

Verona Public School District Curriculum Overview

4th Grade Science



Supervisor:
Glen Stevenson

Curriculum Developed:
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Verona Public Schools
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Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

In Rocks and Minerals, students are asked to explore the differences between rocks and minerals by observing the properties of rock samples, and sorting them based on those properties. Students also investigate minerals, on which they perform tests similar to those conducted by geologists to determine luster, hardness, color, and ability to transmit light, strengthening their ability to conduct experiments and record and interpret their data. Students compile a Mineral Field Guide, which is the sum total of their observations and discoveries. They use this field guide and their new knowledge of rocks and minerals to identify several unknown samples at the end of the unit. Throughout Rocks and Minerals, students read about different minerals and how they are used. Students continue to practice recording data and interpreting their scientific findings to draw conclusions based on evidence.

In Microworlds, students explore magnifiers, learning that tools like lenses and microscopes can be used to extend the sense of sight to view objects in greater detail. By observing everyday objects with a variety of lenses, students learn that a magnifier must be transparent and curved. Students use a microscope, learn the functions of all its parts, and practice proper lighting and focusing techniques. Preparing their own slides, students are able to view onion skin under magnification. Students turn their attention to living specimens and view three microorganisms—Volvox, Blepharisma, and vinegar eels. Observing the structure of these microorganisms, and how they move, feed, grow, and multiply, develops the students' sense of microbial life and interactions among living things and between living things and their environment.

By caring for and observing three unique animals during the Animal Studies unit—the dwarf African frog, the fiddler crab, and the millipede—students are able to focus on animal behavior, comparing and contrasting the needs, behaviors, and anatomical structures of each organism. Each student creates and maintains a personal observation log in which he or she records notes about each animal throughout the unit. Students apply what they learn about body structure, habitat, survival needs, and behavior to a fourth animal—the human—identifying ways that humans are similar to and different from other animals. Students practice observing and recording data in their logs as well as in Venn diagrams, class webs, tables, and drawings. Students conduct a research-based inquiry that moves them away from general observations and asks them to apply their scientific process skills as they gather and synthesize information about their animal's behavior.

Prerequisite(s):



Standard 8: Technology Standards

8.1: Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>	8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming: <i>All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.</i>
<ul style="list-style-type: none"> A. Technology Operations and Concepts B. Creativity and Innovation X C. Communication and Collaboration D. Digital Citizenship E. Research and Information Fluency X F. Critical thinking, problem solving, and decision making 	<ul style="list-style-type: none"> A. The Nature of Technology: Creativity and Innovation B. Technology and Society C. Design X D. Abilities for a Technological World E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices

Social and Emotional Learning Core Competencies: <i>These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities</i>	Career Ready Practices: <i>These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.</i>
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	X CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	CRP3. Attend to personal health and financial well-being. CRP6. Demonstrate creativity and innovation. X CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	X CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	X CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	CRP5. Consider the environmental, social, and economic impact of decisions. CRP7. Employ valid and reliable research strategies. X CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers

9.1: Personal Financial Literacy: <i>This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.</i>	9.2: Career Awareness, Exploration & Preparation: <i>This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.</i>	9.3: Career and Technical Education: <i>This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.</i>
X A. Income and Careers B. Money Management C. Credit and Debt Management D. Planning, Saving, and Investing E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting	X A. Career Awareness (K-4) B. Career Exploration (5-8) C. Career Preparation (9-12)	A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, A/V Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security M. Manufacturing N. Marketing X O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials

Core Instructional Materials: <i>These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.</i>	Differentiated Resources: <i>These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.</i>
<ul style="list-style-type: none"> ● STC Kits: <ul style="list-style-type: none"> ○ Rocks and Minerals ○ Microworlds ○ Animal Studies 	<ul style="list-style-type: none"> ● Various trade books



Unit Title / Topic: Rocks and Minerals	Unit Duration: 60 Days
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Stage 1: Desired Results

Established Goals:

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]

4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

<p style="text-align: center;">Science and Engineering Practices</p> <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Identify the evidence that supports particular points in an explanation. (4-ESS1-1) <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1) <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2) 	<p style="text-align: center;">Disciplinary Core Ideas</p> <p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1) <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2) <p>ESS2.E: Biogeology</p> <ul style="list-style-type: none"> Living things affect the physical characteristics of their regions. (4-ESS2-1) 	<p style="text-align: center;">Crosscutting Concepts</p> <p>Patterns</p> <ul style="list-style-type: none"> Patterns can be used as evidence to support an explanation. (4-ESS1-1), (4-ESS2-2) <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1) <hr style="border: 0.5px dashed black;"/> <p style="text-align: center;">Connections to Nature of Science</p> <p>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</p> <ul style="list-style-type: none"> Science assumes consistent patterns in natural systems. (4-ESS1-1)
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Common Core State Standards Connections:

ELA/Literacy –
RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)

W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1), (4-ESS2-1)

W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS1-1), (4-ESS2-1)

W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1)

Mathematics –
MP.2 Reason abstractly and quantitatively. (4-ESS1-1), (4-ESS2-1)
MP.4 Model with mathematics. (4-ESS1-1), (4-ESS2-1)
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1), (4-ESS2-1)
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1),(4-ESS2-2)

Transfer Goal:

Students will be able to independently use their learning to develop a model for the classification of minerals. Conduct research into the use of rocks and minerals and relate the uses to their properties.

Students will understand that:

- Earth materials have distinctive physical and chemical properties that make them useful for a wide variety of purposes.
- Each mineral has a unique chemistry.
- Rocks are aggregates of minerals and are constantly changing to form new rocks.
- Rocks and minerals have unique properties that may be identified by observation and testing and that help determine how these earth materials are used.
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Essential Questions:

- How are rocks and minerals different?
- How can we tell minerals apart from one another?
- How can we tell rocks apart from one another?

Students will know:

- Minerals have distinctive properties that may be identified by testing.
- Every mineral is composed of only one substance, and that substance is the same throughout the mineral.
- Samples of the same mineral may appear to be different although a mineral can be identified by a set of properties.
- The properties of rocks and minerals determine how they are used.
- Rocks can be classified on the basis of their physical properties.
- Rocks are classified on the basis of their formation as sedimentary, igneous, or metamorphic; they are continuously changing and forming new rocks.
- properties, rock, geologist, smoothness, color, composition, physical property, layering, fossil, weight, volume sediment, sedimentary, magma, lava, layer, igneous, metamorphic, shiny, dull, smooth, heavy, igneous, sedimentary, crystals, feldspar, orthoclase, plagioclase, kaolin, field tests, sulfur, fertilizer, streak test, streak plate, graphite, hematite, transmit, opaque, translucent, transparent, calcite, muscovite, luster, metallic, nonmetallic, pearly, brilliant, waxy, hardness, Mohs scale, soft hardness, medium hardness, diamonds, talc, magnetic, magnetite, compass, poles, crystal, quartz, fluorite, mineraloid, streak, magnetic, biotite

Students will be able to:

- Develop a model for classifying rocks.
- Conduct an investigation of the composition of rocks.
- Conduct investigations of the properties of minerals.
- Develop a model for classifying minerals.
- Present research findings of the uses of rocks and minerals.

Stage 2: Acceptable Evidence

Transfer Task -

Unit Post Assessment
 Research project



Unit Title / Topic: Microworlds	Unit Duration: 60 days
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Stage 1: Desired Results

Established Goals:

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

<p style="text-align: center;">Science and Engineering Practices</p> <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Construct an argument with evidence, data, and/or a model. (4-LS1-1) <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2) 	<p style="text-align: center;">Disciplinary Core Ideas</p> <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) <p>LS4.B: Natural Selection</p> <ul style="list-style-type: none"> Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2) 	<p style="text-align: center;">Crosscutting Concepts</p> <p>Systems and System Models</p> <ul style="list-style-type: none"> A system can be described in terms of its components and their interactions. (4-LS1-1) <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2)
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Common Core State Standards Connections:

ELA/Literacy –

- RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-2)
- RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-2)
- RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-2)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-2)
- SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-2)
- W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2)

Mathematics –

- MP.2 Reason abstractly and quantitatively. (3-LS4-2)
- MP.4 Model with mathematics. (3-LS4-2)
- 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. (3-LS4-2)
- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

Transfer Goal:

Students will be able to independently use their learning prepare a slide of a “wild” microorganism, make a technical drawing of the microorganism, and write a paragraph describing that microorganism.

Students will understand that:

- Living systems at all levels of organization demonstrate the complementary nature of structure and function.
- All living things are composed of cells, the fundamental unit of life. Cells have structures that help them survive in specific environmental conditions.
- Magnification reveals that all living things are made up of one or more cells.
- Observation gives us relevant information about an object. Magnifiers allow us to observe greater detail.
- Magnification reveals the cellular structure of living organisms.

Essential Questions:

- What do microorganisms look like?
- How do microorganisms meet the needs of life?
- How does a microscope work?

Students will know:

- Observation gives us relevant information about an object.
- Magnifiers allow us to observe greater detail.
- Magnification reveals the cellular structure of living organisms.
- Living systems at all levels of organization demonstrate the complementary nature of structure and function
- Magnification reveals that all living things are made up of one or more cells.
- All living things are composed of cells, the fundamental unit of life.
- Cells have structures that help them survive in specific environmental conditions.
- observation, magnify, magnifier, hand lens, magnification, properties, inference, five senses, convex, transparent, magnification, object, image, lens, curvature, opaque, microscope, microscopic, eyepiece, mirror, clip, stage, body, knob, micro, slide, clip, primary color, field of view, millimeter, power, microscopic, wet-mount slide, well slide, depression slide, sodium chloride, Epsom salts, quartz specimen, hay infusion, organisms, cell, cell wall, cell membrane, nucleus, Volvox, green algae, flagella, algae, photosynthesis, colony, chlorophyll, Blepharisma, ciliates, cilia, bacteria, cannibals, binary fission, paramecium, vinegar eel, unpasteurized, vinegar, sterilized, pasteurized, decompose, bacteria, decomposition, infusion, unicellular, multicellular, flagellate, protist, decompose

Students will be able to:

- Make observations and record data using various tools which magnify images.
- Conduct an investigation of the properties of lenses.
- Conduct an investigation of the field of view of a microscope
- Conduct an investigation of slide techniques, focusing, and light adjustments.
- Conduct an investigation of Volvox, Blepharisma, and vinegar eels.
- Conduct an investigation of the diversity of life from a hay/grass infusion.
- Make technical drawings of magnified images

Stage 2: Acceptable Evidence

Transfer Task -

Unit Post-Assessment



Unit Title / Topic: Animal Studies

Unit Duration: 60 days

Stage 1: Desired Results

Established Goals:

- 3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Table with 3 columns: Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts. Each column lists specific standards and their descriptions.

Common Core State Standards Connections:

- ELA/Literacy - RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
Mathematics - MP.2 Reason abstractly and quantitatively.
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.

Transfer Goal:

Students will be able to independently use their learning compare and contrast the structures, behavior, and habitats of three organisms.

Students will understand that:

- An organism's behavior and physical structure are part of a system that includes interrelationships with its environment.
Animals develop behaviors and structures that help them survive in their habitats.
A habitat is where an animal finds food, water, shelter, and space—the things it needs to grow and reproduce.

Essential Questions:

- What is the relationship between an animal and its habitat?
What do all animals need to survive?
How are humans like other animals? How are they different?
How do we study animal behavior?

Students will know:

- Organisms have need of food, space, air, light, and protection that must be met for survival.
The diverse structures and behaviors of different organisms determine how they adapt to the environment.
Observation and data-collection skills are important investigation tools in studying organisms' structures and adaptive behaviors.

Students will be able to:

- Build habitats to suit specific organisms' needs.
Conduct investigations of body structure and behaviors.
Design and conduct a fair test of animal behavior.

Stage 2: Acceptable Evidence

Transfer Task -

Unit Post-Assessment