

Samples - UbD Stage 1

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The complete documents can be found on Wallingford's Curriculum Web page at <http://wallingford.ccsct.com/page.cfm?p=39>

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Grade 3 – Water Cycle

During this unit students investigate how the sun’s energy impacts the water cycle and the effect of heat energy on the melting, evaporation, condensation and freezing of water. Students will also recognize that water can be found many places on earth. Different cloud types and weather tools such as a thermometer, barometer, wind vane and water gauge will be explored.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do.

CSDE Content Standards (CSDE Science Framework 2004)	CSDE Primary Expected Performances (CSDE Science Framework 2004)
<p><i>Properties of Matter – How does the structure of matter affect the properties and uses of materials?</i></p> <p>3.1 - Materials have properties that can be identified and described through the use of simple tests.</p> <ul style="list-style-type: none"> • Heating and cooling cause changes in some of the properties of materials. <p><i>Energy in the Earth’s Systems – How do external and internal sources of energy affect the Earth’s systems?</i></p> <p>4.3 - Water has a major role in shaping the Earth’s surface.</p> <ul style="list-style-type: none"> • Water circulates through the Earth’s crust, oceans and atmosphere. 	<p>B2. Describe the effect of heating on the melting, evaporation, condensation and freezing of water.</p> <p>B12. Describe how the sun’s energy impacts the water cycle.</p>
<p><i>Scientific Inquiry</i></p>	<p>B INQ.1 Make observations and ask questions about objects, organisms and the environment.</p> <p>B INQ.2 Seek relevant information in books, magazines and electronic media.</p> <p>B INQ.3 Design and conduct simple investigations.</p> <p>B INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses.</p>

<p><i>Scientific Literacy</i></p>	<p>B INQ.5 Use data to construct reasonable explanations.</p> <p>B INQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.</p> <p>B INQ.7 Read and write a variety of science-related fiction and nonfiction texts.</p>
<p><i>Scientific Numeracy</i></p>	<p>B INQ.8 Search the Web and locate relevant science information.</p> <p>B INQ.9 Use measurement tools and standard units (e.g., cm, m, g, kg) to describe objects and materials.</p> <p>B INQ.10 Use mathematics to analyze, interpret and present data.</p>
<p style="text-align: center;">Enduring Understandings</p> <p><i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...)</i> <i>K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p style="text-align: center;">Essential Questions</p> <p><i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) <p><u>Unit Specific Enduring Understanding</u></p> <ul style="list-style-type: none"> • A change in temperature can affect the physical properties of water. • Water circulates through a continuous cycle. • The sun’s energy drives weather patterns. • Scientists use various tools to measure and describe weather in order to help predict future weather patterns. 	<ul style="list-style-type: none"> • How is inquiry used to investigate the answers to questions we pose? • How does water change states as it travels through the water cycle? • How does the water cycle impact the environment? • How does energy from the sun affect the weather? • How does heat energy (temperature) change the state of a liquid/solid/gas? • How do you measure and describe weather? • Why do we need to predict the weather?

Knowledge and Skills

What students are expected to know and be able to do

The knowledge and skills in this section have been extracted from Wallingford's K-5 Science Scope and Sequence.

Knowledge

The students will be able to...

- K1. Identify the stages in the water cycle (evaporation, condensations, precipitation, ground water, transpiration).
- K2. Explain the relationship between evaporation and condensation within the water cycle.
- K3. Describe that melting and evaporation require the addition of heat energy and condensations and freezing require removal of heat energy.
- K4. Recognize that water can be found many places on earth. (plants, animals, humans, soil, etc.)
- K5. Explain the function and purpose of weather tools such as a thermometer, barometer, wind vane, and rain gauge.
- K6. Recognize that different cloud types determine weather conditions.
- K7. Identify different forms of precipitation.

Skills

- S1. Generate investigable and non-investigable questions.
- S2. Observe objects (water, soil, plants) and describe commonalities and differences among them.
- S3. Classify, based on observations of properties of water.
- S4. Predict:
 - The state of water dependent upon temperature
 - Future weather conditions based on clouds
 - The effects of the addition or removal of heat on solids, liquids, or gases
- S5. Design an investigation to help answer an investigable question.
- S6. Conduct simple investigations.
- S7. Collect and record data utilizing simple equipment and measuring tools.
 - thermometer
 - tumbler
 - graduated cylinder/rain gauge
- S8. Organize results in an appropriate manner, using:
 - Graphic organizers
 - Charts and graphs.
 - Illustrations or diagrams.
 - Simple reports
 - Journaling
- S9. Communicate results or information in an appropriate manner, using:
 - Presentations, visuals, simple reports, journal, writing prompt

Grade 3 – Plant Life Cycles and Soil Properties

In this unit, Plant Life Cycle & Soil Properties, students will focus their study on the life cycle of flowering plants and the properties of different types of soils. The unit begins with an exploration of a lima bean and the plant embryo inside of it, concentrating students’ attention on the beginning of the plant’s life cycle. Students will then participate in planting *Brassica* seeds (Wisconsin Fast Plants) to observe the remaining stages in the plant’s life cycle (including sprout, leaf and bud growth, growth spurt, pollination, development of seed pods, and seed production). Particular focus will be applied to observing and recording changes in the plant structure in students’ science journals. It is important to note that, because of time constraints, specific time frames have been provided for lesson planning and execution. During “lulls” in the plant part of the unit, lessons regarding soil properties will be introduced.

Several themes are emphasized in this unit. They are (1) plants have a distinct life cycle, (2) other living things depend on plants, (3) fertilization through pollination is essential for plant reproduction, and (4) soils have different properties that are important for plant growth.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do.

CSDE Content Standards (CSDE Science Framework 2004)	CSDE Primary Expected Performances (CSDE Science Framework 2004)
<p><i>Structure and Function-How are organisms structured to ensure efficiency and survival?</i></p> <p>2.2-Plants change their form as part of their life cycles.</p> <ul style="list-style-type: none"> • The life cycles of flowering plants include seed germination, growth, flowering, pollination and seed dispersal. <p><i>The Changing Earth-How do materials cycle through the Earth’s systems?</i></p> <p>2.3-Earth materials have varied physical properties which make them useful in different ways.</p> <ul style="list-style-type: none"> • Soils can be described by their color, texture, and capacity to retain water. • Soils support the growth of many kinds of plants, including those in our food supply. 	<p>A 19. Describe the life cycles of flowering plants as they grow from seeds, proceed through maturation and produce new seeds.</p> <p>A 20. Explore and describe the effects of light and water on seed germination and plant growth.</p> <p>A 21. Sort different soils by properties such as particle size, color and composition.</p> <p>A 22. Relate the properties of different soil types to their ability to retain water and support the growth of certain plants.</p>

<p><i>Scientific Inquiry</i></p>	<p>B INQ.1 Make observations and ask questions about objects, organisms and the environment.</p> <p>B INQ.3 Design and conduct simple investigations.</p> <p>B INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses.</p>
<p><i>Scientific Literacy</i></p>	<p>B INQ.5 Use data to construct reasonable explanations.</p> <p>B INQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.</p>
<p style="text-align: center;">Enduring Understandings</p> <p style="text-align: center;"><i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...) K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p style="text-align: center;">Essential Questions</p> <p style="text-align: center;"><i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) • Matter (Soil) can be described and classified for understanding. (K-12) • The environment is a complex assemblage of interacting and evolving chemical, physical, and biological processes. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Soils have different properties and compositions that make them useful in different ways. • Flowering plants have a life cycle that involves changes in growth and structure that ensures production of new plants. • Other living things depend on plant reproduction to supply the food they need. • Fertilization through pollination is essential for flowering plant reproduction and continuation of the life cycle. 	<ul style="list-style-type: none"> • How is inquiry used to investigate the answers to questions we pose? • What are the properties by which soils are sorted? • How is inquiry used to investigate the amount of water different soils can retain? • What properties of soil are important for plant growth? • What are the conditions necessary for flowering plants to grow? • How does the plant change over the course of its life? • How do flowering plants produce seeds and new plants? • How are plants connected with other living things?

Knowledge and Skills

What students are expected to know and be able to do

**The knowledge and skills in this section have been extracted from Wallingford's
K-5 Science Scope and Sequence.**

Knowledge

- K1. Summarize the conditions necessary for plant growth.
- K2. Identify the distinct stages in the life cycle of a flowering plant from the germination of a seed to the production of new seeds.
- K3. Conclude that flowering plants must be pollinated in order to produce new seeds.
- K4. Recognize the interdependence between the pollinator and the plant.
- K5. Explain why it is advantageous for a plant to produce more than one seed.
- K6. Identify the properties of different types of soil.
- K7. Recognize how soil supports the growth of many plants.
- K8. Relate the properties of different soil types to their ability to retain water.

Skills

The student will be able to...

- S1. Generate testable and questions that need to be answered through print resources..
- S2. Observe objects (soils, leaves, seeds, etc.) and describe commonalities and differences among them.
- S3. Classify, based on observations of properties, the different types of soil.
- S4. Predict:
 - Future plant growth based upon measurements of previous growth.
 - The amount of water different soils might hold.
 - The effect of pollination on the plant's life cycle.
 - The effects of different types of soil on seed germination.
 - The effects of other conditions (light, temperature, etc.) on plant growth
- S5. Design an investigation to help answer an investigable question
- S6. Conduct simple investigations
- S7. Collect and record data utilizing simple equipment and measuring tools. (measure and record the daily growth of plants)
- S8. Organize results in an appropriate manner, using
 - Graphic organizers
 - Charts and graphs.
 - Illustrations or diagrams.
 - Simple reports.
- S9. Communicate results or information in an appropriate manner, using
 - Presentations
 - Visuals
 - Simple reports

Grade 3 – Sound

Through hands-on investigations students will understand how sound is generated and how sounds can be made louder and softer (loudness) and higher and lower (pitch). They will also investigate how sound travels through a variety of materials, and how sound is reflected and/or absorbed by different materials. Students will also understand the structure and function of the ear.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do.

CSDE Content Standards (CSDE Science Framework 2004)	CSDE Primary Expected Performances (CSDE Science Framework 2004)
<p><i>Energy Transfer and Transformations – What is the role of energy in our world?</i></p> <p>5.1 - Sound and light are forms of energy.</p> <ul style="list-style-type: none"> ◆ Sound is a form of energy that is produced by the vibration of objects and is transmitted by the vibration of air and objects. <p><i>Structure and Function – How are organisms structured to ensure efficiency and survival?</i></p> <p>5.2 - Perceiving and responding to information about the environment is critical to the survival of organisms.</p> <p>The sense organs perceive stimuli from the environment and send signals to the brain through the nervous system.</p>	<p>B17. Describe the factors that affect the pitch and loudness of sound produced by vibrating objects.</p> <p>B18. Describe how sound is transmitted, reflected and/or absorbed by different materials.</p> <p>B21. Describe the structure and function of the human senses and the signals they perceive. (ear for sound)</p>
<p><i>Scientific Inquiry</i></p>	<p>B INQ.1 Make observations and ask questions about objects, organisms and the environment.</p> <p>B INQ.2 Seek relevant information in books, magazines and electronic media.</p> <p>B INQ.3 Design and conduct simple investigations.</p> <p>B INQ.4 Employ simple equipment and measuring</p>

	tools to gather data and extend the senses.
<i>Scientific Literacy</i>	<p>B INQ.5 Use data to construct reasonable explanations.</p> <p>B INQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.</p> <p>B INQ.7 Read and write a variety of science-related fiction and nonfiction texts.</p>
<i>Scientific Numeracy</i>	<p>B INQ.8 Search the Web and locate relevant science information.</p> <p>B INQ.9 Use measurement tools and standard units (e.g., cm, m, g, kg) to describe objects and materials.</p> <p>B INQ.10 Use mathematics to analyze, interpret and present data.</p>
<p>Enduring Understandings</p> <p><i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...)</i></p> <p><i>K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p>Essential Questions</p> <p><i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Energy is motion (movement). • Sound is a form of energy. • Sound is energy that is produced by vibrating objects. (The only way sound is created is through vibration.) • Sound can be described by pitch (frequency) and volume and other aspects. • Sound energy (form of kinetic energy) is transmitted through different materials and the air. • Sound is reflected and/or absorbed by different materials. The nature of materials that sound travels through affects the transmission and absorption of 	<ul style="list-style-type: none"> • How is inquiry used to investigate the answers to questions we pose? • What is sound? • How is sound produced? • How does sound travel? • How does sound interact in our environment? • How is energy transformed into sound? • How do humans perceive ('hear') sound? • How do you describe differences in sound? • What materials and variables affect how you hear sound? • How does the shape of an object (shape of room, dome, microphone, speaker etc.) impact hearing?

<p>sound.</p> <ul style="list-style-type: none"> The structure of the human ear and sound devices can enhance the quality of hearing. 	
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Knowledge and Skills

What students are expected to know and be able to do

The knowledge and skills in this section have been extracted from Wallingford's K-5 Science Scope and Sequence.

Knowledge

- K1. Describe the factors that affect the **pitch** and **loudness** of sound produced by vibrating objects.
- Pitch (frequency) is the lowness or highness of a sound, also know as musical note.
 - Vibration is to move back and forth (or up and down).
 - Changing the length, width, tension, or thickness of an object affects the pitch of the sound when it vibrates. Longer, thicker, wider items usually produce a lower pitch. Shorter smaller items usually produce a higher pitch.
 - Volume is the loudness of a sound. Changing the amount of vibration affects the loudness. More vibration (more energy) is louder. .
- K2. Produce sounds with different pitches and volume levels.
- K3. Describe how sound is transmitted, reflected and/or absorbed by different materials.
- Some materials absorb sound and some materials reflect sound. Smaller, softer, more irregular materials absorb sound better. Harder, more regular, and larger objects reflect sound better.
 - Sound can be reflected and heard as an echo.
 - Sound travels differently through solids, liquids and gases. (fastest in solids and slowest in air).
- K4. Demonstrate how sound is affected by different materials (air, water, foam etc.) in different environments. (large room, small room, room with dome etc.)
- K5. Describe the structure and function of the human ear.
- K6. Explain how humans perceive sound including how the ear functions and how the nervous system sends messages to the brain (receptors).
- Explore appropriate decibel levels of common sounds and justify reasons for having sounds at different decibels.
 - Explore technological applications of sound. (hearing aids, microphones, speakers, megaphones)
- K7. Explore decibel levels of common sounds and explain reasons why sounds are different decibel levels.
- K9. Explore technological applications related to sound. (hearing aids, microphones, speakers, megaphones)

Skills

- S1. Generate investigable and non-investigable questions.
- S2. Observe objects and describe commonalities and differences among them.
- S3. Classify, based on observations of properties.
- S4. Predict what might happen.
- S5. Design an investigation to help answer an investigable question.
- S6. Conduct simple investigations.

S7. Collect and record data utilizing simple equipment and measuring tools.

S8. Organize results in an appropriate manner, using:

- Graphic organizers, charts and graphs, illustrations or diagrams, simple reports, etc.

S9. Communicate results or information in an appropriate manner, using:

- Presentation, visuals, simple reports, etc.

Grade 4 - Electrical Circuits and Magnets

In this unit, students will be invited to discover that electricity in circuits can generate energy in the form of light, heat and magnetism through the inquiry process.

Through a series of investigations, students learn that electric circuits require a complete circuit (circle) through which an electrical current passes, and that different types of circuits show different types of characteristics. They will also discover which materials are conductors and insulators of electricity. As a culminating activity, students will apply their new knowledge by researching testable questions and/or wiring flashlights and houses.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do.

CSDE Content Standards (CSDE Science Framework 2004)	CSDE Primary Expected Performances (CSDE Science Framework 2004)
<p><i>Energy Transfer and Transformations – What is the role of energy in our world?</i></p> <p>4.4 - Electrical and magnetic energy can be transferred and transformed.</p> <ul style="list-style-type: none"> • Electricity in circuits can be transformed into light, heat, sound and magnetic effects. • Magnets can make objects move without direct contact between the object and the magnet. <p><i>Forces and Motion – What makes objects move the way they do?</i></p> <p>4.1 - The position and motion of objects can be changed by pushing or pulling.</p> <ul style="list-style-type: none"> • The size of the change in an object’s motion is related to the strength of the push or pull. • The more massive an object is, the less effect a given force will have on its motion. 	<p>B14. Describe how batteries and wires can transfer energy to light a light bulb.</p> <p>B15. Explain how simple electrical circuits can be used to determine which materials conduct electricity.</p> <p>B16. Describe the properties of magnets, and how they can be used to identify and separate mixtures of solid materials.</p> <p>B8. Describe the effects of the strengths of pushes and pulls on the motion of objects.</p> <p>B9. Describe the effect of the mass of an object on its motion.</p>

<p><i>Scientific Inquiry</i></p>	<p>B INQ.1 Make observations and ask questions about objects in the environment. B INQ.2 Seek relevant information in books, magazines and electronic media. B INQ.3 Design and conduct simple investigations. B INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses.</p>
<p><i>Scientific Literacy</i></p>	<p>B INQ.5 Use data to construct reasonable explanations. B INQ.6 Analyze, critique and communicate investigations using words, graphs and drawings. B INQ.7 Read and write a variety of science-related fiction and nonfiction texts.</p>
<p><i>Scientific Numeracy</i></p>	<p>B INQ.8 Search the Web and locate relevant science information. B INQ.9 Use measurement tools and standard units (e.g., cm, m, g, kg) to describe objects and materials. B INQ.10 Use mathematics to analyze, interpret and present data.</p>
<p>Enduring Understandings <i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...) K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p>Essential Questions <i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Electrical circuits require a complete loop through which an electrical current passes. • Electricity is used to generate energy that can be transformed into other forms of energy (sound, light, heat and motion). • Some materials conduct electricity and some 	<ul style="list-style-type: none"> • How is inquiry used to investigate the answers to questions we pose? • How is electricity used to create heat, sound, light, and motion? • How is electricity used in our world? • How do batteries and wires conduct electricity to a light a bulb? • What types of materials are conductors of electricity and what materials are not conductors (insulators)? • How do magnets interact with each other and other objects? • What are properties of magnets? • How does the size and strength of a magnet affect its ability to push and pull?

<p>materials do not.</p> <ul style="list-style-type: none"> • Electricity is essential to living in today’s modern, technologically advanced world. • Magnets produce a force that can move certain objects without direct contact. • Magnets produce a force that can vary in strength and this force can move certain objects and not other objects. 	<ul style="list-style-type: none"> • Can magnetic forces work through different materials?
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Knowledge and Skills
What students are expected to know and be able to do
The knowledge and skills in this section have been extracted from Wallingford’s K-5 Science Scope and Sequence.

Knowledge

- K1. Describe how batteries and wires can transfer energy to light (a light bulb) and/or heat.
- K2. Explain the path of electricity in a circuit (open, closed, parallel, series circuit)
- K3. Wire a simple electrical circuit to light a light bulb.
- K4. Construct a circuit in more than one way using the same materials.
- K5. Use symbols to represent the different parts of an electric circuit schematic.
- K6. Classify materials as conductors of electricity and others materials as insulators based on tests using simple electrical circuits.
- K7. Explain how electricity is essential to our modern world.
- K8. Apply troubleshooting strategies (knowledge of electrical circuits) to complete an incomplete circuit.
- K9. Investigate the properties of magnets including:
 - Magnets have north and south poles
 - Magnetic fields weaken as distance increases.
 - Magnets produce a force that some things respond to and some things do not.
 - Magnets exert a force at a distance/they can push or pull without touching.
 - A magnetic force can hold a limited amount of weight.
 - Magnets possess various degrees of strength.
 - Magnets can exert a force through materials.
- K10. Explore how electricity and magnetism are related (electromagnet)

Skills

- S1. Generate investigable and non-investigable questions.
- S2. Observe objects and describe commonalities and differences.
- S3. Classify, based on observations of properties.
- S4. Predict what might happen.
- S5. Design an investigation to help answer an investigable question.
- S6. Conduct simple investigations.
- S7. Employ simple equipment and measuring tools.
- S8. Organize appropriate and accurate measurements and observations, using:
 - Graphic organizers

- Charts and graphs
- Illustrations or diagrams
- Journaling
- Etc.

S9. Draw conclusions based on data, observations, or findings.

S10. Communicate results or information in an appropriate manner, using:

- Presentations
- Visuals
- Simple reports
- Etc.

Grade 4 – Rocks and Minerals

Students explore the differences and similarities between rocks and minerals by investigating samples of these Earth materials and by performing a series of mineral tests similar to geologist’s field tests. Students will discover how rocks are formed and changed. Non-fiction literatures resources will be used to assist students in uncovering common uses of rocks and minerals. Inquiry skills will be emphasized during these explorations.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do

Content Standards (CSDE Science Framework 2004)	Primary Expected Performances (CSDE Science Framework 2004)
<p><i>The Changing Earth: How do materials cycle through the Earth’s system?</i></p> <p>3.3 Earth materials have different physical and chemical properties.</p> <ul style="list-style-type: none"> Rocks and minerals have properties that may be identified through observations and testing; these properties help determine how the earth materials are used 	<p>B5: Describe the physical properties of rocks and relate them to their potential uses</p> <p>B6: Relate the properties of rocks to the possible environmental conditions during their formation.</p>
<p><i>Scientific Inquiry</i></p>	<p>B INQ.1: Make observations and ask questions about objects, organisms and the environment.</p> <p>B INQ.2: Seek relevant information in books, magazines, electronic sources of information.</p> <p>B INQ.3: Design and conduct simple investigations.</p> <p>B INQ.4: Employ simple equipment and measuring tools to gather data and extend the senses.</p>

<p><i>Scientific Literacy</i></p>	<p>B INQ.6: Analyze, critique, and communicate investigations using words, graphs and drawings.</p> <p>B INQ.7: Read and write a variety of fiction and non-fiction science-related texts.</p>
<p>Enduring Understandings <i>Insights learned from exploring generalizations via the essential questions. (Students will understand THAT...)</i></p>	<p>Essential Questions <i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and the critical thinking to solve problems.(K-12) • The environment is a complex assemblage or interacting and evolving chemical, physical, and biological processes. (K-12) • Earth’s materials (rocks and minerals) are formed and may undergo change by certain conditions, such as erosion or metamorphism, and can occur over various amounts of time. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> • The unique physical and chemical properties of rocks and minerals make them useful. • Rocks and minerals are limited resources. 	<ul style="list-style-type: none"> • How is inquiry used to investigate our environment? • How do rocks and minerals cycle through our environment? • What are the similarities and differences between rocks and minerals? • How are rocks and minerals used? • What story of Earth’s history can we gather from rocks and minerals? • How is weathering the preparation for erosion?

Knowledge and Skills

What students are expected to know and be able to do

The knowledge and skills are aligned with Wallingford's Scope and Sequence.

Knowledge

The students will ...

- K1. Differentiate between rocks and minerals
- K2. Classify rocks and minerals by their properties
- K3. Relate the physical properties of rocks to their potential uses
- K4. Identify the environmental conditions during the formation of sedimentary, igneous, and metamorphic rocks.
- K5. Relate the properties of rocks to the possible environmental conditions during their formation.
- K6. Describe the physical changes that occur in rocks and minerals as a result of weathering and erosion.

Skill

The students will...

- S1. Generate investigable and non-investigable questions.
- S2. Observe rocks and minerals and describe commonalities and differences among them.
- S3. Classify, based on observations of properties
- S4. Predict
- S5. Design an investigation
- S6. Conduct simple investigations
- S7. Employ simple equipment and measuring tools.
- S8. Organize appropriate and accurate measurements and observations , using
 - Graphic organizers
 - Charts and graphs
 - Illustrations or diagrams
 - Journaling
- S9. Draw conclusions based on data, observations, or findings.
- S10. Communicate results or information in an appropriate manner, using
 - Presentations
 - Visuals
 - Simple reports

Grade 5 – Sun, Moon & Earth

This unit focuses on the causes of day and night, the causes of the seasons and the changes (phases) in the Moon’s appearance. The unit begins with investigations of the reason for day and night. Students will model the rotation (spin) of the Earth about its axis to demonstrate the 24-hour cycle of one rotation and observe day and night from Earth. Students will then model the Earth’s revolution or orbit around the sun on an inclined axis (23.5 °) to recognize the reason for the seasons. Students will observe and describe changes (phases) in the appearance of the Moon over a lunar cycle (approximately one month). Students will recognize that the positions of the Earth, Moon and Sun are predictable and that each “celestial (relating to the sky) body” moves in a predictable pattern. By having a deeper understanding of these patterns, we have made technological advances such as telescopes, periscopes, microscopes and even eye glasses to have a better “view” of the world around us and improve our quality of life.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do.

CSDE Content Standards (CSDE Science Framework 2004)	CSDE Primary Expected Performances (CSDE Science Framework 2004)
<p><i>Earth in the Solar System – How does the position of Earth in the solar system affect conditions on our planet?</i></p> <p>5.3 - Most objects in the solar system are in a regular and predictable motion.</p> <ul style="list-style-type: none"> The positions of the Earth and moon relative to the sun explain the cycles of day and night, and the monthly moon phases. 	<p>B22 Explain the cause of day and night based on the rotation of Earth on its axis.</p> <p>B23 Describe the monthly changes in the appearance of the moon, based on the moon’s orbit around the Earth.</p>
<p><i>Science and Technology in Society – How do science and technology affect the quality of our lives?</i></p> <p>5.4 - Humans have the capacity to build and use tools to advance the quality of their lives.</p> <p>Advances in technology allow individuals to</p>	<p>B25 Describe the uses of different instruments, such as eye glasses, magnifiers, periscopes and telescopes, to enhance our vision.</p>

acquire new information about the world.	
<i>Scientific Inquiry</i>	<p>B INQ.1 Make observations and ask questions about objects, organisms and the environment.</p> <p>B INQ.2 Seek relevant information in books, magazines and electronic media.</p> <p>B INQ.3 Design and conduct simple investigations.</p> <p>B INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses.</p>
<i>Scientific Literacy</i>	<p>B INQ.5 Use data to construct reasonable explanations.</p> <p>B INQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.</p> <p>B INQ.7 Read and write a variety of science-related fiction and nonfiction texts.</p>
<i>Scientific Numeracy</i>	<p>B INQ.8 Search the Web and locate relevant science information.</p> <p>B INQ.9 Use measurement tools and standard units (e.g., cm, m, g, kg) to describe objects and materials.</p> <p>B INQ.10 Use mathematics to analyze, interpret and present data.</p>
<p style="text-align: center;">Enduring Understandings</p> <p style="text-align: center;"><i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...)</i> <i>K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p style="text-align: center;">Essential Questions</p> <p style="text-align: center;"><i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> ▪ The predictable position of the earth in the solar system affects the cycles of day and night ▪ The predictable position of the earth in the 	<ul style="list-style-type: none"> • How is inquiry used to investigate the answers to questions we pose? • How does the position of the earth in the solar system affect the cycles of day and night? • How does the position and tilt of the earth’s axis in the solar system affect seasonal cycles? • How does the moon’s orbit around the earth change our perception of the moons surface?

- solar system affects the cycle of the seasons.
- The predictable movement of the moon accounts for the apparent changes in its appearance when viewed from earth.

Knowledge and Skills

What students are expected to know and be able to do

**The knowledge and skills in this section have been extracted from Wallingford's
K-5 Science Scope and Sequence.**

Knowledge

- K9. Analyze relationships between the sun and earth, the earth and moon and the sun, earth and moon.
- K10. Distinguish the difference between revolution and rotation.
- K11. Illustrate the four seasons
- K12. Explain the changes in appearance of our moon over time
- K13. Describe the apparent movement of the sun.
- K14. Conclude that the earth's movement is the reason for the apparent movement of the sun.
- K15. Conclude that the earth's axis is responsible for our seasons.
- K16. Conclude that the rotation of the earth is responsible for the cycle of day and night.

Skills

- a. Generate investigable and non-investigable questions.
- b. Observe objects and describe commonalities and differences among them.
- c. Classify in a variety of ways based on properties.
- d. Predict what might happen.
- e. Design a fair test to answer an investigable question.
- f. Revise plan based on observation/ results.
- g. Conduct simple investigations.
- h. Collect and record data using appropriate tools, such as:
 - Metric ruler
 - Timer
 - Non-standard measuring devices
 - Etc.
- i. Organize appropriate and accurate measurements and observations, using:
 - Graphic organizers
 - Charts and graphs
 - Illustrations or diagrams
 - Journaling
- j. Draw conclusions based on data, observations, or findings.
- k. Communicate results or information in an appropriate manner, using:
 - Presentations
 - Visuals
 - Simple reports

Grade 8 – Laws of Motion

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Content Standard(s)

Generalizations about what students should know and be able to do.

CSDE Content Standards (CSDE Science Framework 2004)	CSDE Primary Expected Performances (CSDE Science Framework 2004)
<p><i>Forces and Motion – What makes objects move the way they do?</i></p> <p>8.1 - Inertia causes an object to continue moving the way it is moving unless it is acted upon by a force to change its motion.</p> <ul style="list-style-type: none"> ◆ A balanced force acting on an object does not change its speed and/or direction of motion. ◆ An unbalanced force acting on an object changes its speed and/or direction of motion. ◆ Objects moving in circles must experience force acting toward the center. 	<p>C 1. Describe the qualitative and quantitative relationships among force, mass and changes in motion.</p> <p>C 2. Describe the forces acting on an object moving in a circular path.</p>
<p><i>Scientific Inquiry</i></p> <ul style="list-style-type: none"> • Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena. • Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation. • Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists. 	<p>C INQ.1 Identify questions that can be answered through scientific investigation.</p> <p>C INQ.2 Design and conduct appropriate types of scientific investigations to answer different questions.</p> <p>C INQ.3 Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.</p>
<p><i>Scientific Literacy</i></p> <ul style="list-style-type: none"> • Scientific literacy includes speaking, listening, presenting, interpreting, reading and writing about science. • Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media 	<p>C INQ.4 Use appropriate tools and techniques to make observations and gather data.</p> <p>C INQ.5 Use mathematical operations to analyze and interpret data.</p> <p>C INQ.6 Identify and present relationships between variables in appropriate graphs.</p> <p>C INQ.7 Draw conclusions and identify sources of</p>

<p><i>Scientific Numeracy</i></p> <ul style="list-style-type: none"> Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas. 	<p>error.</p> <p>C INQ.8 Provide explanations to investigated problems or questions.</p> <p>C INQ.9 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>
<p style="text-align: center;">Enduring Understandings</p> <p><i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...)</i> <i>K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p style="text-align: center;">Essential Questions</p> <p><i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> Science is the method of observation and investigation used to understand our world. (K-12) Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> An object's inertia causes it to continue moving in its original direction unless it is acted upon by a force to change its speed and/or direction. When a centripetal force (center-pulling) is applied to a moving object the object is continuously changing direction as it moves in a circular path. The motion of all objects can be explained and predicted by the Laws of Motion. 	<ul style="list-style-type: none"> How is inquiry used to investigate the answers to questions we pose? Where can you find evidence of Newton's Laws of Motion? What makes objects move the way they do? What forces act on an object moving in a circular path? How are unbalanced and balanced forces related to an object's motion? What causes changes in motion?
<p>Knowledge and Skills</p> <p><i>What students are expected to know and be able to do</i></p>	
<p><u>Knowledge</u></p> <p><i>The student will:</i></p> <p>K17. Illustrate how balanced and unbalanced forces affect the motion of an object.</p> <p>K18. Analyze how different types of friction (fluid, static, rolling, sliding) affect the motion of objects.</p> <p>K19. Demonstrate that objects at rest remain at rest and objects in motion remain in motion unless acted upon by an unbalanced force. (Newton's 1st Law)</p> <p>K20. Recognize how acceleration of an object is directly proportional to the net force and inversely proportional to its mass. ($F=ma$) (Newton's 2nd Law)</p> <p>K21. Differentiate between mass and weight. (weight = mass x gravity)</p> <p>K22. Describe the forces acting on an object moving in a circular path. (centripetal)</p> <p><u>Skills</u></p> <p><i>The student will:</i></p> <p>a. Generate questions that can be explored through scientific investigation.</p>	

- b. Use appropriate tools and techniques to make observations and gather data.
- c. Design and conduct an appropriate investigation to answer investigable questions.
- d. Identify independent and dependent variables and variables that remain constant.
- e. Manipulate variables in order to solve equations.
- f. Identify and present relationships between variables in appropriate graphs.
- g. Draw conclusions and identify sources of error.
- h. Communicate about science in different formats, using relevant science vocabulary, supporting evidence, and clear logic.

	<p>C INQ.17 Draw conclusions and identify sources of error.</p> <p>C INQ.18 Provide explanations to investigated problems or questions.</p> <p>C INQ.19 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>
<p style="text-align: center;">Enduring Understandings</p> <p><i>Insights earned from exploring generalizations via the essential questions (Students will understand THAT...)</i> <i>K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.</i></p>	<p style="text-align: center;">Essential Questions</p> <p><i>Inquiry used to explore generalizations</i></p>
<p><u>Overarching Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Science is the method of observation and investigation used to understand our world. (K-12) • Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) <p><u>Unit Specific Enduring Understandings:</u></p> <ul style="list-style-type: none"> • Heredity is the passage of instructions specifying traits from one generation to another. • Reproduction is a characteristic of living systems and is essential for the continuation of every species. • Advances in technology can change the process of natural human reproduction. The pros and cons of these advances can be debated. • Some of the characteristics of an organism are inherited while others result from interactions with the environment. • In nature, change is possible, inevitable, and sometimes beneficial. • Science ideas evolve as new information is uncovered. 	<ul style="list-style-type: none"> • How is inquiry used to solve problems or gather data to better understand a situation? • How do scientists use observation skills to investigate questions? • What are the characteristics of a controlled experiment? • In what ways do scientists organize and present their discoveries? <ul style="list-style-type: none"> • How do organisms inherit traits from their parents? • How are males and females different? • How is genetic information passed from generation from generation? • How can you look more like a ‘grandparent’ than your parent? • How/why do cells divide? • What is the role of technology in changing natural human reproduction? • What is the scientific evidence that supports evolution? • Why/how do species change over time?

Knowledge and Skills

What students are expected to know and be able to do

The knowledge and skills in this section have been extracted from Wallingford's K-5 Science Scope and Sequence.

Knowledge

- K3.1 Describe the structure and function of the male and female reproductive systems.
- K3.2 Explain the similarities and differences in cell division in somatic (mitosis) and germ cells (meiosis).
- K3.3 Describe the structure of DNA and its function.
- K3.4 Explain how a gene is the mechanism for the inheritance of traits.
- K3.5 Solve Punnett squares to determine patterns of inheritance and sex determination.
- K3.6 Explain how sexual reproduction results in genetic variability which leads to natural selection.
- K3.7 Discuss the relationship between speciation, natural selection, adaptation, and extinction.
- K3.8 Explain how the many pieces of scientific evidence support the theory of evolution.
- K3.9 Debate the technological issues related to genetic research (cloning, selective breeding, stem cell, genetically altered food, etc.)

Skills

- S1.1 Identify questions that can be answered through scientific investigation.
- S1.2 Read, interpret and examine the credibility of scientific claims in different sources of information.
- S1.3 Design and conduct appropriate types of scientific investigations to answer different questions.
- S1.4 Formulate a hypothesis in the 'If..., then...because...' format.
- S1.5 Identify independent and dependent variables, as well as those variables that are kept constant, and the control group.
- S1.6 Use appropriate tools and techniques to make observations, gather data, and organize information (tables and charts).
- S1.7 Use mathematical operations to analyze and interpret data including calculating the average for multiple trials.
- S1.8 Conduct measurements using the appropriate metric device and unit.
- S1.9 Identify and construct appropriate graphs illustrating the relationship between variables.
- S1.10 Draw conclusions and identify and explain at least three sources of error.
- S1.11 Provide explanations to investigated problems or questions.
- S1.12 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.
- S1.13 Gather information using a variety of print and non-print sources.
- S1.14 Cite sources for print and non-print sources such as information located on the internet.
- S1.15 Analyze experimental design and data so as to identify the question investigated, variables, and sources of error.
- S1.16 Apply computer-based tools to present and research information.