My Pocket:* *A History of Our Earth* by Meredith Hoope  
   *The Complete Book of Rocks and Minerals* by Chris Pellant *Smithsonian Handbooks: Rocks Minerals* by Chris Pellant *If You Find a Rock* by Peggy Christian  
   *Rocks in His Head* by Carol Otis Hurst  
   *Experiments With Rocks Minerals* by Salvatore Tocci  
   *National Geographic Kids Everything Rocks and Minerals: Dazzling Gems of Photos and Info That Will Rock Your World* by Steve Tomecek

Resources

* Interactive Rock Cycle (<http://www.learner.org/interactives/rockcycle/>)

Grade 6 Science  
Science 6

ESS: Soil and Energy Resources

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.6.1b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

SL.6.1c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

SL.6.1d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

SL.6.2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric.

SL.6.3. Delineate a speakers argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

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.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Rocks, Minerals and Soil

Minerals have specific, quantifiable properties.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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.

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

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

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.

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

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Reading: History/Social Studies

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.

RH.6-8.1. Cite specific textual evidence to support analysis of primary and secondary sources.

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

RH.6-8.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.

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

RH.6-8.3. Identify key steps in a texts description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.1. Write arguments focused on discipline-specific content.

WHST.6-8.1a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.

WHST.6-8.1b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

WHST.6-8.1c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

WHST.6-8.1e. Provide a concluding statement or section that follows from and supports the argument 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.

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.2a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

WHST.6-8.2b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

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

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

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

WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

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

WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.

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.

WHST.6-8.10. Write routinely over extended time frames (time for 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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

**Soil is unconsolidated material that contains nutrient matter and weathered rock.**

a. Soil formation occurs at different rates and is based on environmental conditions, types of existing bedrock and rates of weathering.  
b. Soil forms in layers known as horizons.  
c. Soil horizons can be distinguished from one another based on properties that can be measured.

**Rocks, minerals and soils have common and practical uses.**

a. Nearly all manufactured material requires some kind of geologic resource.  
b. Most geologic resources are considered nonrenewable. c. Rocks, minerals and soil are examples of geologic resources that are nonrenewable.

d. Fossil fuels are nonrenewable sources of energy.

Skills

1. Recognize that soil forms at different rates and has different measurable properties, depending on the environmental conditions.
2. Define soil.
3. Explain ways soil is formed and depleted.
4. Recognize that soil layers are called horizons.
5. Identify soil composition.

Differentiate between the different soil horizons (O, A, B and C) using the standard composition of each.

1. Use specific tools to measure soil characteristics and properties.
2. Explain that the properties in soil that are useful in soil identification include texture, color, composition, permeability and porosity.
3. Use specific tools to measure soil characteristics and properties (e.g., permeability, porosity, texture, color).
4. Analyze soil maps to identify soil formations.
5. Differentiate between soil and dirt.
6. Categorize types of soil.
7. Explain how the uses of soil depend upon their properties.
8. Recognize that the characteristics of soil rocks and mineral determine how they can be used.
9. Connect examples of different ways soils, rocks and minerals can be used.
10. Research different use of rocks, minerals and soils within Ohio.
11. Investigate the stability of different geologic material.
12. Relate the extraction methods, usage, storage and disposal of rocks, minerals and soil.
13. Identify uses of rocks, minerals and soils for construction, energy, transportation, agriculture, domestic use, and technology.
14. Support the understanding that rocks, minerals and soils are considered nonrenewable resources.
15. Recognize that soil maps (paper or digital) combined with geologic, aerial or topographic maps can assist in local identification of soil formations.

Recognize that the conservation of resources through the management of the resources is an important part of understanding the uses of rocks, minerals and soil.

1. Appreciate God's awesome design of our Earth and space systems.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. How does soil form?
2. How do the properties of soil determine their use?
3. How are rocks, minerals and soils nonrenewable resources?
4. Why does the value of rocks, minerals and soils differ depending on the characteristics?

Standards Vocabulary

1. soil
2. weathering
3. bedrock
4. horizons
5. measurable properties
6. environmental conditions
7. texture
8. color
9. composition
10. permeability
11. porosity
12. soil sampling
13. soil maps
14. topographic maps
15. geologic maps
16. aerial maps
17. erosion
18. flood waters
19. soil depletion
20. dust bowl
21. desertification
22. nonrenewable
23. fossil fuels
24. radio active material
25. road salt
26. asphalt
27. agriculture
28. lime
29. peat
30. fertilization
31. pesticides
32. lithium
33. silica
34. conservation
35. extraction

Stage 2: Assessment Evidence

Flooding Lab

Formative: Lab Assignment

Using four or five unknown soil samples, student groups will design and conduct an investigation to determine which soil is best to use inside the sandbags. They will analyze the soil data and test results to make the final determination. Finally, students will share their findings and decision with the class regarding the best soil to use. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Community Soil Horizons

Summative: Lab Assignment

Working in cooperative groups, students will compare a specific and identifiable soil horizon in different locations within the community. They will compare and contrast the depth and width of the soil horizons, conduct research on the soil horizons, and explain the differences that are measured. When the project is completed, groups will share their findings with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Horizon Comparison

Formative: Graphic Organizer

Students will make a digital illustration and explain the differentiation between the different soil horizons (O, A, B and C) using the standard composition of each. They will share their work with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Landslide Lab

Formative: Lab Assignment

Working with a partner, students will plan and implement an investigation to determine what type of soil is most likely to fail in a landslide event (sand, clay, loam, silt, gravel). They will formulate a hypothesis, conduct the experiment, make observations and record data, analyze the data, and write a conclusion. They will then research areas of past or present soil depletion (e.g., the dust bowl, desertification, mass wasting, erosion) and compare that information with the findings from their experiment. They will present their findings to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Mountain Landslide Lab

Formative: Lab Assignment

Through a scientific investigation students will test slope stability and landslides, by creating mountains out of different materials (e.g., sand, gravel, clay). Water is added to test the stability of each material. Students will analyze the data and write a conclusion to represent the findings. What assessment tools or strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Model of Ohio

Summative: Visual Arts Project

Working in cooperative groups, students will make a 3-D model of Ohio that illustrates the major geologic resources that are found. They will share the final product with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Stage 3: Learning Plan

Learning Experiences

1. Scientific Investigation: During some flooding events, sandbags are used to slow down or redirect floodwaters. Working in cooperative groups, have students develop a list of criteria required for the bags.

Using four or five unknown soil samples, have them design and conduct an investigation to determine which soil is best to use inside the sandbags. Ask them to analyze the soil data and test results to make the final determination. Have students share their findings and the decision with the class.

1. Scientific Investigation: Working in cooperative groups, have students compare a specific and identifiable soil horizon in different locations within the community. Have them compare and contrast the depth and width of the soil horizons, conduct research on the soil horizons, and explain the differences that are measured. When project is completed, have groups share their findings with the class. Have groups share their findings with the class.
2. Independent Work. Have students make a digital illustration and explain the differentiation between the different soil horizons (O, A, B and C) using the standard composition of each. Have them share their work with the class.
3. Scientific Investigation: Working with a partner, have students plan and implement an investigation to determine what type of soil is most likely to fail in a landslide event (sand, clay, loam, silt, gravel). Have them formulate a hypothesis, conduct the experiment, make observations and record data, analyze the data, and write a conclusion. Research areas of past or present soil depletion (e.g., the dust bowl, desertification, mass wasting, erosion) and compare that information with the findings from their experiment. Ask them to present findings to the class.
4. Working in cooperative groups, have students make a 3-D model of Ohio that illustrates the major geologic resources that are found. Share the final product with the class.

Resources

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

Resources

1. iPad Resources
2. Literature Connection  
   *Soil!: Get the Inside Scoop* by David L. Lindbo  
   *Soil* by Rebecca Faulkner  
   *Stone Wall Secret* by Kristine and Robert Thorson  
   *Soil Science Simplified* by Helmut Kohnke and D. P. Franzmeier  
   *Life in a Bucket of Soil* by Alvin Silverstein  
   *Composting: Nature's Recyclers* by Robin Koontz

Resources

* Earth Rocks Activity (<http://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_earth/cub_earth_lesson1.xml>)

Grade 6 Science  
Science 6

LS: Cells

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.6.1b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

SL.6.1c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

SL.6.1d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

SL.6.2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric.

SL.6.3. Delineate a speakers argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

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.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Life Science (LS)

Topic: Cellular to Multicellular

Cells are the fundamental unit of life.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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.

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.1. Write arguments focused on discipline-specific content.

WHST.6-8.1a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.

WHST.6-8.1b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

WHST.6-8.1c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

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

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.2a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

WHST.6-8.2b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

WHST.6-8.2c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

WHST.6-8.2f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

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

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

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

WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

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

WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.

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.

WHST.6-8.10. Write routinely over extended time frames (time for 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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. **Cells are the fundamental unit of life.**  
   a. All living things are composed of cells.  
   b. Different body tissues and organs are made of different kinds of cells.  
   c. The ways cells function are similar in all living organisms.

**All cells come from pre-existing cells.**

a. Cells repeatedly divide resulting in more cells and growth and repair in multi-cellular organisms.

**Cells carry on specific functions that sustain life.**

a. Many basic functions of organisms occur in cells.  
b. Cells take in nutrients and energy to perform work, like making various molecules required by that cell or an organism.

c. Every cell is covered by a membrane that controls what can enter and leave the cell.

d. Within the cell are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, information feedback and movement.

**Living systems at all levels of organization demonstrate the complementary nature of structure and function.**

a. The level of organization within organisms includes cells, tissues, organs, organ systems and whole organisms.

b. Whether the organism is single-celled or multi-cellular, all of its parts function as a whole to perform the tasks necessary for the survival of the organism.

c. Organisms have diverse body plans, symmetry and internal structures that contribute to their being able to survive in their environments.

Skills

Use microscopes, micrographs, safety procedures, models and illustrations to observe cells from many different types of organisms.

1. Recognize that cells are the basic unit of structure and function of all living things.
2. Explain that many organisms are single-celled and that one cell must carry out all the basic functions of life.
3. Explain that multicellular organisms and the cells that form these organisms can be organized at various levels to carry out all the basic functions of life.
4. Identify and explain the parts of a microscope through illustration and properly operate a microscope.
5. Observe cell structure from eubacteria (cynaobacteria), protista (algae, amoeba, diatoms, euglena, volvox) and fungi (common mushrooms, bread molds) to identify cell wall, cell membrane and nucleus.
6. Observe the following cell components found in plantae cells (mosses, ferns and angiosperms): nucleus, mitochondria, chloroplast, ribosome, plasma membrane, vacuole and lysosome.
7. Recognize that different body tissues and organs are made up of different kinds of cells.
8. Explain that cells in similar tissues and organs in animals are similar.
9. Explain that tissues and organs found in plants differ slightly from similar tissues in animals.
10. Identify, illustrate and differentiate between the organelles of a cell.
11. Make observations of cells from relatable living things (pond water, cheek cells, plant leaf and onion cells).
12. Label chromosomes in a cell and explain their importance in cell division.
13. Use microscopes to view a variety of cells, tissues and organs to compare and contrast their similarities and differences.

Describe how the structure of specialized cells that form tissues relates to the function that the cells perform.

1. Recognize that traits are passed down from parent to offspring through chromosomes within this cell division.
2. Explain that all cells contain genetic material described as chromosomes.
3. Describe the role of mitosis in single-celled organisms and multi-cellular organisms.
4. Disprove the theory of spontaneous generation by supporting claims with evidence from Redi and Pasteur.
5. Compare and contrast binary fission and mitosis.
6. Demonstrate an understanding of transport (active/passive) within a cell and the vitality of a cell membrane.
7. Identify ways specific organelles contribute to the overall function of a cell and its processes.
8. Explore conditions that optimize and/or minimize cellular function in a cell.

Describe how different organ systems interact to enable complex multi-cellular organisms to survive.

Compare sample cells from different tissues in plants and animals.

1. Distinguish between the body plans among organisms (symmetry, external and internal structures) in relation to the classification of organisms.
2. Connect the idea of cell size to the ability of the cell to transport necessary materials into its interior.

Compare the four major types of tissues (epithelial, connective, nerve and muscle tissue).

Identify general distinctions among the cells of organisms that support classifying some as plants, some as animals and some that do not fit neatly into either group.

1. Recognize that God calls us to be good stewards of His creation.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear  
   pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. In what ways are cells the fundamental unit of life?
2. How do living things interact with one another and with the nonliving elements of their environment?
3. To what extent does the cell do the same things that we do?
4. Why do cells divide?
5. How are cells organized into a complex multi-cellular organism?
6. How does technology aid biologists in the study of living organisms?

Standards Vocabulary

1. cell
2. modern cell theory
3. microscope
4. organelles
5. nucleus
6. mitochondria
7. chloroplast
8. ribosomes
9. cell membrane
10. cell wall
11. vacuole
12. lysosome
13. cytoplasm
14. plant cell
15. animal cell
16. tissues
17. organs
18. organ systems
19. traits
20. chromosomes
21. binary fission
22. multicellular organisms
23. mitosis
24. cell division
25. spontaneous generation
26. Redi's experiment
27. Pasteur's experiment
28. homeostasis
29. gas exchange
30. energy transfer
31. disposal of waste
32. synthesis
33. levels of organization
34. body plans
35. symmetry
36. internal structure
37. cell size
38. cell cycle

Stage 2: Assessment Evidence

Cell Model

Formative: Performance

Working with a partner, students will build a 3-D model of a plant or animal cell. Students will explain the cellular structures and how each of their functions contribute to the survival of the cell. They will explain their cell and its structure to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Single-Cell Structure

Formative: Lab Assignment

Students will use microscopes, micrographs, models or illustrations, to observe a single-celled organism. They will make a drawing of the cell and label the visible cellular structures. Finally, they will write an explanation of how a single-celled organism carries out all functions required for life. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Effects of Solutions on Cells

Formative: Lab Assignment

Working in cooperative groups, students will predict what will happen when a cell is placed in solutions of varying concentration levels. They will plan and conduct a scientific investigation to prove or disprove predictions. At the conclusion of the investigation, students will present their data using a table or chart, analyze their data, compare their data with data from other groups and write a summary report of the investigation addressing any differences noted in the data from the other groups. The class will conclude the investigation with a discussion. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Movement of Chromosomes

Formative: Cooperative Group Work

Working with a partner, students will model the movement of chromosomes during plant cell division and explain why this process ensures genetic information is passed from one generation to the next. They will share their work with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Yeast Lab

Summative: Lab Assignment

Working in cooperative groups, students will test the effectiveness of a cellular leavening agent (yeast) for making bread under different conditions (e.g., vary the amount of sugar, the type of flour, the type of sugar). After multiple trials, they will determine which recipe makes the least dense bread (as represented by air spaces). Finally, they will prepare a report of their findings that includes illustrations and share their work 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 with a partner, have students build a 3-D model of a plant or animal cell. Have students explain the cellular structures and how each of their functions contributes to the survival of the cell. Have them explain their cell and its structure to the class.
2. Scientific Investigation. Have students use microscopes, micrographs, models or illustrations, to observe a single-celled organism. Have them make a drawing of the cell and label the visible cellular structures. Ask them to write an explanation of how a single-celled organism carries out all functions required for life.
3. Working in cooperative groups, have students predict what will happen when a cell is placed in solutions of varying concentration levels. Then have them plan and conduct a scientific investigation to prove or disprove predictions. At the conclusion of the investigation, have them present their data using a table or chart, analyze their data, compare their data with data from other groups and write a summary report of the investigation. Have them address any differences noted in the data from the other groups. Conclude the investigation with a class discussion.
4. Working with a partner, have students model the movement of chromosomes during plant cell division and explain why this process ensures genetic information is passed from one generation to the next. Have them share their work with the class.
5. Scientific Investigation. Working in cooperative groups, have students test the effectiveness of a cellular leavening agent (yeast) for making bread under different conditions (e.g., vary the amount of sugar, the type of flour, the type of sugar). After multiple trials, have them determine which recipe makes the least dense bread (as represented by air spaces). Finally, have them prepare a report of their findings which includes illustrations. Have them share their work with the class.

Resources

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

Resources

Resources

1. iPad Resources
2. Literature Connection  
   *Fergus and the Cell* by Emma Lungren  
   *The Basics of Cell Life With Max Axiom, Super Scientist* by Amber J. Keyser  
   *Cells, Tissues, and Organs* by Donna Latham  
   *Cells, Tissues, and Organs* by Richard Spilsbury  
   *The Microscope Book* by Shar Levine  
   *The World of the Microscope* by Corinne Stockley and Chris Oxlade  
   *The Microscope and How to Use It* by Dr. Georg Stehli

Resources

* Web 2.0 Tools (<http://edjudo.com/web-2-0-teaching-tools-links>)

Grade 6 Science  
Science 6

PS: Matter

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.6.1b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

SL.6.1c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

SL.6.1d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

SL.6.2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric.

SL.6.3. Delineate a speakers argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

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.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Physical Science (PS)

Topic: Matter and Motion

All matter is made up of small particles called atoms.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.

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

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

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

WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.

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.

WHST.6-8.10. Write routinely over extended time frames (time for 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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

**All matter is made up of small particles called atoms.**

a. Each atom takes up space, has mass and is in constant motion.  
b. Mass is the amount of matter in an object.

c. Elements are a class of substances composed of a single kind of atom.

d. Molecules are the combination of two or more atoms that are joined together chemically.

e. Compounds are composed of two or more different elements.   
f. Each element and compound has properties, which are independent of the amount of the sample.  
g. Similarities and differences are found among elements.  
h. Three states of matter are solid, liquid, and gas.

**Changes of state are explained by a model of matter composed of atoms and/or molecules that are in motion.**

a. When substances undergo changes of state, neither atoms nor molecules themselves are changed in structure.

b. Thermal energy is a measure of the motion of the atoms and molecules in a substance.

c. Mass is conserved when substances undergo changes of state.

**Students will know and understand the following as they relate to these standards.**  
a. Volume vs. mass  
b. Property of density  
c. Formulas of mass and volume  
d. Density in relation to mass and volume  
e. Thermal vs. kinetic energy  
f. Temperature vs. thermal energy

Skills

1. Recognize that all matter is made up of particles that are too small to be seen.
2. Explain that there is empty space between the atoms that make up a substance.
3. Define matter, atoms, mass, volume, density, elements, molecules and compounds.
4. Explain that an element is a substance that cannot be broken down into simpler substances.
5. Compare and contrast elements, molecules and compounds.
6. Recognize that there are approximately 90 different naturally occurring elements that have been identified.
7. Explain that all atoms of any one element are alike, but are different from atoms of other elements.
8. Explain that all substances are composed of one or more elements.
9. Recognize that compounds are composed of elements joined together chemically and that they are unique and unchanging in composition.
10. Illustrate how elements and compounds can form molecules when they are joined together chemically.
11. Explain that all particles of a pure substance have nearly identical mass.
12. Recognize that matter has properties of mass and volume.
13. Explain the difference between mass and volume.
14. Demonstrate the understanding that equal volumes of different substances usually have different masses (property of density)
15. Measure mass and volume of different objects.
16. Create a chart showing the measures of mass and volume of different objects.
17. Develop a graph based off a chart showing mass and volume.
18. Analyze a graph comparing mass and volume in order to determine the density of an object. Provide evidence to justify which object has a greater density.
19. Identify the three states of matter. (solid, liquid, gas).
20. Describe and illustrate the behavior of atomic particles for each state of matter.
21. Explain in terms of the atomic theory why gases can be compressed, while liquids and solids cannot.
22. Match the properties of a state of matter with a picture of a sample representative of a specific state of matter.
23. Explain how the arrangement of atoms determines the specific properties of solids, liquids and gases.
24. Support the idea that neither atoms nor molecules themselves are changed when substances undergo changes of states.
25. Recognize that thermal energy is the total amount of kinetic energy present in a substance.
26. Compare and contrast thermal and kinetic energy.
27. Investigate how mass, kinetic energy and material of a substance can cause change in thermal energy.
28. Compare the thermal energy and temperature of objects.
29. Conduct an experiment demonstrating the change in motion and spacing between particles during phase changes.
30. Apply the concepts of thermal energy to changing states of matter.
31. Prove that compounds are created when two different substances collide (liquid/gaseous state).
32. Reflect engineering structures in creation.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear  
   pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. Why is it important to know about the properties and classification of matter?
2. How and why does matter change due to thermal energy?
3. How are molecules arranged in different states of matter?

Standards Vocabulary

1. matter
2. atoms
3. element
4. compounds
5. mass
6. volume
7. solid, liquid, gas
8. molecules
9. density
10. thermal energy
11. kinetic energy
12. atomic particles
13. changes of state
14. temperature

Stage 2: Assessment Evidence

State of Matter Match

Formative: Writing Assignment

Students will match the properties of a state of matter with a picture of a sample representative of a specific state of matter. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Phase Change Lab

Formative: Lab Assignment

Working in cooperative groups, students will investigate the behavior of atoms/molecules in a sample of water as it goes through three distinct phase changes (e.g., solid to liquid to gas). They will measure the temperature at each phase and construct a graphical representation to aid in devising a plausible explanation for what happens during the phase changes. They will use their graphical representation to explain what happens to the atoms/molecules in each phase change. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Atomic Model

Formative: Performance

Students will use a digital tool to draw a model/pictorial representation that depicts the behavior of atomic particles for each state of matter (solid, liquid, gas). They will explain the molecular motion for each state in writing. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Which Remedy Works Better?

Summative: Cooperative Group Work

Working in cooperative groups, students will evaluate the preparations of two remedies for an upset stomach, both containing the same medication in the same amount. In doing the evaluation, they will determine which preparation would provide the fastest relief and why? Students will use data found in various sources, including the Internet, to support their conclusions. Finally, they will present their findings and defend the reliability of the research sources. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Three States of Matter Lab

Summative: Lab Assignment

Working with a partner, students will develop and test a hypothesis about the behavior of three different states of matter in a closed retractable space (e.g., using a syringe, observe and record data when a solid, like a marshmallow, and a liquid is placed inside the chamber). They will illustrate and explain the results of their experiment in writing and share their results 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. Independent Work. Have students match the properties of a state of matter with a picture of a sample representative of a specific state of matter.
2. Scientific Investigation. Working in cooperative groups, have students investigate the behavior of atoms/molecules in a sample of water as it goes through three distinct phase changes (e.g., solid to liquid to gas). Have them measure the temperature at each phase and construct a graphical representation to aid in devising a plausible explanation for what happens during the phase changes. Ask them to use their graphical representation to explain what happens to the atoms/molecules in each phase change.
3. Independent Work. Have students use a digital tool to draw a model/pictorial representation that depicts the behavior of atomic particles for each state of matter (solid, liquid, gas). Have them explain the molecular motion for each state in writing.
4. Working in cooperative groups, have students evaluate the preparations of two remedies for an upset stomach, both containing the same medication in the same amount. One preparation involves a tablet to be chewed and swallowed. The other preparation involves a liquid to be swallowed. In doing the evaluation, have students determine which preparation would provide the fastest relief and why? Ask them to use data found in various sources, including the Internet to support their conclusions. Have them present their findings and defend the reliability of the research sources.
5. Working with a partner, have students develop and test a hypothesis about the behavior of three different states of matter in a closed retractable space (e.g., using a syringe, observe and record data when a solid, like a marshmallow, and a liquid is placed inside the chamber). Ask them to illustrate and explain the results of their experiment in writing. Share their results with the class.

Resources

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

Resources

1. iPad resources  
   App- States of Matter
2. Literature Connection  
   *The Solid Truth About States of Matter With Max Axiom,*  
   *Super Scientist* by Agnieszka Biskup  
   *The Scoop About Measuring Matter* by Amber J. Keyser  
   *Teaching Physical Science through Children's Literature* by  
   Susan Gertz , Dwight Portman, Mickey Sarquis  
   *Children's Literature: An Integrated Approach* by Carol M.  
   Butzow and John W. Butzow

Resources

* Density - Mass Volume Activities (<http://www.educationfund.org/uploads/docs/Publications/Curriculum_Ideas_Packets/Density_Dynamic_Duo_of_Mass-and-Volume.pdf>)

Grade 6 Science  
Science 6

PS: Motion

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 6 OH: English Language Arts 6-12

Speaking & 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.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.6.1b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

SL.6.1c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

SL.6.1d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

SL.6.2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric.

SL.6.3. Delineate a speakers argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

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.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

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

SL.6.5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

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

SL.6.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 6 OH: Science (2011)

Physical Science (PS)

Topic: Matter and Motion

All matter is made up of small particles called atoms.

OH Grades 6-8 OH: Literacy in History/Social Studies, Science, & Technical Subjects 6-12

Reading: Science & Technical Subjects

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.

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

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

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.

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

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Capacities of the Literate Individual

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

They demonstrate independence.

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.

WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.2a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

WHST.6-8.2b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

WHST.6-8.2c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

WHST.6-8.2e. Establish and maintain a formal style and objective tone.

WHST.6-8.2f. Provide a concluding statement or section that follows from and supports 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.

WHST.6-8.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

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

WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

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

WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.

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.

WHST.6-8.10. Write routinely over extended time frames (time for 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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. **There are two categories of energy: kinetic and potential.**  
   a. Objects and substances in motion have kinetic energy.  
   b. Objects and substances can have energy as a result of their position (potential energy).

**An objects motion can be described by its speed and the direction in which it is moving.**

a. An objects position and speed can be measured and graphed as a function of time.   
b. The gravitational potential energy of an object is determined by its height.

Skills

1. Define kinetic and potential energy.
2. Classify energy as kinetic or potential and provide justification.
3. Recall that an object can have potential energy due to its position relative to another object and can have kinetic energy due to its motion.
4. Explain gravitational potential energy, electrical energy, thermal energy, and sound energy.
5. Use virtual experiments to explore various types of energy.
6. Investigate the relationship between height and gravitational potential energy and communicate results graphically.
7. Recognize that increasing height increases gravitational potential energy.
8. Explain the relationship between motion and speed.
9. Determine the necessity of reference point when measuring speed.
10. Calculate the speed of a moving object.
11. Experiment inside and outside the classroom creating/interpreting graphs to investigate motion.
12. Recognize that plotting position (vertically) and time (horizontally) can be used to compare and analyze motion.
13. Recognize that motion describes the change in the position of an object as time changes.
14. Explain that fast motion is represented by steep lines and slow motion is represented by lines that are more gradual.
15. Explain how the relative speeds and positions of different objects can be determined from comparing their position vs. time graphs.
16. Determine the speed of an object at any given time or determine the time at which an object has a particular speed from analyzing the speed vs. time graph.
17. Recognize that plotting the speed (vertical axis) and time (horizontal axis) allows for comparison and analysis of speed.
18. Explain that constant speed would be represented with a straight line above or below the horizontal axis.

Graphically represent the data collected from an object moving at constant speed.

Identify what is changing and what is not changing for an object moving at constant speed.

Compare the position vs. time graphs for fast and slow-moving objects.

Describe an objects motion by tracing and measuring its position over time.

Calculate the average speed of an object given the distance and time.

1. Explain that when a force on an object acts toward a single center, the objects path may curve into an orbit around the center.
2. Reflect on the engineering structures in creation.

**Common Core Literacy Skills**

1. Read closely and comprehend scientific text.
2. Cite evidence from text.
3. Draw conclusions from text.
4. Use correct scientific terms.
5. Analyze the structure of text.
6. Analyze the author's purpose.
7. Integrate quantitative and technical information within a text.

**Common Core Writing Content**

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

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

**Common Core Speaking and Listening**

1. Engage effectively in a range of collaborative discussions.
2. Come to discussions prepared, having read or studied required material.
3. Follow rules for collegial discussions.
4. Pose and respond to specific questions with elaboration and detail.
5. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6. Interpret information presented in diverse media and formats.
7. Delineate a speakers argument and specific claims.
8. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details.
9. Use appropriate eye contact, adequate volume, and clear  
   pronunciation.
10. Include multimedia components and visual displays.
11. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.

Essential Questions

1. How are energy and matter related?
2. What is energy?
3. In what ways are energy and motion interconnected?
4. How can the motion of an object be described in terms of speed and direction?

Standards Vocabulary

1. matter
2. energy
3. kinetic energy
4. potential energy
5. gravitational potential energy
6. electrical energy
7. thermal energy
8. sound energy
9. motion
10. speed
11. reference point
12. vertical axis
13. horizontal axis
14. time
15. circular motion
16. force
17. single center

Stage 2: Assessment Evidence

Water Wheel Lab

Summative: Lab Assignment

Working in cooperative groups, students will design and build a system that uses water to cause a wheel to turn. They will evaluate the designs from the groups to determine which design features are most effective. Then the groups will redesign their water wheel to incorporate best design practices.Groups will be asked to plan and implement a scientific experiment to determine the effectiveness of the water wheels produced by the class. They will outline the design by representing it pictorially and give an oral account of the function of each part of the design; explain the reasons for design decisions; graphically represent the data collected from the experiment; and compare the design features of effective and ineffective designs. Finally, they will classify the energy at each stage in the design as kinetic, potential or a combination of the two and support the conclusion that increasing height increases gravitational potential energy with evidence from the experiment.In a class discussion, students will reflect on the experiment and what they learned from doing it. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Is There Energy When Something is Dropped?

Formative: Lab Assignment

Working with a partner, students will plan and implement a scientific experiment to determine the relationship between height and gravitational potential energy using this interactive simulation. They will represent the data graphically and analyze the data to determine patterns and trends. They will formulate a conclusion about the relationship between height and gravitational potential energy and share their results with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Speed of Moving Objects

Summative: Cooperative Group Work

Working in cooperative groups, students will examine "constant speed." They will be asked a scientific question about the motion of an object that moves at constant speed. Then they will:a. Plan and implement a scientific investigation to answer the question.b. Determine what data will be collected and what tools will be needed.c. Analyze the data to determine patterns and trends about objects that move with constant speed and objects that move with different constant speeds.d. Graphically represent the data collected from an object moving at constant speed.e. Compare the position vs. time graphs for fast-and slow-moving objects.Groups will present their report to the class for discussion. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Designing a Mousetrap Car

Summative: Lab Assignment

Working with a partner and given a mousetrap car, students will redesign it so it will move to reproduce a particular position vs. time graph. They will test the design using a motion detector and describe an objects motion by tracing and measuring its position over time. They will share their results with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Constant Speed

Summative: Lab Assignment

Working in cooperative groups and given the distance and time, students will calculate the average speed of an object. They will identify what is changing and what is not changing for an object moving at constant speed and justify their answer with references to a distance vs. time graph. As a class, they will discuss their findings. 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. Scientific Investigation. Working in cooperative groups, have students design and build a system that uses water to cause a wheel to turn. Have them evaluate the designs from the groups to determine which design features are most effective. Then have the groups redesign their water wheel to incorporate best design practices.  
   Ask the groups to plan and implement a scientific experiment to determine the effectiveness of the water wheels produced by the class. Outline the design by representing it pictorially and give an oral account of the function of each part of the design. Explain the reasons for design decisions. Graphically represent the data collected from the experiment. Compare the design features of effective and ineffective designs. Classify the energy at each stage in the design as kinetic, potential or a combination of the two. Support the conclusion that increasing height increases gravitational potential energy with evidence from the experiment. In a class discussion, have students reflect on the experiment and what they learned from doing it.
2. Scientific Investigation. Working with a partner, have students plan and implement a scientific experiment to determine the relationship between height and gravitational potential energy using this interactive simulation. Ask them to represent the data graphically and analyze the data to determine patterns and trends. Have them formulate a conclusion about the relationship between height and gravitational potential energy and share their results with the class.
3. Scientific Investigation: Working in cooperative groups, have students examine "constant speed." Ask them a scientific question about the motion of an object that moves at constant speed. Then have them:  
   a. Plan and implement a scientific investigation to answer the question.  
   b. Determine what data will be collected and what tools will be needed.  
   c. Analyze the data to determine patterns and trends about objects that move with constant speed and objects that move with different constant speeds.  
   d. Graphically represent the data collected from an object moving at constant speed.  
   e. Compare the position vs. time graphs for fast-and slow-moving objects.  
   Have the groups present their report to the class for discussion.
4. Scientific Investigation. Working with a partner and given a mousetrap car, have students redesign it so it will move to reproduce a particular position vs. time graph. Have them test the design using a motion detector and describe an objects motion by tracing and measuring its position over time. Have them share their results with the class.
5. Scientific Investigation. Working in cooperative groups and given the distance and time, have students calculate the average speed of an object. Have them identify what is changing and what is not changing for an object moving at constant speed and justify their answer with references to a distance vs. time graph. As a class, have the students discuss their findings.

Resources

* NASA (<http://www.nasa.gov>)

Resources

Resources

1. iPad Resources
2. Literature Connection  
   *Forces and Motion: A Question and Answer Book* by Catherine A. Welch  
   *Forces and Motion* by Casey Rand  
   *Isaac Newton and the Laws of Motion* by Andrea Gianopolous  
   *Kinetic Energy:* *The Energy of Motion* by Don Nardo

Resources

* Skater Simulation (<http://phet.colorado.edu/en/simulation/energy-skate-park>)