

5th Grade / Content Area: Science Curriculum

Unit 1

Course Description: Structure, Properties, and Interactions of Matter

Big Ideas:

- Matter is made of particles too small to be seen
- Regardless of the types of change that occurs when heating, cooling or mixing substances, the total weight of matter is conserved.
- Materials can be identified based on their properties
- Certain materials, when mixed, can result in new substances

<p>Essential Questions</p> <ul style="list-style-type: none"> ● How can understanding the properties of matter impact our lives? ● How can we prove that matter is neither created nor destroyed? 	<p>Enduring Understandings</p> <p>By the end of this unit, students will know:</p> <ul style="list-style-type: none"> ● Matter is a term that applies to all of the things around us and it is made of particles that are too small to see. ● When substances are heated, cooled, or mixed the total weight before and after is always the same. ● Substances can be identified based on observable and measureable properties. ● Sometimes when two substances are mixed, each of the substances keeps its original properties and sometimes a new substance is formed. ● Gravity pulls down on objects toward the center of the Earth
<p>Areas of Focus: Proficiencies (Cumulative Progress Indicators)</p> <p>Students will:</p> <p>Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> · Use models to describe phenomena. (5-PS1-1) <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> · Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4) · Make observations and measurements to produce data to serve as the basis for 	<p>Examples, Outcomes, Assessments</p> <p>By the end of this unit, students will be able to:</p> <ul style="list-style-type: none"> ● Give an examples of what is matter ● Describe how gases are made from matter particles that are too small to be seen. (Ex: an inflated balloon) ● Measure and graph the weights of matter before and after being heated, cooled, or mixed. ● Identify materials based on various observable properties. ● Determine whether the mixing of two substances always results in the formation of new substances or not

evidence for an explanation of a phenomenon. (5-PS1-3)
Using Mathematics and Computational Thinking

· Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

and provide examples.

- Identify the differences between soluble and insoluble solutions.

Instructional Focus:

Vocabulary:

Atoms
Change
Color
Cooling
Dissolve
Electrical Conductivity
Gas
Graph
Hardness
Heating
Liquid
Magnetic Forces
Matter
Measure
Mixture
Model
Molecule
Particle
Properties
Reaction
Reflectivity
Solid
Solution
Substance
Thermal Conductivity

Assessments:

Table 1. What to Look For in Students' Responses to Probes

Areas for Analysis	What to Look For
Concepts and ideas	Number of students choosing a selected res groups of students using similar explanation
Use of terminology	Confusion of everyday words with their scien appropriate use of scientific terminology
Transfer of learning	Ability to apply ideas across contexts or in n
Prior knowledge or experience	Ideas that students bring to their learning; e may have had that impact their ideas
Sophistication level	Grade levels at which the students' ideas ar
Reasoning	Types of rules or justifications students use
Ability to explain	Students' ability to write or verbalize an expl

Before:

- Pretest students for understanding.
- KWL (What you Know, Want to know, about matter)

	<p><u>During:</u></p> <ul style="list-style-type: none"> -Quizzes (see SMART lesson) -Think/Pair/Share -Develop a model to describe that matter is made of particles too small to be seen. -Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. -Journals entries throughout the unit. -Make observations and measurements to identify materials based on their properties. <p><u>After:</u></p> <p><u>KWL (What you Learned)</u></p> <ul style="list-style-type: none"> - Project: Conduct an investigation to determine whether the mixing of two or more substances results in new substances. Possible Project: Create a tri-fold board to display results. (Teacher created rubric focused on Science and Literacy standards) and/or -Post-test <p>Instructional Strategies Interdisciplinary Connections/Technology Integration Global Perspectives</p>
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The following skills and themes should be reflected in the design of units and lessons for this course or content area.

21st Century Skills:

Creativity and Innovation

Critical Thinking and Problem Solving

Communication and Collaboration

Information Literacy

Media Literacy

Life and Career Skills

21st Century Themes (as applies to content

area):
Financial, Economic, Business, and
Entrepreneurial Literacy

Civic Literacy

Health Literacy

5th Grade / Content Area: Science Curriculum

Unit 2 Energy in Organisms

Course Description: This unit places an emphasis on the idea that plants acquire their material for growth primarily from air and water. The food of most animals can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food, and other animals eat the animals that eat the plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore act as “decomposers”. Decomposition eventually restores some materials back to the soil. Organisms can only survive in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of organisms are able to meet their needs in a relatively stable web of life and all organisms meet these needs through the transfer of the sun’s energy through matter.

Big Ideas: An ecosystem is a community of independent organisms along with the inorganic components (chiefly soil, water, air, and rocks) that make up their environment. A biome is a large ecosystem, characterized by its dominant life-forms—for example, the Amazonian rain forest.

Essential Questions	Enduring Understandings
<ul style="list-style-type: none">- How is the sun important to our lives?- How is the sun important to all organisms on earth?- In what ways is the sun related the flow of energy?- How does the sun impact the roles of producers, consumers and decomposers in an ecosystem?- How can an organism maintain its	<p>Students will understand that...</p> <p>At the end of this unit, the idea that we want our students to understand is that everything gets it’s energy from the sun. All organisms, whether plants, animals, or decomposers fit together in a food web in which energy from the sun is transferred through matter.</p>

<p>population in an ecosystem? What factors can threaten a species?</p>	
<p>Areas of Focus: Proficiencies (Cumulative Progress Indicators) Students will:</p> <p>5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen</p> <p>5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.</p> <p>5-PS1-3 Make observations and measurements to identify materials based on their properties</p> <p>5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances</p>	<p>Examples, Outcomes, Assessments</p> <p>Instructional Focus:</p> <ul style="list-style-type: none"> - Plants use the materials around them to make food - Energy is the ability to do work. - Cellular respiration is the process by which organisms get energy. - Plants are the only organisms that make their own food. - Plants and animals are connected and therefore both get their energy from the sun. - Plants use the materials around them to make food. - Food webs are made up of producers, consumers, and decomposers - Food webs start with the sun and follow the transfer of energy. - Decomposition plays an important role in the food web. - After matter is transferred from producers to consumers, it gets recycled back into the soil (thanks to decomposers) so the cycle can begin again. - Organisms can only survive in environments in which their particular needs are met. All organisms have the same basic needs. <p>Sample Assessments:</p> <ul style="list-style-type: none"> - Draw a comic strip outlining the steps of cellular respiration. - Draw a comic strip outlining the steps of photosynthesis. - Given an organism, students will label it as either a producer, consumer, and decomposer - Create a food web with yarn <p>Instructional Strategies:</p> <ul style="list-style-type: none"> - Plant Lab - Photosynthesis and Cellular Respiration Lab

- Decomposition Lab
- Re-create the food web using yarn.
- Types of Energy Centers

Interdisciplinary Connections

ELA/Literacy

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability

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

W.5.8 Recall relevant information from experiences or gather relevant information from print or digital sources.

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

Math

MP.2 Reason abstractly and quantitatively

MP.4 Model with mathematics

MP.5 Use appropriate tools strategically

5. NBT.A.1 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real world problems

5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurements

5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units

Technology Integration

	Global Perspectives
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NOTE re: Examples, Outcomes and Assessments

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Critical Thinking and Problem Solving

Communication and Collaboration

Information Literacy

Media Literacy

Life and Career Skills

21st Century Themes (as applies to content area):

Financial, Economic, Business, and Entrepreneurial Literacy

Civic Literacy

Health Literacy

**Grade 5
Science
Unit 3 - Earth Systems**

Course Description

Big Ideas:

- Earth is a nonliving object that is made up of four major systems.
- The Earth's geosphere is composed of four distinct layers.
- Animals and plants rely on each other to create the gases needed for survival.
- The ozone layer protects us from the Earth's harmful UV rays.
- The vast majority of water on Earth is salt water and unusable. Most of the water that is usable is trapped in glaciers.
- Areas that are near water will have milder climate changes because the ocean will slowly absorb and release heat.

<p>Essential Questions</p> <ul style="list-style-type: none"> ● How can understanding the properties of matter impact our lives? ● How can we prove that matter is neither created nor destroyed? 	<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Explain the four major systems of the Earth. ● Differentiate between the different layers of the Earth based on distinct characteristics. ● Describe how life on Earth would be different if the ozone layer continues to be depleted. ● Interpret and create graphs that represent the location of both salt and fresh water on Earth. ● Analyze lab results that suggest that areas near water will see milder temperature fluctuations than areas that are further inland.
<p>Areas of Focus: Proficiencies</p> <p>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans).</p> <p>These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)</p> <p>Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in</p>	<p>Examples, Outcomes, Assessments</p> <ul style="list-style-type: none"> ● Investigate the four systems of Earth and how they interact ● Research weather and changes of the earth within each system ● Determine the types of water on the earth and the importance of water <p>Assessments:</p> <p><u>Before:</u> -Pretest students for understanding. -KWL (What you Know, Want to know, about matter)</p> <p><u>During:</u> -Quizzes (see SMART lesson)</p>

<p>streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)</p>	<ul style="list-style-type: none"> -Think/Pair/Share -Develop a model to describe that matter is made of particles too small to be seen. -Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. -Journals entries throughout the unit. -Make observations and measurements to identify materials based on their properties. <p><u>After:</u> KWL (<u>What you Learned</u>)</p> <ul style="list-style-type: none"> - Project: Conduct an investigation to determine whether the mixing of two or more substances results in new substances. Possible Project: Create a tri-fold board to display results. (Teacher created rubric focused on Science and Literacy standards) and/or -Post-test <p>Instructional Strategies Interdisciplinary Connections/Technology Integration Global Perspectives</p>
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Financial, Economic, Business, and

Entrepreneurial Literacy

Civic Literacy

Health Literacy

Unit 4

Course Description: Earth and the Universe

Big Ideas:

This unit helps students to develop a new perspective on the world they're standing on. They will be given evidence that the Earth beneath our feet is actually moving through space, both spinning on its axis, and traveling in a great orbit around the Sun. They will see how these movements account for the patterns we see in our sky (the paths of our Sun across the sky, the changing seasons, and the changing constellations). The Moon and planets, which the students will observe have their own patterns of movement in the sky.

<p>Essential Questions</p> <ul style="list-style-type: none">• How does relative distance affect the brightness of a star?• What causes night and day?• Why are some constellations only visible during certain times of the year?• Why do shadows appear larger at certain times of the day, and shorter at other times?	<p>Enduring Understandings</p> <p>By the end of this unit, students will know:</p> <ul style="list-style-type: none">• Create an argument that relative brightness of the Sun compared to other stars is a function of the distance to those stars.• Explain how day turns into night• Explain why the sun casts different sized shadows.• Explain that the location of constellation in the night sky appear in different locations due to the rotation and revolution of Earth.
<p>Areas of Focus: Proficiencies</p> <p>The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)</p> <p>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</p>	<p>Examples, Outcomes, Assessments</p> <p>By the end of this unit, students will be able to:</p> <ul style="list-style-type: none">• Students will explore the relationships between star brightness, distance, size, and temperature and investigate how distance impacts the brightness of stars.• Students will explore the sun, earth's rotation, and time• The Earth's rotation causes the sun to change angles in the sky which creates a predictable pattern of shadows on the ground.• Students will explore why the moon seems to change shape (phases) over

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2),(5-PS1-3),(5-PS1-4)

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. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)

MP.2 Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)

MP.4 Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)

MP.5 Use appropriate tools strategically. (PS1-2),(PS1-3)

the course of a month.

Assessments:

Table 1. What to Look For in Students' Responses to Probes

Areas for Analysis	What to Look For
Concepts and ideas	Number of students choosing a selected res groups of students using similar explanation
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- Pretest students for understanding.
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During:

- Quizzes
- Think/Pair/Share
- Develop a model to describe that matter is made of particles too small to be seen.
- Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
- Journals entries throughout the unit.
- Make observations and measurements to identify materials based on their properties.

After:

KWL (What you Learned)

- Project: Conduct an investigation to determine whether the mixing of two or more substances results in new substances. Possible Project: Create a tri-fold board to display results. (Teacher created rubric focused on Science and Literacy standards) and/or
- Post-test

Instructional Strategies
 Interdisciplinary Connections/Technology Integration
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21st Century Themes (as applies to content area):

- Financial, Economic, Business, and Entrepreneurial Literacy
- Civic Literacy
- Health Literacy

Unit 4

Course Description: Forces/Gravitational Pull

Big Ideas:

This unit helps students to develop a new perspective on the world they're standing on. They will be given evidence that the Earth beneath our feet is actually moving through space, both spinning on its axis, and traveling in a great orbit around the Sun. They will see how these movements account for the patterns we see in our sky (the paths of our Sun across the sky, the changing seasons, and the changing constellations). The Moon and planets, which the students will observe have their own patterns of movement in the sky.

<p>Essential Questions</p> <ul style="list-style-type: none"> • How does weight and mass effect the gravitational force on various objects? • Why is it important to understand gravity? • How would life be different on Earth with no gravitational force on objects? 	<p>Enduring Understandings</p> <ul style="list-style-type: none"> • Explain how the concept of gravity was observed throughout history. • Form hypotheses about the rate at which objects will fall when dropped • Explain how mass and distance relate to the strength of gravity
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- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Areas of Focus: Proficiencies
 Forces and Interactions:
 The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)

Engineering Design:
 Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

Different solutions need to

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 W.5.8 Recall relevant information from

Examples, Outcomes, Assessments
 By the end of this unit, students will be able to:

- Identify the variables that affect the strength of the gravity and predict how motion would change if gravity was stronger or weaker.
- Use the engineering process to construct models and construct/test a parachute prototype that will safely transport a washer to a targeted area on the ground.

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<p>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. (5-PS1-2),(5-PS1-3),(5-PS1-4)</p> <p>W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)</p> <p>MP.2 Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)</p> <p>MP.4 Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)</p> <p>MP.5 Use appropriate tools strategically. (PS1-2),(PS1-3)</p>	<p>evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.</p> <ul style="list-style-type: none"> -Journals entries throughout the unit. -Make observations and measurements to identify materials based on their properties. <p><u>After:</u> KWL (<u>What you Learned</u>)</p> <ul style="list-style-type: none"> - Project: Conduct an investigation to determine whether the mixing of two or more substances results in new substances. Possible Project: Create a tri-fold board to display results. (Teacher created rubric focused on Science and Literacy standards) and/or -Post-test <p>Instructional Strategies Interdisciplinary Connections/Technology Integration Global Perspectives</p>
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