Grade 7 Science
Science 7

Scientific Process and Inquiry

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 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

The Dignity of Work and the Rights of Workers

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 is essential for living in the 21st century.**

1. Independent and dependent variables
2. Inferring and predicting
3. Steps of the scientific method
4. Control variables
5. Testable hypothesis
6. Controlled scientific experiment
7. Recording and analyzing data
8. Making a conclusion using data
9. Formulating scientific questions
10. Qualitative and quantitative observations
11. Graphs, tables and charts
12. Communicating scientific findings

Skills

1. Design and conduct open-ended scientific investigations.
2. Design a simple experimental procedure with an identified control and appropriate variables.
3. Use appropriate tools and techniques to gather, organize, analyze, and interpret data.
4. Synthesize information to determine cause and effect relationships between evidence and explanations.
5. Use evidence from a data set to determine cause and effect relationships that explain a phenomenon.
6. Recognize possible sources of bias and error, alternative explanations, and questions for further exploration.
7. Analyze alternative scientific explanations and predictions and recognize that there may be more than one good way to interpret a given set of data.
8. Identify faulty reasoning and statements that go beyond the evidence or misinterpret the evidence.
9. Use graphs, tables and charts to study physical phenomena and infer mathematical relationships between variables (i.e., speed and density).
10. Formulate and identify questions to guide further investigations/experiments.
11. Identify simple independent and dependent variables.
12. Explain that variables and controls can affect the results of an investigation.
13. Communicate scientific understanding using descriptions, explanations, and models.
14. Interact with living things in the environment in ways that promote respect.
15. Explain how social needs, attitudes and values influence the direction of technological development.
16. Show that the reproducibility of results is essential to reduce bias in scientific investigations.

**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. What makes an experiment valid?
2. What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?
3. To what extent can scientists communicate their results based on the validity of an experiment/investigation?
4. How do scientists use and interpret graphs, tables, and charts to infer mathematical relationships?
5. What drives scientific and technological advancement?
6. How do science concepts, engineering skills, and applications of technology improve the quality of life?

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. technology
19. bias
20. unbiased
21. textual evidence
22. quantitative
23. qualitative
24. arguments
25. informative
26. explanatory
27. relevant sources

Stage 2: Assessment Evidence

Safety in the Science Classroom

Formative: Class Discussion

Using various strategies, students will review the science safety rules and the proper use of scientific equipment. A science safety contract will be created with the students and they will share the contract with their parents. Parents and students will sign the contract. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Exploring Scientific Method and Inquiry

Formative: Cooperative Group Work

Working with a partner, students will plan and implement a valid (carry out three times) scientific investigation utilizing the scientific method. They will follow the steps in the scientific process as outlined. When the experiment is completed each group will analyze their results and then compare their results with the results of the other groups. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Being a Detective!

Formative: Class Work

Given a photograph, chart and/or table, students will make at least three observations, state inferences based on observations, and make predictions about what is and what might happen based on their observations and inferences. They will explain the three observations, write about what experiences or knowledge they used to make the inferences and provide evidence for the basis of their predictions. Students will share their work in a class discussion. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

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 and 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 plan and implement a valid (carry out three times) scientific investigation utilizing the scientific method. Have them follow the steps in the scientific process as follows:
a. **INQUIRY** - What do I want to find out? (Asks a question to guide the investigation.)
b. **HYPOTHESIS** - What do I think I'll find out? (A statement about how the inquiry question could be answered.)
c. **PROCEDURE** - How do I find out? (Identifies/lists steps or sequence.)
d. **SCIENCE SKILLS MATERIALS** - What science tools will/did I use (Ruler, scale, magnet, thermometer, hand lens, etc. for measuring, observing, inferring, predicting, recording data, etc.)
e. **RESULTS** - What happened? (Tables, graphs, charts, drawings, qualitative and quantitative data.)
f. **CONCLUSIONS** - What did I learn from this activity? (Written, graphic, oral, etc.)
When completed, have each group analyze their results and then compare their results with the results of the other groups.
3. Independent Work. Given a photograph, chart and/or table, have students make at least three observations, state inferences based on observations, and make predictions about what is and what might happen based on their observations and inferences. Have them explain three observations, write about what experiences or knowledge they used to make the inferences and provide evidence for the basis of their predictions. Have students share their work in a class discussion.

Resources

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

Resources

Resources

1. iPad Resources
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

* Scientific Skills - Valid Experiment (<http://www.glencoe.com/sec/math/prealg/prealg04/add_lesson/using_sampling_pa1.pdf>)

Grade 7 Science
Science 7

ESS: Hydrologic Cycle

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Cycles and Patterns of Earth and the Moon

The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

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.

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.6-8.1a. 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.

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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Rights and Responsibilities

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

**The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.**

a. Thermal energy is transferred as water changes state throughout the cycle.
b. The cycling of water in the atmosphere is an important part of weather patterns on Earth.
c. The rate at which water flows through soil and rock is dependent upon the porosity and permeability of the soil or rock.
d. Contamination can occur within any step of the hydrologic cycle.
e. Ground water is easily contaminated as pollution present in the soil or spilled on the ground surface moves into the ground water and impacts numerous water sources.

Skills

1. Recognize that the movement of water through the spheres of Earth is known as the hydrologic cycle.
2. Explain the different pieces of the hydrologic cycle (e.g., properties of water, changes of state, relationships of water to weather, effects of water on Earths surface).
3. Define lithosphere, hydrosphere, atmosphere and biosphere.
4. Compare and contrast the lithosphere, hydrosphere, and atmosphere.

Describe the movement of water through all four spheres of Earth (lithosphere, hydrosphere, atmosphere, biosphere).

1. Explain that when water changes state and energy is transferred, it cycles from one sphere into another.
2. Recognize that ground water and surface water quality are important components of the hydrologic cycle.
3. Explain how porosity and permeability of rock and/or soil can affect the rate at which the water flows.

Explain how the pattern of the cycling illustrates the relationship between water, energy and weather.

Explain, draw, and label the hydrologic cycle.

Recognize that the movement of water in the hydrologic cycle also can move contamination through each of the spheres.

1. Identify the changes in thermal energy as water changes state in the hydrologic cycle.

Recognize that the sun is the source of energy that drives the hydrologic cycle.

1. Develop a scientific model showing that the sun is the source of energy that drives the hydrologic cycle.
2. Explain the processes of weathering and erosion.
3. List the causes of erosion.
4. Describe the cause/effect factors related to how rivers, lakes, and ground water can be depleted or polluted, becoming less hospitable to life and even becoming unavailable or unsuitable for life.
5. Recognize that topographic and aerial maps can be used to identify drainage patterns and watersheds that contribute to the cycling of water.
6. Recognize personal responsibility for the planet/stewardship.

**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 Earth's water move through the hydrologic cycle?
2. How does water move through underground layers of soil and rock?
3. How does the porosity and permeability of rock and soil affect the rate at which the water flows?
4. In what way can water that was contaminated with pollutants be moved throughout each of the spheres?
5. Why is it important for me to understand the hydrologic cycle?

Standards Vocabulary

1. lithosphere
2. biosphere
3. hydrosphere
4. atmosphere
5. hydrologic cycle (water cycle)
6. thermal energy
7. contamination
8. point source pollution
9. non-point source pollution
10. evaporation
11. condensation
12. precipitation
13. watershed
14. surface runoff

Stage 2: Assessment Evidence

Surface Water Runoff/Acid Rain Graph

Formative: Cooperative Group Work

Working with a partner, students will use GPS/GIS programs, topographic maps and/or aerial maps, to identify regions where surface water run-off and/or acid rain could impact ground or surface water quality. They will describe the movement of water through all four spheres of Earth (lithosphere, hydrosphere, atmosphere, biosphere). Students will use a digital tool to illustrate the results graphically and share their work with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Storm Water Runoff Reduction

Summative: Research Project

Working in cooperative groups, students will develop, test and evaluate plans outlining a specific method to reduce storm water flow at a specific site in the local community (e.g., a housing construction project, the school parking lot). They will present their findings/plans to the class, school administrators, or the local government. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Water Contamination in Ohio

Summative: Cooperative Group Work

Working in cooperative groups, students will research and investigate an area in Ohio that exhibits a unique water contamination problem (e.g., acid mine drainage in southeastern Ohio, mercury contamination in Lake Erie). They will document recent discoveries, case studies, clean-up technologies or field investigations that are occurring and use a digital tool to present their findings to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Collecting Water

Summative: Cooperative Group Work

Working in cooperative groups, students will research and evaluate the effectiveness of different tools, models and methods to collect ground water and surface water data (e.g., rate of flow, direction of movement, types of contamination). They will present their recommendations orally, graphically or in writing. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Water Quality Testing

Formative: Report

Students will investigate and use different methods and tools that measure water flow and water quality, and evaluate which methods and tools are most effective for the desired outcome. They will share their findings with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Environmental Careers

Summative: Research Project

Students will research or investigate an actual environmental event (e.g., a specific release of a toxin or contaminant) and determine how it impacted each of Earths spheres. Students will identify a body of water that has been flagged as an environmental hazard. They will identify careers needed to assist in analyzing the problem, developing a solution, and acting to resolve the issue. Students will identify which organizations and agencies to consult, how they will mobilize the necessary resources, and their specific role in the project. Students will create a poster showing the various careers and share it with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Working with a partner, have students use GPS/GIS programs, topographic maps and/or aerial maps, to identify regions where surface water run-off and/or acid rain could impact ground or surface water quality. Describe the movement of water through all four spheres of Earth (lithosphere, hydrosphere, atmosphere, biosphere). Have them use a digital tool to illustrate the results graphically and share their work with the class.
2. Working in cooperative groups, have students develop, test and evaluate plans outlining a specific method to reduce storm water flow at a specific site in the local community (e.g., a housing construction project, the school parking lot). Have them present their findings/plans to the class, school administrators, or the local government.
3. Working in cooperative groups, have students research and investigate an area in Ohio that exhibits a unique water contamination problem (e.g., acid mine drainage in southeastern Ohio, mercury contamination in Lake Erie). Have them document recent discoveries, case studies, clean-up technologies or field investigations that are occurring. Have students use a digital tool to present their findings to the class.
4. Independent Work. Have students investigate and use different methods and tools that measure water flow and water quality, and evaluate which methods and tools are most effective for the desired outcome. Have them share their findings with the class.
5. Working in cooperative groups, have students research and evaluate the effectiveness of different tools, models and methods to collect ground water and surface water data (e.g., rate of flow, direction of movement, types of contamination). Have them present their recommendations orally, graphically or in writing.
6. Career Connection. Have students research or investigate an actual environmental event (e.g., a specific release of a toxin or contaminant) and determine how it impacted each of Earths spheres. Have them identify a body of water that has been flagged as an environmental hazard and identify careers needed to assist in analyzing the problem, developing a solution, and acting to resolve the issue. Have them identify which organizations and agencies to consult, how to mobilize the necessary resources, and their specific role in the project.

Resources

* Monday Creek - Acid Mine Drainage (<http://mondaycreek.org/what-were-doing/water-quality-data/>)

Resources

Resources

1. iPad Resources
2. Literature Connection
*Project Wet* by The Watercourse and Western Regional Environmental Education Council.
*The Usborne Science Encyclopedia*
*The Magic School Bus Wet All Over: A Book About The Water Cycle* by Pat Relf and Carolyn Bracken
3. **American Educational The Hydrologic Cycle DVD** by American Educational Products

Resources

* Water Activities (<http://geology.com/teacher/water.shtml>)

Grade 7 Science
Science 7

ESS: Atmosphere

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Cycles and Patterns of Earth and the Moon

The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

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.

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

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

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

Rights and Responsibilities

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

**The atmosphere has different properties at different elevations and contains a mixture of gases that cycle through the lithosphere, biosphere, hydrosphere and atmosphere.**

a. The atmosphere is held to the Earth by the force of gravity.
b. The atmosphere has defined layers.
c. There are defined layers of the atmosphere that have specific properties, such as temperature, chemical composition and physical characteristics.
d. Gases in the atmosphere include nitrogen, oxygen, water vapor, carbon dioxide and other trace gases.
e. Biogeochemical cycles illustrate the movement of specific elements or molecules (such as carbon or nitrogen) through the lithosphere, biosphere, hydrosphere and atmosphere.

Skills

1. Define and explain atmospheric current, climate and biogeochemical cycles.

Identify the general properties of the different layers of the atmosphere.

Recognize human-made and natural factors that can change the properties of the atmosphere.

1. Analyze real-time scientific data pertaining to air quality and properties of air to study atmospheric properties and air quality.
2. Construct a model that represents the general properties of the layers of the atmosphere.
3. Identify the different gases that are present in Earth's atmosphere.
4. Explain how human-made and natural factors can change the properties of the atmosphere.
5. Trace the different biogeochemical cycles through each of Earth's spheres.
6. Explain how greenhouse gases (including water vapor), ozone (in the atmosphere and at Earths surface), and natural events/human activities can change the properties of the atmosphere.
7. Recognize personal responsibility for the planet/stewardship.

**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 way are the properties and composition of the Earth's atmosphere essential to understanding atmospheric current, climate, and biogeochemical cycles?
2. How can greenhouse gases, ozone, and natural events/human activities change properties of the atmosphere and ultimately the climate?
3. How do elements and/or molecules move between the different layers of the atmosphere?

Standards Vocabulary

1. thermosphere
2. stratosphere
3. mesosphere
4. ionosphere
5. exosphere
6. troposphere
7. ozone layer
8. greenhouse gases
9. Oxygen (O2)
10. Nitrogen (N)
11. Carbon Dioxide (CO2)
12. Ozone (O3)

Stage 2: Assessment Evidence

Filtration Mask Exploration

Formative: Lab Assignment

Working in cooperative groups, students will develop a method of testing and evaluating the best material to use in a physical filtration mask used by humans that are exposed to particulate matter (e.g., mold, dust, soil, ash). They will compile and analyze test methods and data and present their final recommendations (based on the scientific evidence) to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Ozone Levels Over Time

Formative: Performance

Working with a partner, students will use ozone data from the stratospheric level to generate a graph that illustrates the changes in the ozone over a specific period of years. Partners will write a conclusion on what has happened to the ozone layer over the years and share their work with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Relationships Between Air Pressure, Temperature and Altitude

Formative: Comparative Study

Working in cooperative groups, students will plan and implement an investigation to test the relationship between air pressure, elevation and temperature. They will determine where to find reliable data sets that can be used to verify the hypothesis and analyze the data and make a final determination. They will write a final analysis and conclusion to share with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Air Quality Informational Pamphlet

Summative: Research Project

Working with a partner, students will imagine that they have been employed by the Center For Disease Control. Their job will be to create a tri-fold brochure about the air quality of the Cleveland area and how it affects persons living in the area. When completed, students will share their brochure 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

Working in cooperative groups, have students develop a method of testing and evaluating the best material to use in a physical filtration mask used by humans that are exposed to particulate matter (e.g., mold, dust, soil, ash). Have them compile and analyze test methods and data and present their final recommendations (based on the scientific evidence) to the class.

1. Working with a partner, have students use ozone data (See Links) from the stratospheric level to generate a graph that illustrates the changes in the ozone over a specific period of years. Have partners share their work with the class.

Working in cooperative groups, have students plan and implement an investigation to test the relationship between air pressure, elevation and temperature. Ask them to determine where to find reliable data sets that can be used to verify the hypothesis. Analyze the data and make a final determination. Have them write a final analysis and conclusion to share with the class.

1. Working with a partner, have students imagine that they have been employed by the Center for Disease Control. Their job is to create a tri-fold brochure about the air quality of the Cleveland area and how it affects persons living in the area. The tri-fold brochure should include the following:
a. Front cover page
b. Information about what is in the air (what SHOULD be there and what SHOULDNT)
c. How it (what shouldnt be there) got there (sources)
d. The health effects of what is in the air (good or bad)
e. What can be done to improve it
f. Back cover page with additional resources (websites, books, organizations, etc.).
The information obtained for the project should come from many resources (Internet, library, professionals in the field, etc.). Outside resources used should be listed on the back cover. Information presented should be up to date and relevant to the geographic location.

Resources

* Graphing Ozone Data (<http://cse.ssl.berkeley.edu/SegwayEd/lessons/Ozone/graphing.html>)

Resources

Resources

1. iPad Resources
2. Literature Connection
*Project Wet* by Watercourse and Western Regional Environmental Education Council
*The Usborne Science Encyclopedia*
3. Contact your local news station and have a meteorologist come to visit.
4. The Weather Channel for Kids (See Link.)
5. National Center for Atmospheric Research (See Link.)

Resources

* Weather Channel Kids (<http://www.theweatherchannelkids.com/>)

Grade 7 Science
Science 7

ESS: Currents

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Cycles and Patterns of Earth and the Moon

The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

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).

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

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

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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Rights and Responsibilities

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

**Thermal-energy transfers in the ocean and the atmosphere contribute to the formation of currents, which influence global climate patterns.**

a. The sun is the major source of energy for wind, air and ocean currents and the hydrologic cycle.
b. As thermal energy transfers occur in the atmosphere and ocean, currents form.
c. Large bodies of water can influence weather and climate.
d. The jet stream is an example of an atmospheric current and the Gulf Stream is an example of an oceanic current.
e. Ocean currents are influenced by factors other than thermal energy, such as water density, mineral content (such as salinity), ocean floor topography and Earths rotation.
f. All of these factors delineate global climate patterns on Earth.
g. Regional temperature and precipitation contribute to the identification of climatic zones.

Skills

1. Explain the relationship among atmospheric and oceanic currents and climate.
2. Identify and explain why the factors contribute to the global climate.
3. Investigate current and climate patterns on a global level using a variety of maps, models and technology.
4. Investigate and compare the general patterns of the jet stream and Gulf Stream using a world map.
5. Analyze data to determine the pattern of the Gulf Stream and compare present patterns with documented seasonal patterns.
6. Explain how the causes of moving currents in the atmosphere and ocean are connected to thermal energy, density, pressure, composition and topographic/geographic influences.
7. Appreciate God's awesome design of our earth 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.

Resources

Essential Questions

1. How do oceanic currents form and how do they affect climate?
2. How do atmospheric currents form and how do they affect climate?
3. Why is there a relationship between thermal energy and the moving currents?

Standards Vocabulary

1. current
2. Coriolis effect
3. climate
4. El Nio
5. upwelling
6. jet stream
7. Gulf Stream
8. atmospheric current
9. oceanic current
10. thermal energy
11. air pressure
12. water density
13. density
14. pressure
15. composition
16. topographic/geographic influences

Stage 2: Assessment Evidence

Buoy Patterns Over Five Years

Summative: Comparative Study

Working in cooperative groups, students will analyze real-time drifter buoy data to determine the pattern of the Gulf Stream. They will compare the present pattern with documented seasonal patterns over a five-year period. Using quantifiable data, they will outline factors that contribute to the changing patterns and influence of the Gulf Stream. They will share their findings with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Velocity of the Gulf Stream Map

Formative: Performance

Students will record drifter-buoy velocity data in a graph or chart. They will use the velocity data to make a simple map showing the general patterns of the Gulf Stream. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Gulf Stream Voyage

Formative: Cooperative Group Work

Working in cooperative groups, students will be engaged in a real-time data project tracking the Gulf Stream using the resources provided (see Links). Students will work in pairs within a group of six to do all of the activities connected with the project. When completed, they will bring all of their different information together to assess their understanding of the effects of the Gulf Stream. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Working in cooperative groups, have students analyze *real-time drifter buoy data* to determine the pattern of the Gulf Stream. Have them compare the present pattern with documented seasonal patterns over a five-year period. Using quantifiable data, outline factors that contribute to the changing patterns and influence the Gulf Stream. (See Links). Have them share their findings with the class.
2. Independent Work. Have students record drifter-buoy *velocity* data in a graph or chart. Have them use the velocity data to make a simple map showing the general patterns of the Gulf Stream. (Research the documented patterns of the *Jet Stream* in the Links.)
3. Gulf Stream Voyage. Working in cooperative groups, engage students in a real-time data project tracking the Gulf Stream using the resources provided (see Links). Have them conduct all of the activities connected with the project.

Resources

* Graphic Organizers 2 (<http://www.studenthandouts.com/graphicorganizers.htm>)

Resources

Resources

1. iPad Resources
2. Literary Connection
*The Usborne Science Encyclopedia*
3. Major Ocean Currents - game/activity (See Link for game instructions and cards)

Resources

* National Weather Service (<http://www.srh.weather.gov/jetstream/atmos/atmos_intro.htm>)

Grade 7 Science
Science 7

ESS: Earth, Moon, and Sun

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Earth and Space Science (ESS)

Topic: Cycles and Patterns of Earth and the Moon

The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

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.

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

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

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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Rights and Responsibilities

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

**The relative patterns of motion and positions of the Earth, moon and sun cause solar and lunar eclipses, tides and phases of the moon.**

a. The moons orbit and its change of position relative to the Earth and sun result in different parts of the moon being visible from Earth (phases of the moon).

b. A solar eclipse occurs when Earth moves into the shadow of the moon (during a new moon).
c. A lunar eclipse occurs when the moon moves into the shadow of Earth (during a full moon).
d. The parts of an eclipse are umbra and penumbra.
e. Gravitational force between the Earth and the moon causes daily oceanic tides (neap and spring).
f. When the gravitational forces from the sun and moon align (at new and full moons) spring tides occur.
g. When the gravitational forces of the sun and moon are perpendicular (at first and last quarter moons), neap tides occur.

Skills

1. Create models and simulations to demonstrate the changing positions of the moon and Earth (as they orbit the sun) and lunar/solar eclipses, daily tides, neap and spring tides, and the phases of the moon.
2. Explain the role of gravitational forces and tides in relationship to the position of the Earth, moon and sun.

Recognize the different phases of the moon.

1. Cite evidence showing that objects in the solar system are in regular and predictable motions that explain such phenomena as days, years, seasons, eclipses, tides and moon cycles.
2. Label and construct a model showing the parts of eclipses.
3. Recognize that the Earth and its solar system are part of the Milky Way galaxy, which are part of the universe.
4. Chart or graph phases of the moon, Earths rotation, sun position and resulting tidal data for one month.
5. Differentiate between spring and neap tides.
6. Appreciate the Earth God has given to us.

**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 the moon's orbit and its change of position relative to the Earth and sun result in different parts of the moon being visible from Earth?
2. Why do solar and lunar eclipses occur?
3. In what way does the gravitational pull between the Earth and moon affect oceanic patterns?
4. Why are the phases of the moon and tides considered cyclical?

Standards Vocabulary

1. new moon
2. full moon
3. 1st quarter moon
4. 3rd quarter moon
5. solar eclipse
6. lunar eclipse
7. umbra
8. penumbra
9. spring tide
10. neap tide
11. partial solar eclipse

Stage 2: Assessment Evidence

Models of Solar and Lunar Eclipses

Formative: Cooperative Group Work

Working in cooperative groups, students will design and conduct an experiment using 3-D modeling, drawing or technology to represent the factors that must exist for a full or partial solar or lunar eclipse. They will use actual data to create the model. When completed, they will present their model with detailed explanation to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Moon and Tide Tracking

Summative: Project

Students will create a data table and track the following information for a specific location for each day for one month: a. Moon phase (possibly drawing this for differentiation) b. High and low tide times and height (two times a day) from the Wave Cast Website c. Sun, Earth, moon positions (drawing) At the end of the month, using their knowledge of Spring and neap tides, students will highlight the day(s) of that month that exhibited the strongest spring tide and the day(s) that exhibited the most neutral neap tide. They will create a graph to represent the high and low tides of the month. Then, the students will use data collected to explain why the day(s) they picked for the strongest spring tide and the most neutral Neap tide were selected. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Stage 3: Learning Plan

Learning Experiences

1. Working in cooperative groups, have students design and conduct an experiment using 3-D modeling, drawing or technology to represent the factors that must exist for a full or partial solar or lunar eclipse. Use actual data to create the model. Present with detailed explanation to the class.
2. Independent Work. Have students create a data table and track the following information for a specific location for each day for one month:

a. Moon phase (possibly drawing this for differentiation)

b. High and low tide times and height (two times a day) from the Wave Cast Website

c. Sun, Earth, moon positions (drawing)

At the end of the month, using their knowledge of spring and neap tides, have students highlight the day(s) of that month that exhibited the strongest spring tide and the day(s) that exhibited the most neutral Neap tide. Have them create a graph to represent the high and low tides of the month. Then, have students use data collected to explain why the day(s) they picked for the strongest Spring Tide and the most neutral neap tide were selected.

Resources

* Wave Cast ([http://wavecast.com/tides/?location=Edgartown\_Marthas\_Vineyard\_Mass.txtlocationName=nEdgartown%20Marthas%20Vineyard%20Mass](http://wavecast.com/tides/?location=Edgartown_Marthas_Vineyard_Mass.txt&locationName=nEdgartown%20Marthas%20Vineyard%20Mass))

Resources

Resources

1. iPad Resources
2. Literature Connection
*The Usborne Science Encyclopedia*
3. See Link for a blog with note taking with models

Resources

* Sun and Earth Notes Ideas (<http://teachingwithstowe.blogspot.com/2012/07/revolve-and-rotate.html>)

Grade 7 Science
Science 7

LS: Cycles of Matter and Flow of Energy

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Life Science (LS)

Topic: Cycles of Matter and Flow of Energy

Matter is transferred continuously between one organism to another and between organisms and their physical environments.

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.

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.6-8.1b. 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.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

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.

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.

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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Rights and Responsibilities

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

**Matter is transferred continuously between one organism to another and between organisms and their physical environments.**

a. Plants use the energy in light to make sugars out of carbon dioxide and water (photosynthesis).
b. The sugar materials can be used and immediately stored for later use.
c. Organisms that eat plants break down plant structures to produce the materials and energy they need to survive. Then they are consumed by other organisms.

d. Energy can transform from one form to another in living things.
e. Animals get energy from oxidizing food, releasing some of its energy as heat.

f. The total amount of matter and energy remains constant, even though its form and location change. (Conservation of Matter and Energy)

g. Chemical reactions can be explained as the rearrangement of atoms in molecules.
h. Elements are continuously recycled.

Skills

1. Define and explain photosynthesis and respiration.
2. Explain how matter and energy are transferred between organisms.
3. Recognize that the total amount of matter and energy remains constant in an ecosystem, even though the form and location undergo continual change.
4. Explain the phenomena showing that photosynthetic cells convert solar energy into chemical energy that is used to carry on life functions or is transferred to consumers and used to carry on their life functions.
5. Compare and contrast photosynthesis and cellular respiration.
6. Investigate the exchange of oxygen and carbon dioxide between living things and the environment.
7. Compare the reactants and products of both photosynthesis and cellular respiration.
8. Examine and identify the chloroplasts in a leaf cell.
9. Identify the materials used by plants to make food.
10. Create a chart that compares the reactants and products of photosynthesis and respiration.
11. Model the pathways of water, oxygen, and carbon dioxide through a plant.
12. Describe the movement of oxygen and carbon dioxide between living things and the environment.
13. Describe structures that animals use to obtain oxygen.
14. Cite evidence of how energy and matter are conserved in an ecosystem.

Distinguish between photosynthesis and respiration and illustrate how the two processes are connected.

Create a chart that compares the reactants and products of both photosynthesis and respiration.

1. Identify the cellular structures primarily responsible for photosynthesis and respiration.
2. Interpret a diagram to explain how oxygen and carbon dioxide are exchanged between living things and the environment.
3. Recognize that energy rich molecules that are passed from organism to organism are eventually recycled by decomposers back into mineral nutrients usable by plants.
4. Investigate how overpopulation impacts an ecosystem.
5. Investigate and appreciate the great diversity among organisms provided by God.
6. Demonstrate a respect for life (people, plants, animals).

**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 energy transform from one form to another in living things?
2. How do chloroplasts in a plant cell convert energy from the sun into sugar and sugar polymers?
3. How is photosynthesis different and similar to cellular respiration?
4. In what way is the total amount of matter constant in an ecosystem?

Standards Vocabulary

1. photosynthesis
2. respiration
3. chloroplasts
4. chlorophyll
5. carbon dioxide
6. sugar
7. starch
8. oxygen
9. stomata
10. respiration
11. reactants
12. Law of Conservation of Matter
13. Law of Conservation of Energy

Stage 2: Assessment Evidence

Photosynthesis vs. Cellular Respiration

Formative: Posters

Students will create a poster that illustrates and explains the processes of cellular respiration (in animals) and photosynthesis (in plants). Their poster should reflect the connection between the two processes and also have displayed the formulas of both. The graphic should show the flow of materials as indicated by arrows. They will share their poster with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Energy Pipeline (from Project Wild)

Summative: Cooperative Group Work

Working in cooperative groups, students will simulate organic production and energy loss for major trophic levels in an ecosystem. The class will act as a "growth" assembly line that becomes increasingly complex with each round of play. (See Project Wild page 105 for directions). Groups will draw a diagram that illustrates the energy flow in a simple ecosystem showing how energy is dissipated at each level and how it reflects the complexity of interactions among organisms within the system. (See Project Wild in the Links) They will share their chart with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Biomass Products

Formative: Writing Assignment

Students will evaluate the pros and cons of using biomass products such as ethanol vs. traditional fossil fuels including anticipated real-world effects for production and usage of biomass products vs. traditional fossil fuels. They will prepare a digital presentation to share 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. Independent Work. Have students create a poster that illustrates and explains the processes of cellular respiration (in animals) and photosynthesis (in plants). Their poster should reflect the connection between the two processes and also have displayed the formulas of both. The graphic should show the flow of materials as indicated by arrows. Have them share the poster with the class.
2. Energy Pipeline Activity. Working in cooperative groups,

have students simulate organic production and energy loss for major trophic levels in an ecosystem. Have the class act as a "growth" assembly line that becomes increasingly complex with each round of play. (See *Project Wild* page 105 for directions).

Have them draw a diagram that illustrates the energy flow in a simple ecosystem showing how energy is dissipated at each level and how it reflects the complexity of interactions among organisms within the system. (See *Project Wild* in the Links)

Independent Work. Ethanol, a plant product, is used in place of fossil fuels. Have students evaluate the pros and cons of using biomass products such as ethanol vs. traditional fossil fuels including anticipated real-world effects for production and usage of biomass products vs. traditional fossil fuels. Have them prepare a digital presentation to share with the class.

Resources

* Elodea Photosynthesis Lab (<http://kenpitts.net/bio/energy/elodea_lab.htm>)

Resources

1. iPad Resources
2. Literature Connection
*Photosynthesis* by Alvin Silverstein and Virginia Silverstein
*Respiration and Photosynthesis* by Donna Latham
*The Usborne Science Encyclopedia*
*Project WILD* by the Council for Environmental Education

Resources

* Photosynthesis Presentations (<http://www.neok12.com/Photosynthesis.htm>)

Grade 7 Science
Science 7

LS: Biomes

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Life Science (LS)

Topic: Cycles of Matter and Flow of Energy

Matter is transferred continuously between one organism to another and between organisms and their physical environments.

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.

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.6-8.1b. 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.

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

Rights and Responsibilities

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

**In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.**

a. Biomes are regional ecosystems characterized by distinct types of organisms that have developed under specific soil and climatic conditions.

b. The variety of physical (abiotic) conditions that exists on Earth gives rise to diverse environments (biomes) and allows for the existence of a wide variety of organisms (biodiversity).

c. Ecosystems are dynamic in nature; the number and types of species fluctuate over time.
d. Disruptions, deliberate or inadvertent, to the physical (abiotic) or biological (biotic) components of an ecosystem impact the composition of an ecosystem.

Skills

1. Recognize that biomes are defined by abiotic components of the environment topography, soil types, precipitation, solar radiation and temperature.
2. Connect biomes to climate zones on a global level by using a variety of maps, models and technology.
3. Compare and contrast the different biomes found on Earth.
4. Recognize that the Earths biomes include aquatic (freshwater, brackish water and marine water), forest (tropical and temperate), desert (cold and hot), grassland, taiga and tundra.
5. Illustrate how biomes link to climate zones on a global level by using a variety of maps, models and technology
6. Trace and explain how matter and energy are transferred through an ecosystem.
7. Identify and connect the biotic and abiotic elements of the major biomes.
8. Explain how ecosystems are composed of linked and fluctuating interactions between biotic and abiotic factors.
9. Identify the factors that cause the populations of organisms in ecosystems to increase at rapid rates.
10. Investigate factors that can limit population growth.
11. Recognize that as one population proliferates, it is held in check by one or more environmental factors.
12. Explain how a damaged ecosystem is likely to recover in a succession of stages that eventually results in a system similar to the original one after a natural disaster such as a flood or fire occurs.
13. Investigate and appreciate the great diversity among organisms.

**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 way do different factors determine the type of biome found in an area?
2. In what ways do number and types of species in an ecosystem fluctuate over time?
3. How can population growth be limited in an ecosystem?
4. How are matter and energy transferred through an ecosystem?

Standards Vocabulary

1. biome
2. abiotic
3. biotic
4. biodiversity
5. ecosystems
6. predator
7. prey
8. limiting factors
9. aquatic biomes
10. forest biomes
11. desert biomes
12. grassland
13. taiga
14. tundra
15. climate zones
16. parasites
17. decomposers
18. succession

Stage 2: Assessment Evidence

Endangered Species Report

Summative: Performance

Students will research an endangered or threatened species and examine environmental conditions that may have contributed to that organisms classification. They will find evidence to determine if any conservation efforts have been employed and document whether or not the efforts have been successful. They will share their report with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Create Your Own Ecosystem

Summative: Online Learning

Working with a partner, students will engage in the Habitable Planet Interactive lab designed to build an ecosystem and explore the interrelationships between biotic and abiotic factors and their changes. (See Links) When students have completed the lab, they will write a report explaining how biotic and abiotic factors affect an ecosystem and how changes in such factors can alter the ecosystem. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Ohio's Wetland Mitigation Plan

Summative: Research Project

Working in cooperative groups, students will analyze or critique the impact of Ohios wetland mitigation plans on a local community or the state as a whole. They will include real-world data from the sites in the analysis or critique. If feasible, they will monitor the local environment (e.g., stream, river, construction site) for the impact Ohios wetland mitigation plans have on water quality (e.g., oxygen levels, pH, phosphorus levels, nitrogen levels) and how the plans will impact living organisms (e.g., algae, diatoms, mussels, insect larvae). Finally, they will anticipate future trends on the flora and fauna in the ecosystem based upon the real-world data. Groups will share their findings with the class and, if possible, a local environmental group. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Stage 3: Learning Plan

Learning Experiences

1. Independent Work. Have students research an endangered or threatened species and examine environmental conditions that may have contributed to that organisms classification. Have them find evidence to determine if any conservation efforts have been employed and document whether or not the efforts have been successful. Have them share their report with the class.
2. Habitable Planet Interactive Lab. Working with a partner, have students engage in the interactive lab designed to build an ecosystem and explore the interrelationships between biotic and abiotic factors and their changes. (See Links.) When students have completed the lab, have them write a report explaining how biotic and abiotic factors affect an ecosystem and how changes in such factors can alter the ecosystem.
3. Working in cooperative groups, have students analyze or critique the impact of Ohios wetland mitigation plans on a local community or the state as a whole. Have them include real-world data from the sites in the analysis or critique. If feasible, have them monitor the local environment (e.g., stream, river, construction site) for the impact Ohios wetland mitigation plans have on water quality (e.g., oxygen levels, pH, phosphorus levels, nitrogen levels) and how the plans will impact living organisms (e.g., algae, diatoms, mussels, insect larvae). Finally, have them anticipate future trends on the flora and fauna in the ecosystem based upon the real-world data. Have them share their findings with the class and, if possible, a local environmental group.

Resources

* Habitable Planet (<http://www.learner.org/courses/envsci/interactives/ecology/index.php>)

Resources

Resources

1. iPad Resources
2. Literature Connection
*Biomes and Ecosystems* by Barbara J. Davis
*Project WILD* by the Council for Environmental Education
*Project WILD Aquatic* by the Council for Environmental Education
*The Usborne Science Encyclopedia*

Resources

* Project Wild (<http://www.projectwild.org>)

Grade 7 Science
Science 7

PS: Atoms and Elements

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Physical Science (PS)

Topic: Conservation of Mass and Energy

The properties of matter are determined by the arrangement of 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.

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

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

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

Rights and Responsibilities

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

**The properties of matter are determined by the arrangement of atoms.**

a. Elements can be organized into families with similar properties, such as highly reactive metals, less-reactive metals, highly reactive nonmetals and some gases that are almost completely nonreactive.

b. Substances are classified according to their properties, such as metals and acids.

c. When substances interact to form new substances, the properties of the new substances may be very different from those of the old, but the amount of mass does not change.

**Note:** This is the conceptual introduction of the Periodic Table of Elements.

**Note 2:** Acids and bases are included in this topic.

Skills

1. Determine the chemical symbol, atomic number and/or atomic mass of an element given the name of the element.
2. Analyze atomic structure utilizing the periodic table.
3. Recognize that elements are organized into groups based on their properties (including melting and/or boiling points) and position on the periodic table.
4. Explain that groups of elements include metals, non-metals and gases that are almost completely nonreactive.
5. Identify an element as a metal, nonmetal, metalloid or noble gas using the periodic table
6. Identify atoms, molecules, ions, elements and compounds.
7. Determine valance electrons of an element by its location on the Periodic Table.
8. Use the periodic table to predict how reactive an element is.
9. Recognize the relationship between the atomic number and the number of protons of an element.
10. Predict the patterns of bonding and the behavior of elements by their location on the Periodic Table.
11. Identify ways various elements are used in everyday life.
12. Recognize that nonreactive gases exist primarily as elements and do not react to form many compounds.
13. Explain that most metals are malleable, have high melting points, are usually solid at room temperature and are good conductors of heat and electricity.
14. Explain that nonmetals are poor conductors of heat and electricity, are usually gases at room temperature and, as solids, tend to be dull and brittle.
15. Explain a mixture as materials composed of two or more substances that retain their separate atomic compositions, even when mixed.
16. Create a variety of mixtures to show that two or more substances that retain their separate atomic compositions.
17. Compare and evaluate the acidity or alkalinity of a compound found in the natural world (i.e., streams, soil, air).
18. Analyze how acidity and alkalinity values impact the natural world (i.e., why high acidity in water ecosystems from acid rain can impact the organisms that live there).
19. Explain that the pH scale has a range of 0-14.
20. Determine the pH value of acids and alkaline substances.
21. Relate acidity and alkalinity values to their use in the natural world.
22. Explain how the arrangement of atoms determines properties specific to a certain state of matter.
23. Define physical change.
24. Define chemical change.

Match the properties of a state of matter with the picture of a sample representative of a specific state of matter.

1. Appreciate the Earth that God has given to us.

**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 way are elements organized in the periodic table?
2. How does the structure of matter influence its physical and chemical behavior?
3. In what way does the Law of Conservation of Matter apply when substances interact?
4. How are acidity and alkalinity of a compound important in the natural world?

Standards Vocabulary

1. atom
2. mixture
3. element
4. compound
5. metals
6. non-metals
7. acids
8. bases
9. pH Scale
10. malleable
11. reactive
12. melting point
13. conductor
14. substances
15. chemical change
16. physical change
17. atomic mass
18. period
19. group
20. chemical symbol
21. alkaline metals
22. alkaline earth metals
23. metalloid
24. family
25. halogen
26. noble gases

Stage 2: Assessment Evidence

Egg Drop

Summative: Lab Assignment

Working in cooperative groups, students will use their knowledge about the properties specific to certain types of material used for packaging to design packaging (using various types of materials) for an egg that will allow the package to drop from a considerable height without breaking. They will test their design, record their results, organize, and communicate their resulting data in multiple formats to share with the class. Students will write a reflection on what they used and why and then a summary at the end of what happened to their egg and why their design was or was not successful. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

It's "Element"ry Brochure

Formative: Technology Project

Students will use a digital tool to create an informational brochure on a specific assigned element from the periodic table. The brochure should address: family,group, atomic number, atomic weight, Bohr model, metal/non-metal/gas, melting point, boiling point, reactivity, and uses in everyday life. When the brochure is finished, students will share it with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Working in cooperative groups, have students use their knowledge about the properties specific to certain types of material used for packaging to design packaging (using various types of materials) for an egg that will allow the package to drop from a considerable height without breaking. Have the students test their design, record their results, organize and communicate their resulting data in multiple formats to share with the class.
Have students write a reflection on what they used and why and then a summary at the end of what happened to their egg and why their design was or was not successful.
2. Independent Work. Have students use a digital tool to create an informational brochure on a specific assigned element from the periodic table. The brochure should address: family, group, atomic number, atomic weight, Bohr model, metal/non-metal/gas, melting point, boiling point, reactivity, and uses in everyday life. When the brochure is finished, have them share it with the class.

Resources

* Middle School Science (<http://www.middleschoolscience.com/index.html>)

Resources

1. iPad Resources
2. Literature Connection
*Atoms* by Chris Oxlade
*Atoms and Molecules* by Richard Spilsbury and Louise Spilsbury
*The Usborne Science Encyclopedia*
*The Elements Song* by Tom Lehrer

Resources

* Tom Lehrer's "The Elements Song" (<http://www.youtube.com/watch?v=zGM-wSKFBpo>)

Grade 7 Science
Science 7

PS: Conservation of Matter and Energy

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Physical Science (PS)

Topic: Conservation of Mass and Energy

The properties of matter are determined by the arrangement of 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.

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.

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.6-8.1a. 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.

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

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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Rights and Responsibilities

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

**Energy can be transformed or transferred but is never lost.**

a. When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after transfer. Conservation of Energy.
b. When energy is transformed from one form to another, the total amount of energy remains the same. Conservation of Matter.

Skills

1. Recognize that energy can change forms, but the total amount of energy remains constant.
2. Describe how an object can have potential energy due to its position or chemical composition and can have kinetic energy due to its motion.
3. Design an experiment to show how some systems dissipate less energy than others.
4. Recognize that a closed system is one that does not interact with its surroundings.

Recognize that energy or matter cannot enter or leave a closed system.

1. Recognize that most systems on Earth are open systems.
2. Explain that matter and energy can be transferred into or out of an open system.

Describe two ways that energy can leave a system so it may appear to disappear.

1. Identify ecosystems, the atmosphere, the hydrosphere, the solar system and the human body as systems.
2. Develop a model showing the energy movement in closed and open systems.
3. Recognize that energy which is transformed into thermal energy (dissipated energy) and released into the surroundings is difficult or impossible to recapture.
4. Explain how some systems dissipate less energy than others, leaving more energy to use.

Explain where the energy of a swinging pendulum goes as it slows to an eventual stop.

Explain why the energy from a teaspoon of hot water appears to have disappeared as it is placed into a gallon of room temperature water.

1. Recognize that the sun, which is a gift from God, is an energy source for the earth.

**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 can matter and energy be transferred into or out of an open system?
2. Why do we say that energy cannot be lost or created?

Standards Vocabulary

1. open system
2. closed system
3. energy transfer
4. Conservation of Energy
5. Conservation of Matter
6. thermal energy
7. kinetic energy
8. potential energy
9. transfer
10. dissipated energy

Stage 2: Assessment Evidence

Roller Coaster

Formative: Lab Assignment

Working in cooperative groups, students will design and construct a roller coaster so that a marble will travel over a track that involves at least three hills. They will apply the Law of Conservation of Energy to the roller coaster design. They will make a series of bar graphs that show kinetic energy, potential energy and thermal energy for eight different positions on the roller coaster. Each set of bar graphs will be placed on a different index card for each position and cards will be shuffled. Groups will switch index cards and roller coaster designs. They will organize the index cards in the correct order for the coaster. As a class, students will reflect on what they learned about the conservation of energy from this activity. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Skate Park

Formative: Class Work

Students will plan and implement a scientific experiment to explore energy transformations for a skateboarder using the Skate Park simulation (see Links). The program can track changes in different types of energy over time. They will graphically represent the energy of the skateboarder during a run and analyze the data to determine patterns and trends and formulate a conclusion about energy transformations. They will summarize the experiment in writing and share with the class. The class will use the results from different groups to compare different designs to the energy graphs and support the conclusion with experimental evidence. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Building a Machine

Summative: Cooperative Group Work

Students will design and construct a machine that performs a simple task in many steps. (See Links) They will use materials that are lying around the classroom and the home or, if possible, they will use design software to make a labeled pictorial representation of the design.Students will test the machine as each additional component is added and explain the solutions to problems they encountered during testing. They will redesign their machine to solve problems encountered during the testing and trace all the energy transformations that occur as the machine performs its task. Finally, students will record any problems encountered as well as the changes made to the machine to overcome these problems. Groups will share their results 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. Working in cooperative groups, have students design and construct a roller coaster so that a marble will travel over a track that involves at least three hills. Apply the Law of Conservation of Energy to the roller coaster design.As a class, have the students reflect on what they learned about the conservation of energy from this activity.

Make a series of bar graphs that show kinetic energy, potential energy and thermal energy for eight different positions on the roller coaster.

Place each set of bar graphs on a different index card for each position and shuffle the cards. Switch index cards and roller coaster designs with another group in the class. Organize the index cards in the correct order for the coaster.

Working with a partner, have students plan and implement a scientific experiment to explore energy transformations for a skateboarder using the *Skate Park* simulation (See Links). The program can track changes in different types of energy over time. Graphically represent the energy of the skateboarder during a run. Analyze the data to determine patterns and trends and formulate a conclusion about energy transformations. Summarize the experiment in writing and share with the class. Use the results from different groups in the class to compare different designs to the energy graphs and support the conclusion with experimental evidence.

Working in cooperative groups, have students design and construct a machine that performs a simple task in many steps. (See Links) Use materials that are lying around the classroom and the home or, if possible, have them use design software to make a labeled pictorial representation of the design.
Have the students test the machine as each additional component is added and explain the solutions to problems they encountered during testing. Have them redesign their machine to solve problems encountered during the testing. Have them trace all the energy transformations that occur as the machine performs its task. Finally, have the students record any problems encountered as well as the changes made to the machine to overcome these problems and have them share their results with the whole class.

Resources

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

Resources

1. iPad Resources
Coaster Physics - create and build your own coaster and then "ride it" while it graphs your potential and kinetic energy
2. Literature Connection
*Kinetic Energy: The Energy of Motion* by Don Nardo
*Kinetic and Potential Energy: Understanding Changes Within Physical Systems* by Jennifer Viegas
*Energy: Its Forms, Changes, Functions* by Tom DeRosa and Caroly Reeves
*The Usborne Science Encyclopedia*

Resources

* Kinetic and Potential Energy (<http://www.youtube.com/watch?v=vl4g7T5gw1M>)

Grade 7 Science
Science 7

PS: Energy Transfer

Stage 1: Desired Results

Catholic Standards

Targeted Standards

OH Grade 7 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.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others ideas and expressing their own clearly.

SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

SL.7.1c. Pose questions that elicit elaboration and respond to others questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d. Acknowledge new information expressed by others and, when warranted, modify their own views.

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

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

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

SL.7.3. Delineate a speakers argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

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.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; 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.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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

SL.7.6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

OH Grade 7 OH: Science (2011)

Physical Science (PS)

Topic: Conservation of Mass and Energy

The properties of matter are determined by the arrangement of 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).

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

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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Rights and Responsibilities

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

**Energy can be transferred through a variety of ways.**

a. Kinetic energy is the energy a body possesses by virtue of being in motion.
b. Potential energy is the energy possessed by a body by virtue of its position relative to others, stresses within itself, electric charge, and other factors.
c. Mechanical energy can be transferred when objects push or pull on each other over a distance.
d. Electromagnetic waves transfer energy when they interact with matter.
e. Thermal energy can be transferred through radiation, convection and conduction.
f. Electrical energy transfers when an electrical source is connected in a complete electrical circuit to an electrical device.
g. Electricity can be measured through current, voltage and resistance.
h. Renewable energy systems include wind, geothermal, water and solar.
i. The types of waves used include seismic, oceanic, sound and light.
j. Waves can be classified as transverse or longitudinal.
k. Wave are described in terms of speed, wavelength, amplitude and frequency.
l. Sound waves are described by pitch and frequency.

Skills

1. Identify the types, sources and uses of energy (solar, thermal, chemical, mechanical. thermonuclear, photoelectric and electromagnetic, kinetic and potential).

Recall four different ways that energy can be transferred between two objects.

1. Give examples of energy transformation.
2. Apply the Law of Conservation of Energy to various energy transformations.
3. Recognize that waves can be described by their speed, wavelength, amplitude and frequency.

Explain the motion of convection in liquids and gases.

1. Plan and design experiments to demonstrate how objects move differently based on the force exerted on the object (mechanical force).
2. Investigate how thermal energy can be transferred using radiation, conduction and convection by creating scenarios that transfer heat in those ways.

Explain how thermal energy can transfer from one object to another by conduction.

1. Draw conclusions about how vibrations move differently in different mediums.
2. Demonstrate the relationship between light and the appearance of an object.
3. Explain how light forms images in the human eye.
4. Relate the speed of sound to the characteristics of different media.
5. Explain the phenomena of the Doppler effect.
6. Predict the Doppler effect of a moving sound source or a moving sound receiver.
7. Differentiate between the different types of electromagnetic waves in terms of wavelength.
8. Demonstrate (using a slinky or a rope) different properties of a wave.
9. Understand how all waves transfer energy.
10. Identify the parts of a wave.
11. Recognize the relationship between frequency and wavelength to the energy of a wave.
12. Create experiments to connect energy transfer and waves to the natural world. (i.e., renewable energy).
13. Research electrical energy produced by a variety of sources.
14. Distinguish series circuits from parallel.
15. Design series and parallel circuits to show the flow of currents.
16. Prove that a parallel circuit has more than one pathway and a series circuit only has one pathway.

Explain why the flow of current is the same at all parts of a series circuit.

1. Explain how electric currents and magnets are related.
2. Define alternating and direct current.

Recognize that electrical energy in a circuit can be transferred into kinetic, thermal, light, sound and/or magnetic energy.

1. Use voltmeters and ammeters to determine the voltage, current and resistance flowing through a circuit in order to create a relationship between the three.
2. Define electromagnet.
3. Give the factors that affect the strength of an electromagnet.
4. Describe how an electromagnet is used.
5. Contrast a permanent magnet with an electromagnet.
6. Research renewable and nonrenewable energy forms.
7. Recognize that the sun, which is a gift from God, is an energy source for the earth.

**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 can waves be classified and described?
2. In what ways is mechanical energy transferred from one object to another?
3. How do the different forms of electromagnetic waves transfer energy when they interact with matter? (Can be taught with Atmosphere unit.)
4. How are light waves different than sound waves?
5. To what degree do the three forms of thermal energy transfer work together? (Can be taught with Atmosphere unit.)
6. How does electric energy transfer in the different types of circuits (i.e., parallel, series, closed)?

Standards Vocabulary

1. mechanical energy
2. transference
3. force
4. energy transfer
5. work
6. vibrations
7. waves
8. mechanical waves
9. medium
10. transverse waves
11. longitudinal waves
12. speed
13. wavelength
14. amplitude frequency
15. pitch
16. sound wave
17. loudness
18. electromagnetic waves
19. light waves
20. vacuum
21. thermal energy
22. heat
23. conduction
24. convection
25. radiation
26. density
27. fluid
28. currents
29. energy source
30. geothermal energy
31. circuit
32. potential energy
33. charges
34. voltage
35. voltmeter
36. open circuit
37. closed circuit
38. resistance
39. series circuit
40. parallel circuit
41. renewable energy
42. oceanic waves
43. seismic waves

Stage 2: Assessment Evidence

Seven Forms of Energy

Formative: Class Work

Using the lesson plan on the seven forms of energy, students will engage in an activity designed to help them understand and recognize the seven forms of energy through the completion of several card-sorting activities that require them to record and discuss their reasoning and through analysis of other groups sorting decisions. In addition, students will demonstrate their understanding of the seven forms of energy by sorting the cards (types of energy) into the proper groups and completing an assessment. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Candle Wheel

Formative: Lab Assignment

Working in cooperative groups, students design and construct a candle wheel that will turn a maximum number of times in one minute. They will test their designs for effectiveness and compare their results with the results from the other groups. The class will analyze the data to determine patterns and trends between design and effectiveness and then formulate a hypothesis about what design features are most effective. Each group will represent their design with a labeled picture constructed with design software and orally present the design to the class, explaining how energy is transferred at each step. As a class, students will compare the designs of different groups with the effectiveness of the designs. Finally, the class will engage in a discussion on the applications in which the concepts addressed in this design could be used in the real world. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Series and Parallel Circuits

Summative: Comparative Study

Working in cooperative groups, students will plan and implement a scientific experiment to investigate the amount of electric current flowing through different positions of both series and parallel circuits. Using the data, students will analyze it and compare the results for both the series circuits and the parallel circuits to determine patterns and trends. They will formulate conclusions that state what happens to the flow of electric current in a series circuit and a parallel circuit and support their conclusions with evidence from the experiment. Finally, they will explain why the flow of current is the same at all parts of a series circuit. Each group will present their findings to the class and discuss what was learned by doing this experiment. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Stage 3: Learning Plan

Learning Experiences

1. Class Activity. Using the lesson plan on the *seven forms of energy* (See Links), engage students in an activity designed to help them understand and recognize the seven forms of energy through the completion of several card-sorting activities that require them to record and discuss their reasoning and through analysis of other groups sorting decisions. In addition, students will demonstrate their understanding of the seven forms of energy by sorting the cards (types of energy) into the proper groups and completing an assessment.
2. Working in cooperative groups, have students design and construct a candle wheel that will turn a maximum number of times in one minute. Have them test their designs for effectiveness and compare their results with the results from the other groups. Have the class analyze the data to determine patterns and trends between design and effectiveness and then formulate a hypothesis about what design features are most effective.
Have each group represent their design with a labeled picture constructed with design software and orally present the design to the class, explaining how energy is transferred at each step. As a class, compare the designs of different groups with the effectiveness of the designs.
Finally, have the class engage in a discussion on the applications in which the concepts addressed in this design could be used in the real world.
3. Working in cooperative groups, have students plan and implement a scientific experiment to investigate the amount of electric current flowing through different positions of both series and parallel circuits. Ask them to organize and represent the data from the experiment. Using the data, have the students analyze it and compare the results for both the series circuits and the parallel circuits to determine patterns and trends. Have them formulate conclusions that state what happens to the flow of electric current in a series circuit and a parallel circuit. Support their conclusions with evidence from the experiment. Finally, have them explain why the flow of current is the same at all parts of a series circuit. Have each group present their findings to the class and discuss what was learned by doing this experiment.

Resources

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

Resources

1. iPad Resources
2. Literature Connection
*The Usborne Science Encyclopedia*
*The Earth's Resources: Renewable and Non-Renewable* by Rebecca Harman
*Earth's Resources* by Sue Barraclough
*Geothermal Energy: Using Earth's Furnace* by Carrie Gleason
*Generating Wind Power* by Niki Walker

Resources

* National Geographic - Education ([http://education.nationalgeographic.com/education/topics/energy/?ar\_a=1audiences=1](http://education.nationalgeographic.com/education/topics/energy/?ar_a=1&audiences=1))