Grade 5 Science
Science 5

Scientific Process and Inquiry

Stage 1: Desired Results

Catholic Standards

Targeted Standards

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

Reading: Informational Text

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

RI.5.1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

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

RI.5.2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

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

RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

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

RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

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

RI.5.5. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.

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

RI.5.6. Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.

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

RI.5.7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

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.

RI.5.8. Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

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

RI.5.9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

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

RI.5.10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

Writing

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

W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.5.2a. Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.5.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.5.2c. Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).

W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2e. Provide a concluding statement or section related to the information or explanation presented.

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

W.5.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 13 above.)

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

W.5.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

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

W.5.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

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

W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

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

W.5.8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

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

W.5.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.5.9b. Apply grade 5 Reading standards to informational texts (e.g., Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point[s]).

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

W.5.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

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

SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others ideas and expressing their own clearly.

SL.5.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.5.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.5.1c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

SL.5.1d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

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

SL.5.2. Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

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

SL.5.3. Summarize the points a speaker makes and explain how each claim is supported by reasons and 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.5.4. Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

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

SL.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

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

SL.5.6. Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Capacities of the Literate Individual

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

They demonstrate independence.

OH Grade 5 OH: Science (2011)

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of 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.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

Care for God's Creation

The Rights of Children

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

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

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

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

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

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

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

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

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

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

Content

1. Scientific process (state the problem, hypothesis, procedure, experiment, data and conclusion)
2. Scientific interpretation
3. Scientific tools and equipment
4. Science Safety
5. Ethical practices reflecting Catholic Social Justice Teachings

Skills

1. Recall, explain and use the steps of the scientific process (state the problem, hypothesis, procedure, experiment, data and conclusion) in observations and experiments.
2. Develop, design and conduct investigational experiments.
3. Select and safely use the appropriate tools to collect data when conducting investigations and communicating findings to others.
4. Identify one or more variables in a simple experiment.
5. Evaluate observations and measurements by self/others and identify reasons for discrepancies.
6. Record and organize observations (journals, charts, tables).
7. Communicate findings to others through a variety of methods (written, oral or graphic representation).
8. Read and analyze tables and graphs produced by self and others.
9. Use evidence and observations to explain and communicate the results of investigations.
10. Explain why the results of an experiment are sometimes different from expected results (unexpected and unrealized differences in investigative methods or errors in observations).
11. Discuss and apply specific science safety procedures.
12. Choose appropriate tools or instruments to safely complete the scientific investigations.
13. Organize and evaluate observations, measurements, and other data to formulate inferences and conclusions.
14. Use simple instruments correctly to make observations (thermometers, balances, scales, microscopes).
15. Interact with living things in the environment in ways that promote respect.
16. Evaluate ways that using the solution to a problem may affect people or the environment.
17. Describe the importance of keeping clear, thorough and accurate records of observation.
18. Debate positive and negative impacts of human activities and technology on the environment.
19. Explain how people conserve energy, save money and/or reduce pollution.
20. Describe, illustrate, organize, and evaluate a design process used to solve a problem (recycling or saving energy).

Summarize how conclusions and ideas change as new knowledge is gained.

Develop descriptions, explanations, and models using evidence to defend/support findings.

Identify how scientists use different kinds of ongoing investigations depending on the questions they are trying to answer.

Explain how the solution to one problem may create other problems.

Investigate positive and negative impacts of human activity and technology on the environment.

1. Use technology with gratitude and responsibility to enhance human life.

**Common Core Literacy Skills**

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

**Common Core Writing Content**

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

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

**Common Core Listening and Speaking Skills**

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

Essential Questions

1. How are scientific questions answered?
2. How is scientific knowledge generated and validated?
3. How can I investigate my ideas about nature?
4. How do I decide which scientific claims to believe? What's the evidence?

How do scientists use tools to observe, describe, and measure the interactions they find in the natural world?

1. How might advances in science and technology affect society?

Standards Vocabulary

1. experiment
2. hypothesis
3. data
4. inference
5. conclusion
6. measure
7. analyze
8. investigation
9. instruments

Stage 2: Assessment Evidence

Hershey Kiss

Formative: Lab Assignment

Working with a partner, students will observe a Hershey Kiss using their senses. They will create a chart to record their observations and share their data with the rest of the students in a class discussion. At the conclusion of the discussion, students will write a summary statement about what they learned in the exercise. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Chocolate Chips

Summative: Lab Assignment

Working with a partner, students will apply the scientific process to the chocolate chip experiment. They will identify the problem, state their hypothesis, record the procedure used in the experiment, collect their data (record observations), and write their conclusion. When the work is completed, the class will discuss the importance of following the scientific method when doing investigations. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Penny Lab

Formative: Cooperative Group Work

Working with a partner, students will complete the Penny Lab activity, completing all lab activity forms. At the conclusion of the activity, students will share their findings. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Penny Lab

Summative: Comparative Study

At the conclusion of the discussion about the Penny Lab activity, students will write a summary of the results of the two experiments in which they compare their results. 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. As a class, review the safety rules and procedures for science lessons and experiments.
2. Working with a partner, have students observe a Hershey Kiss using their senses. Have them create a chart to record their observations. Have them share their data with the rest of the students in a class discussion. At the conclusion of the discussion, have the students write a summary statement about what they learned in the exercise.
3. Have students create a flap book for the steps in the scientific method. Label the pages for each step. On the inside, write the definition or other important information that pertains to the step. Have the students keep these books to help them when doing science experiments and writing science reports.
4. Working with a partner, have the students apply the scientific process to the chocolate chip experiment. In the experiment the students will place chocolate chips on paper plates and place them in the sun. Using a hand lens they will focus the sunlight on only one plate of chips and observe what happens. Working together, have them identify the problem, state their hypothesis, record the procedure used in the experiment, collect their data (record observations), and write their conclusion. When the work is completed, conduct a class discussion to highlight the importance of following the scientific method when doing investigations.
5. Working with a partner, have students complete the Penny Lab activity. (See Links.) At the conclusion of the activity, have students share their findings.

Resources

* Science Graphic Organizers (<http://science.dadeschools.net/elem/documents/profDev/leadersSession-5-Feb-2013/Vocabulary_PP%20for%20Science%20Leaders/Science%20Graphic%20Organizers.pdf>)

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
Ba*bar 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
*Scientific Method Investigation: A Step-by-Step Guide for Middle-School Students* by Schyrlet Cameron
*How to Think Like a Scientist: Answering Questions by the Scientific Method* by Stephen P. Kramer
*Investigating the Scientific Method with Max Axiom, Super Scientist* by Donald B. Lemke
*What's Going to Happen?: Making Your Hypothesis* by Paul C. Challen
*What's the Problem?: How to Start Your Scientific Investigation* by Kylie Burns
*What's the Plan?: Designing Your Experiment* by Natalie Hyde
*What's Going On?: Collecting and Recording Your Data* by Kylie Burns
*What Do We Know Now?: Drawing Conclusions and Answering the Question* by Robin Johnson
*We Are Wise, Let's Hypothesize* by Kelly Doudna
3. Directions for Making the Flap Book: Use three sheets of computer paper. Holding them together vertically, fan the sheets out, placing one on top of the other, approximately 3/4 inch apart, from the bottom of each sheet. Hold them in that fanned position, and fold down all three papers from the top, so there are equal sized sections. You should end up with a wider title page on top and five sections below. Place two staples on the fold line using a long-arm stapler.

Resources

* Spongebob Squarepants Scientific Inquiry (<http://sciencespot.net/Media/scimthdexps.pdf>)

Grade 5 Science
Science 5

ESS: Cycles and Patterns in the Solar System

Stage 1: Desired Results

Catholic Standards

Targeted Standards

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

Reading: Informational Text

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

RI.5.1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

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

RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

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

RI.5.5. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.

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

RI.5.7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

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

RI.5.9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

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

RI.5.10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

Writing

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

W.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.5.1a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writers purpose.

W.5.1b. Provide logically ordered reasons that are supported by facts and details.

W.5.1c. Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).

W.5.1d. Provide a concluding statement or section related to the opinion presented.

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

W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.5.2a. Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.5.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.5.2c. Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).

W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2e. Provide a concluding statement or section related to the information or explanation presented.

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

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

W.5.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

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

W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

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

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W.5.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

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

SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others ideas and expressing their own clearly.

SL.5.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

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SL.5.1c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

SL.5.1d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

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SL.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Capacities of the Literate Individual

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

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OH Grade 5 OH: Science (2011)

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of grades 5-8 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:

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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.

Earth and Space Science (ESS)

Topic: Cycles and Patterns in the Solar System

The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

Solidarity

Care for God's Creation

The Rights of Children

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

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

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

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

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

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

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

Content

1. **The solar system includes the sun and all celestial bodies that orbit the sun.**
2. **Each planet in the solar system has unique characteristics.**
a. The distance from the sun, size, composition and movement of each planet are unique.
b. Planets revolve around the sun in elliptical orbits.
c. Some planets have moons and/or debris that orbit them.
d. Comets, asteroids and meteoroids orbit the sun.
3. **The sun is one of many stars that exist in the universe.**

a. The sun appears to be the largest star in the sky because it is the closest star to Earth.
b. Some stars are larger than the sun and some stars are smaller than the sun.

1. **Most of the cycles and patterns of motion between the Earth and sun are predictable.**
a. Earths revolution around the sun takes approximately 365 days.
b. Earth completes one rotation on its axis in a 24-hour period, producing day and night, making the sun, stars and moon appear to change position in the sky.
c. Earths axis is tilted at an angle of 23.5 and this tilt, along with Earths revolution around the sun, affects the amount of direct sunlight that the Earth receives in a single day and throughout the year.
d. The average daily temperature is related to the amount of direct sunlight received.
e. Changes in average temperature throughout the year are identified as seasons.

Skills

Recognize that there are eight major planets in the solar system and they all orbit the sun.

Recognize that other celestial bodies also orbit the sun.

1. Identify the planets that have a moon or moons that orbit them.
2. Recognize that the Earth is a planet that has a moon that orbits it.
3. Explain that the planets' orbits are caused by gravitational attraction to the sun.

Recognize that moons orbit around planets because of their gravitational attraction to the planets.

1. Describe and illustrate the cycles and patterns (seasons, day, night and year) involving the sun, Earth and planets.
2. Analyze and synthesize the characteristics of the planets and their orbit around the sun.
3. Explain that while there are many other stars of different sizes in the universe, the sun is a medium-sized star and is the only star in our solar system.
4. Recognize that stars appear in patterns called constellations.
5. Recall that there are many other stars in the universe and they are different sizes, but the sun appears larger because it is closer to the Earth.
6. Compare and contrast the similarities and differences between the sun and the other stars.
7. Classify and differentiate between the characteristics of the inner and outer planets.
8. Compare and contrast between the dwarf planet Pluto and the other planets.
9. Investigate the effect of gravity on an object's weight and mass between the different planets.
10. Explain that steroids are metallic, rocky bodies that orbit the sun but are too small to be classified as planets.
11. Identify meteors as a particle or chunk of metallic or stony matter called a meteoroid that enters Earths atmosphere from outer space.
12. Recognize that comets are a mixture of ices (both water and frozen gases) that are not part of a planet.
13. Describe and illustrate the similarities and differences of asteroids, comets, meteors and meteoroids.

Identify a telescope as a tool that can be used to magnify the appearance of objects in the solar system.

Recognize that the rotation of Earth on its axis produces day and night, which is why the sun, stars and moon appear to change position in the sky.

**Common Core Literacy Skills**

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

**Common Core Writing Content**

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

**Common Core Listening and Speaking Skills**

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

Essential Questions

1. How are parts of the Earth related?
2. Why is the study of the solar system important to the science of Earth Science?
3. How can patterns be used to describe the universe?
4. How do the characteristics, cycles and patterns involving the sun, Earth and planets affect one another?

Standards Vocabulary

1. solar system
2. planet
3. star
4. moon
5. orbit
6. inter planet
7. outer planet
8. gravity
9. asteroids
10. meteor
11. meteoroid
12. comets
13. dwarf planet
14. telescope
15. satellite
16. Hubble Telescope
17. light years

Stage 2: Assessment Evidence

Compare and Contrast Planets

Formative: Comparative Study

Students will make a table, chart or graphic that interprets the general characteristics of the major planets in the solar system. They will use real data (current) to compare and contrast the findings. When completed, students will select one of the planets and write a story, with illustration, about the planet. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Choose A New Planet To Live On

Summative: Research Project

Working with a partner, students will choose a planet (other than Earth) to research and develop a plan to colonize the planet with humans. They will evaluate current conditions and what would be needed to meet the basic requirements for humans to live on the other planet. They will critique the plan and make a final recommendation based on the research and present their recommendations to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Planet Model

Summative: Research Project

Working with a partner, students will choose a major planet. They will plan and build a scaled model that can demonstrate the planet size, rotation, and revolution in relationship to the sun and the Earth. Students will conduct the demonstration (with explanation) to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Meteors, Asteroids, Meteoroids and Comets

Summative: Technology Project

Working in a cooperative group, students will research the characteristics of comets, meteors, meteoroids and asteroids and use the information collected to make a Prezi, Slide Rocket or PowerPoint presentation to share with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Where to Build a Solar Energy Facility?

Not Available: Project

Working in cooperative groups, students will explore the concept that solar energy collection is most effective in areas that receive direct sunlight for long periods of time. They will research areas on Earth that receive direct sunlight. They will critique different zones of the Earth, evaluate the data and make a recommendation (using the scientific data) for locating a solar energy facility. Groups will share and defend the recommendation with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Class activity. As a class, make a table, chart or graphic that interprets the general characteristics of the major planets in the solar system. Use real data (current) to compare and contrast the characteristics. Have students select one of the planets and write a story about the planet. Include illustrations to enhance the story. (See resources in the Links.)
2. Working with a partner, have students choose a planet (other than Earth) to research and develop a plan to colonize the planet with humans. Evaluate current conditions and what would be needed to meet the basic requirements for humans to live on the other planet. Critique the plan by asking the following questions:
a. Is the plan feasible?
b. What equipment is required?
Make a final recommendation based on the research and present your recommendations to the class.
3. As a class, fill out a KWL chart to find out what the students know about gravity and weight. Then have the students use the website in the resource links and try putting their weight into the different planets, moons and stars to see how their weight changes on each planet. Record the data they find in their science journal. Come back together as a class and complete the rest of the KWL chart after they have completed the activity.
4. Working with a partner, have students choose a major planet. Plan and build a scaled model that can demonstrate the planet size, rotation, and revolution in relationship to the sun and the Earth. Conduct the demonstration (with explanation) to the class.
5. Independent work. Have the students differentiate between the sun and a red dwarf or blue giant star making a table or chart to represent the comparison. Ask them to write a summary statement about the comparison and share it with the class.
6. Working in a cooperative group, have students research the characteristics of comets, meteors, meteoroids and asteroids and use the information collected to make a Prezi, Slide Rocket or PowerPoint presentation to share with the class.
7. Project. Working in cooperative groups, have students explore the concept that solar energy collection is most effective in areas that receive direct sunlight for long periods of time. Have them research areas on Earth that receive direct sunlight. Critique different zones of the Earth. Evaluate the data and make a recommendation (using the scientific data) for locating a solar energy facility. Have the groups share and defend the recommendation with the class.

Resources

* Website on Mars (<http://www.ucls.uchicago.edu/students/projects/martiansuntimes/index.html>)

Resources

1. iPad Resources
2. Literature Connection
*The Solar System For Kids: Learn About the Planets and Other Cool Facts About Our Solar System* by Kid Reads
*What Do You See? Our Solar System* by Cane Sevenster
*Comet, Stars, the Moon and Mars: Space Poems and Paintings* by Douglas Florian
*The Sun* by Melaine Chrismer
*Comets, Meteors and Asteroids* by Seymour Simon
*Comets and Asteroids: Space Rocks* by Greg Roza
*Our Solar System* by Seymour Simon

Resources

* Planet Distance Activity Website (<http://cse.ssl.berkeley.edu/AtHomeAstronomy/activity_10.html>)

Grade 5 Science
Science 5

LS: Interactions within Ecosystems

Stage 1: Desired Results

Catholic Standards

Targeted Standards

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

Reading: Informational Text

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

RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

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

RI.5.7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

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

RI.5.9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

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

RI.5.10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

Writing

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

W.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.5.1a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writers purpose.

W.5.1b. Provide logically ordered reasons that are supported by facts and details.

W.5.1c. Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).

W.5.1d. Provide a concluding statement or section related to the opinion presented.

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

W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.5.2a. Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.5.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.5.2c. Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).

W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2e. Provide a concluding statement or section related to the information or explanation presented.

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

W.5.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 13 above.)

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

W.5.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

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

W.5.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

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

W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

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

W.5.8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

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

W.5.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.5.9a. Apply grade 5 Reading standards to literature (e.g., Compare and contrast two or more characters, settings, or events in a story or a drama, drawing on specific details in the text [e.g., how characters interact]).

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

W.5.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

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

SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others ideas and expressing their own clearly.

SL.5.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.5.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.5.1c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

SL.5.1d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

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.5.4. Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

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

SL.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

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

SL.5.6. Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Capacities of the Literate Individual

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

They demonstrate independence.

OH Grade 5 OH: Science (2011)

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of 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;

Life Science (LS)

Topic: Interactions within Ecosystems

Organisms perform a variety of roles in an ecosystem.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

Solidarity

Care for God's Creation

The Rights of Children

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

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

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

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

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

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

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

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

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

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

Content

**Organisms perform a variety of roles in an ecosystem.**

a. Populations of organisms can be categorized by how they acquire energy.

b. Food webs can be used to identify the relationships among producers, consumers and decomposers in an ecosystem.

**All of the processes that take place within organisms require energy.**

a. For ecosystems, the major source of energy is sunlight.

b. Energy entering ecosystems as sunlight is transferred and transformed by producers into energy that organisms use through the process of photosynthesis.
c. Energy that passes from organism to organism as illustrated in food webs.
d. In most ecosystems, energy derived from the sun is transferred and transformed into energy that organisms use by the process of photosynthesis in plants and other photosynthetic organisms.

1. **Relationships between the carbon dioxide/oxygen and nitrogen cycles in the ecosystems.**
2. **Differences and similarities of biomes and ecosystems.**
3. **Symbiotic relationships.**

Skills

1. Recognize that plants and some microorganisms are producers and that they are the foundation of the food web.
2. Explain how producers transform energy from the sun and make food through a process called photosynthesis.
3. Trace and illustrate the organization of simple food chains (producers/plants, consumers/animals and decomposers /bacteria and fungi) and food webs.
4. Examine and synthesize the role of producers in the transfer of energy which flows in one direction, entering ecosystems as sunlight to chemical energy through photo synthetic organisms to consumers (herbivores, omnivores and carnivores) and decomposers.
5. Recognize that the exchange of energy that occurs in an ecosystem can be represented as a food web.

Draw a food web using arrows to illustrate the flow of energy and properly identify the producers and consumers.

Compare the roles of producers, consumers and decomposers and explain how they work together within an ecosystem.

Classify them as producers, consumers, decomposers or by type of symbiotic relationships

Recognize that the exchange of energy in an ecosystem is essential because all processes of life for all organisms require a continual supply of energy.

Investigate change in an established model of an ecosystem over time.

Explain ways that humans can improve the health of ecosystems.

1. Chart the interdependent relationships of plants and animals in the carbon dioxide/oxygen cycle and the nitrogen cycle.
2. Compare and contrast properties and differences in an organism's environment/habitat that affect its survival (ecosystems and biomes).
3. Evaluate and summarize the relationships dependent upon the organisms of another species for survival.
4. Explain symbiotic relationships: Mutualism, commensalism and parasitism.
5. Investigate locally threatened or endangered species and the effects of remedial programs, species loss, and the introduction of a new species on the local environment.
6. Analyze and summarize how organisms can survive only in ecosystems in which their needs can be met (e.g., food, water, shelter, air, carrying capacity, and waste disposal).
7. Recognize that the world has different ecosystems, and distinct ecosystems support the lives of different types of organisms.
8. Describe primary features and location of major land biomes (tundra, taiga, temperate forest, tropical rainforest, desert, grassland).
9. Identify atmosphere/lithosphere and impact on biome.
10. Describe sources of power and uses in biome.
11. Describe how animals physically/behaviorally adapt to their environment.
12. Explain how specific plants and animals grow, consume nutrients, breathe, reproduce, eliminate waste, and die in a biome.
13. Explain how scientists classify living things.
14. Explain parts and types of cells (plants/animals).
15. Describe the interdependence of plants and animals within a biome.
16. Relate the effects of human activities on the environment to the justice theme of care 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. Integrate correct scientific terms.
5. Interpret pictures and diagrams.
6. Compare and contrast two texts on the same topic.
7. Utilize various text features (e.g. headings, tables of contents, glossaries, electronic menus, and icon).
8. Distinguish between pictorial and informational text.

**Common Core Writing Content**

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

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

**Common Core Listening and Speaking Skills**

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

Essential Questions

1. How do plants reproduce?
2. What would life be like without our major source of energy?
3. How do plants and animals interact with nonliving things to form an ecosystem?
4. How is energy passed through an ecosystem?
5. In what ways do organisms coexist for survival in an ecosystem?
6. How do plants and animals adapt to their habitats?
7. How do changes in the environment affect all organisms?

Standards Vocabulary

1. energy
2. ecosystem
3. food webs
4. food chains
5. symbiosis
6. commensalism
7. parasitism
8. photosynthesis
9. carbon dioxide/oxygen cycle
10. nitrogen cycle
11. producers
12. consumers
13. organisms
14. microorganism
15. ecosystems
16. shelter
17. biome
18. herbivores
19. omnivores
20. carnivores

Stage 2: Assessment Evidence

Bloom Ball

Summative: Book Report

Working in cooperative groups, students will complete a research project using a Bloom Ball on one of the biomes of the world. They will research 4 animals, 4 plants, 4 climates, and 4 other fun facts including a title about that biome. They will present their "ball" to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Create An Ecosystem

Summative: Research Project

Working with a partner, students will design and build a self-sustaining ecosystem (e.g., terrarium, bottle biology, or an aquarium). The ecosystem should include all the organisms in an area and the environment in which they live. Students will write a "how to" informational essay with diagrams on how to set up and maintain an ecosystem and share their essay with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Worm Compost Bin

Summative: Research Project

As a class, design and build a worm compost bin. Using the bin, students will identify the worm compost bin as a mini ecosystem. Using this model as an ecosystem, they will identify symbiotic relationships that may exist in similar conditions in the real world. In addition, students will:a. Research the definition of ecosystem and how to construct a worm binb. Gather information/evidence to debate if the worm bin is a mini ecosystemc. Study food chainsd. Explain ways that humans can improve the health of our ecosystemFinally, students will write a newspaper article about a new ecosystem and the symbiotic relationships that were discovered using the worm compost project. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Food Web

Formative: Technology Project

Working with a partner and given a list of common organisms and a description of their environmental interactions, students will digitally illustrate a food web using arrows to show the flow of energy. They will properly identify the producers and consumers. Finally, they will present their food web to the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Careers

Summative: Cooperative Group Work

Working in cooperative groups, students will examine the factors that impact white-tailed deer population in Ohio and determine the implications for a community when the population decreases or increases. After students have determined the implications for a community, they will identify and explore careers directly or indirectly impacted in addressing the issues. Finally, they will use digital tools to create a poster for one of the careers they identify and share it with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Resources

Stage 3: Learning Plan

Learning Experiences

1. Working in cooperative groups, have students complete a research project using a Bloom Ball, on one of the biomes of the world. Research four animals, plants, climate, and four other fun facts including a title about that biome. Present the project to the class. Share their "ball" with the class. (See Links for the template for the Bloom Ball.)
2. Working with a partner, have students design and build a self-sustaining ecosystem (e.g., terrarium, bottle biology, or an aquarium). The ecosystem should include all the organisms in an area and the environment in which they live. Considerations for the ecosystem include the size of the container, the location to create the proper temperature, light and humidity, and organisms that will support one another. Ask students to write a "how to" informational essay with diagrams on how to set up and maintain an ecosystem. Have them share their essay with the class.
3. As a class, design and build a worm compost bin. Ask the question: Are worm compost bins mini ecosystems? Using this model as an ecosystem have students identify symbiotic relationships that may exists in similar conditions in the real world. In addition, have students:
a. Research the definition of ecosystem and how to construct a worm bin
b. Gather information/evidence to debate if the worm bin is a mini ecosystem
c. Study food chains
d. Explain ways that humans can improve the health of our ecosystem
Finally, have students write a newspaper article about a new ecosystem and the symbiotic relationships that were discovered using the worm compost project.

Working with a partner and given a list of common organisms and a description of their environmental interactions, have students digitally illustrate a food web using arrows to show the flow of energy. Have them properly identify the producers and consumers. Have them present their food web to the class.

Working in cooperative groups, have students examine the factors that impact white-tailed deer population in Ohio and determine the implications for a community when the population decreases or increases. After students have determined the implications for a community, have them identify and explore careers directly or indirectly impacted in addressing the issues. Have them use digital tools to create a poster for one of the careers they identify and share it with the class.

Resources

* Bloom Ball Directions (<http://www.mrroughton.com/assignments-new/bloom-ball>)

Resources

1. iPad Resources
2. Literature Connection
*The Life Cycle of the Poison Dart Frog* by Anna Kingston
*Animal Life Cycles* by Anita Ganeri
*Insect Life Cycles* by Molly Aloian and Bobbie Kalman
*The Life Cycle of the Praying Mantis* by Andrew Hipp and Dwight Kuhn
*Many Biomes, One Earth* by Sneed B. Collard III and James M. Needham
*What Are Earth's Biomes* by Bobbie Kalman
*Who Eats What? Food Chains and Food Webs* by Patricia Lauber
*What If There Were No Bees? A Book About the Grassland Ecosystem* by Suzanne Slade
*Butterfly, Flea, Beetle and Bee: What Is An Insect?* by Brian P. Cleary
*Dolphin, Fox, Hippo and Ox: What Is A Mammal?* by Brian P. Cleary
*Catfish, Cod, Salmon and Scrod: What Is A Fish?* by Brian P. Cleary
3. Brainpop
Ecosystems, Food Chains, Land Biomes and Extinction
4. United Streaming
Creature Feature: Videos on ecosystems, survival, and adaptation

Resources

* Bloom Ball (<http://wvde.state.wv.us/strategybank/documents/BloomBallTemplate.pdf>)

Grade 5 Science
Science 5

PS: Light, Sound, and Motion

Stage 1: Desired Results

Catholic Standards

Targeted Standards

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

Reading: Informational Text

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

RI.5.1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

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

RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

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

RI.5.7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

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

RI.5.9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

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

RI.5.10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

Writing

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

W.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.5.1a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writers purpose.

W.5.1b. Provide logically ordered reasons that are supported by facts and details.

W.5.1c. Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).

W.5.1d. Provide a concluding statement or section related to the opinion presented.

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

W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.5.2a. Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

W.5.2b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.5.2c. Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).

W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2e. Provide a concluding statement or section related to the information or explanation presented.

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

W.5.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 13 above.)

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

W.5.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

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

W.5.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

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

W.5.8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

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

W.5.9. Draw evidence from literary or 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.

W.5.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

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

SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others ideas and expressing their own clearly.

SL.5.1a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

SL.5.1b. Follow agreed-upon rules for discussions and carry out assigned roles.

SL.5.1c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

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.5.4. Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

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

SL.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Capacities of the Literate Individual

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

They demonstrate independence.

OH Grade 5 OH: Science (2011)

Science Inquiry and Application

Interconnections within Systems This theme focuses on helping students recognize the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. During the years of 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.

Physical Science (PS)

Topic: Light, Sound and Motion

The amount of change in movement of an object is based on the weight of the object and the amount of force exerted.

Catholic Identity

DOC All Grades Catholic Identity

Catholic Social Justice Teachings

Life and Dignity of the Human Person

Rights and Responsibilities

Call to Family, Community, and Participation

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 amount of change in movement of an object is based on the mass of the object and the amount of force exerted.**

a. Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t).

b. Earth pulls down on all objects with a gravitational force.
c. Weight is a measure of the gravitational force between an object and the Earth.
d. Any change in speed or direction of an object requires a force and is affected by the mass\* of the object and the amount of force applied.

**Light and sound are forms of energy that behave in predictable ways.**

a. Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted or absorbed.

b. Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound.

Skills

1. Calculate and prove that movement can be measured by speed (speed is calculated by dividing distance by time).
2. Explain and demonstrate that the change in speed and direction of an object depends on the mass and force being applied (Newton's 2nd Law).
3. Demonstrate that a force can cause an object to start moving, stop, or change speed or direction.
4. Use measurement tools and standard units to compare and contrast the motion of objects such as toy cars, balls, model rockets or planes in terms of change in position, speed and direction.
5. Design and conduct experiments to determine how the motion of objects is related to the mass of the object and the strength of the force applied.
6. Explain how forces cause changes in motion.
7. Describe how friction forces caused by air resistance or interactions between surface materials affect the motion of objects.

Predict the effect of an objects mass on its motion.

Recall the mathematical relationship between distance, time and speed.

Identify what factors must be measured to determine speed.

Recognize that increasing the force acting on an object will result in greater changes in motion.

Recognize that objects with greater mass\* will change their motion less than objects with less mass.

Identify three ways the motion of an object can be changed (e.g., speed up, slow down, change direction).

Identify two factors that influence the amount of change in motion of an object.

1. Define and explain refraction of light.
2. Describe and demonstrate how the angle that light approaches a reflective surface affects the direction in which the light is reflected.
3. Explain what happens when light passes into a new medium.
4. Describe how light absorption and reflection allow one to see the shapes and colors of objects.
5. Describe the structure and function of the human senses and the signals they perceive.
6. Compare and contrast the structures of the human eye with those of a camera.
7. Describe the uses of different instruments, such as eyeglasses, magnifiers, periscopes, and telescopes to enhance our vision.
8. Construct and describe how sound is produced by vibrating objects.
9. Explain how the rate of vibration is related to the pitch of a sound.
10. Describe and illustrate how different mediums affects the pitch of sound.
11. Recognize that longer tubes produce lower pitches and shorter tubes produce higher pitches.

Explain how the design of the instrument allows different pitches to be produced.

Recall that increasing the rate of vibration can increase the pitch of a sound.

1. Appreciate the movement of all things God has created.

**Common Core Literacy Skills**

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

**Common Core Writing Content**

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

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

**Common Core Listening and Speaking Skills**

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

Essential Questions

1. How can you determine the speed of an object? How are gravity and weight related?
2. What factors affect the speed and direction of objects?
3. How do forces affect the motion of an object?
4. Why do different materials reflect, refract or absorb light?
5. How do different surfaces affect the properties of light?
6. What effect do lenses have on light and the images we see?
7. What effect do mirrors have on light and the images we see?
8. When light interacts with an object, how can direction of the light be changed?
9. How does the medium that sound travels through, affect what we hear?
10. Why do we hear sounds?

Standards Vocabulary

1. matter
2. speed
3. gravity
4. mass
5. force
6. friction
7. refraction
8. reflection
9. absorbed
10. pitch
11. medium
12. vibration

Stage 2: Assessment Evidence

Force, Mass & Speed Investigation

Summative: Lab Assignment

Working in a cooperative group, students will plan and implement a scientific experiment that determines how the mass of an object (or amount of force acting on an object) affects how the motion of an object changes. They will represent the data graphically and analyze it to determine trends. Groups will formulate a conclusion and share results with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Catching Speeders!

Formative: Cooperative Group Work

Working with a partner, students will design a system by which police officers could make observations from an airplane to determine the speed of a car. They will give an example of how the speed could be calculated from the measurements. Partners will share the design and how it would work with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Light Passing Through Different Mediums

Formative: Cooperative Group Work

At science stations and working with a partner, students will investigate what happens when light enters a new medium (e.g., passing from air to water, passing from Jell-O to air). They will pictorially represent the path light takes when traveling from one medium to another and give each illustration a caption. They will share their work with the class. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Is the Pencil Bent?

Formative: Homework

Students will draw a picture of a pencil half-submerged in a cup of water and trace the path of light as it travels from a submerged part of the pencil to the eye. They will use this picture to explain why the pencil appears to be bent or broken when placed in water. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

PVC Sounds & Pitch

Summative: Cooperative Group Work

Working with a partner, students will investigate how the length of PVC tubing affects the pitch of the sound. They will summarize the data in a way that is clear and easy to understand. Finally, the students will verbally explain how the design of the instrument allows different pitches to be produced. What assessment tools/strategies will you use to assess student work? (checklists, rubrics, self-assessment tools, etc.)

Building a Periscope

Not Available: Project

Working in cooperative groups, students will design a mirror system to use when building a periscope. They will determine the ideal angle to place a reflective surface to bend light through a right angle. Students will draw a picture of the periscope design and trace the path of light as it travels from the object to the eye. They will log their trials and errors in a journal and then explain why it actually worked. 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 a cooperative group, have students plan and implement a scientific experiment that determines how the mass of an object (or amount of force acting on an object) affects how the motion of an object changes. Represent the data graphically and analyze it to determine trends. Formulate a conclusion and share results with the class.
2. Working with a partner, have students design a system by which police officers could make observations from an airplane to determine the speed of a car. Give an example of how the speed could be calculated from the measurements. Share the design and how it would work with the class.
3. At science stations and working with a partner, have students investigate what happens when light enters a new medium (e.g., passing from air to water, passing from Jell-O to air). Have them pictorially represent the path light takes when traveling from one medium to another. Give each illustration a caption. Share with the class.
4. Independent work. Have students draw a picture of a pencil half-submerged in a cup of water. Trace the path of light as it travels from a submerged part of the pencil to the eye. Use this picture to explain why the pencil appears to be bent or broken when placed in water.
5. Working in cooperative groups, have students design a mirror system to use when building a periscope. Have them determine the ideal angle to place a reflective surface to bend light through a right angle. Draw a picture of the periscope design and trace the path of light as it travels from the object to the eye. Log their trials and errors in a journal and then explain why it actually worked (see Links).
6. Working with a partner, have students investigate how the length of PVC tubing affects the pitch of the sound. Have them summarize the data in a way that is clear and easy to understand. Finally, have the students verbally explain how the design of the instrument allows different pitches to be produced.

Resources

* Science Graphic Organizers 2 (<http://www.edrawsoft.com/science-graphic-organizer.php>)

Resources

Resources

1. iPad Resources
2. Literature Connection
*Edison's Fantastic Phonograph* by Diana Kimpton
*Sound* by David Tomlinson
*Isaac Newton and the Laws of Motion* by Andrea Gianopoulos
3. Videos by Bill Nye
*Motion 3-2-1 Classroom Contact: RefractionFacts of Light and Color*
4. United Streaming
*A First LookSound*

Resources

* Interactive Site on Friction (<http://www.bbc.co.uk/schools/scienceclips/ages/8_9/friction.shtml>)