

SCIENCE

Kindergarten

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Lab journals require students to document and communicate their findings with ever increasing sophistication. From initial drawings to more complex analysis, lab journals provide a method for students to document their learning. The curriculum is integrated to connect with ideas and processes used across the curriculum. Mathematical skills are given practical application in science and are integrated with other disciplines as appropriate. The curriculum is designed to teach benchmarks found in national science standards as well as the Minnesota state standards for K-12 science education.

In Kindergarten, students practice and develop observational skills, apply mathematical concepts, and draw conclusions about their immediate environment. Our units focus on multi-sensory approaches while at the same time allowing students to develop beginning scientific skills.

Units of Study- Key Content--Essential Questions and Skills

Concepts, Understandings,

<p>Seasonal Changes -Fall: leaves, apples, popcorn, hibernation, migration; Winter: birds, light, shadow; Spring: plants and plant growth; climate adaptation by animal life).</p> <ul style="list-style-type: none"> • How does the change of seasons affect people, animals and plants and how do these organisms adapt to meet their needs for survival and growth in specific environments? <p>The Solar System (Constellations, cycles of day and night)</p> <ul style="list-style-type: none"> • What are the components of the solar system and how do we observe the changes that take place as the seasons change and at different times of day/night? <p>Human Body (Human organism, dental health, food and health)</p> <ul style="list-style-type: none"> • How does my body work and how do I keep my body healthy? 	<p>An introduction to the scientific process by:</p> <ul style="list-style-type: none"> • Predicting • Observing • Comparing • Contrasting • Communicating
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Wood, Paper, Fabric

- In what ways are the materials (paper, wood, fabric) alike and different? Where can you find these materials in the world around you? What might happen if we change one part of the experiment?

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Grade 1-2

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First and second grade science is taught in a two year cycle. One year focuses on the life cycles of organisms and includes observations of frogs, butterflies and plants. The second year focuses on introducing students to the physical sciences. The next year cycle includes the study of matter (solids, liquids, and gas), motion, and magnetism.

Units of Study- Key Content--Essential Questions

Concepts, Understandings, and Skills

<p>Year A units include:</p> <p>Solids and Liquids</p> <ul style="list-style-type: none"> • What are the properties of solids, liquids, and gases how can you change the states of matter? How does the property of an object affect its use? <p>Balance and Motion</p> <ul style="list-style-type: none"> • How can the use of counterweights make something balance and how does movement affect balance? How does an axis affect balance? <p>Magnets</p> <ul style="list-style-type: none"> • What is magnetism? What is a permanent magnet? <p>Year B units include:</p> <p>Butterflies, Frogs, Insects ,Plants</p> <ul style="list-style-type: none"> • How are life cycles the same/different of various organisms and how does an organism adapt to its habitat? What does an organism need to survive? 	<p><i>Grade 1/2 science units are completed in a two year cycle, with an emphasis on the scientific process.</i></p> <ul style="list-style-type: none"> • Making predictions • Observing • Gathering and recording data • Writing conclusions
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Grade 3

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In third grade students begin to appreciate the general principles of science and how these laws connect between different disciplines. They are able to identify trees by their leaves and characteristics. We also study the water cycle and how weather impacts our daily lives. During our study of electricity students will be introduced to how series and parallel circuits work.

Units of Study- Key Content--Essential Questions and Skills

Concepts, Understandings,

<p>Tree Study: characteristics, identification, field trips</p> <ul style="list-style-type: none"> • How do specific characteristics of trees help in identification and how does climate affect tree life? What connections can be made between the study of trees with weather and climate? <p>Weather and Water: properties of water, climate, temperature, water cycle, wind/storms, weather conditions, clouds, use of weather instruments, meteorology</p> <ul style="list-style-type: none"> • How does geography influence climate changes and cloud formation? Can natural disasters be predicted and what impact does weather have on people and their lives? Why are water cycles important in relation to weather and how does this impact ground absorption and precipitation? 	<p>Science units are explored with an emphasis on the scientific process:</p> <ul style="list-style-type: none"> • Making predictions • Observing • Gathering and recording data • Writing conclusions
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Electricity: Circuits (series and parallel, electrical phenomena)

- What are the different types of electrical phenomena and how are they manifested? How do series and parallel circuits work in the design of a telegraph?

Levers and Pulleys: Simple machines, real life examples, effort, creation of simple machines.

- How do levers, pulleys, and other simple machines make our everyday real life easier? How do these simple machines such as wheels, gears, and axels reduce effort and what mathematical connections can be applied in their use?

*Integrated activities include: Nature center visits to do leaf identification, literature connections, guest speakers (St.. Louis Park forester, local meteorologist) and sketching in art class.

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Grade 4

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In our fourth grade science units students are challenged to think more abstractly about complex systems, such as tectonic plates, the solar system, and the circulatory system. Students learn relevant knowledge about taking care of their bodies and changes that occur during puberty.

Units of Study- Key Content--Essential Questions and Skills

Concepts, Understandings,

<p>Geology: study of rocks, minerals, fossils, layers of the earth, earth changes (earthquakes, volcanoes), fossil hunting field trip</p> <ul style="list-style-type: none"> • How has the composition of Earth changed over time and continue to change today? How are rocks and minerals classified? <p>Astronomy: Solar system, moon, stars/ constellations</p> <ul style="list-style-type: none"> • How do different elements of the solar system relate to each other and how do scientists identify objects in space? <p>Human Body: Major body systems (circulatory, nervous, skeletal) and learning about puberty</p> <ul style="list-style-type: none"> • While developing a positive self image what choices can we make to live a healthy lifestyle? What major systems are in our bodies and how do we use them in daily life? 	<ul style="list-style-type: none"> • Develop the scientific skills: observation, noting similarities and differences • Make inferences/critical thinking • Communicate scientific findings and information in a variety of ways • Understand how the earth is formed and changed through the study of geology • Understand earth's place in the solar system and universe • Understand the movement of objects in the solar system • Develop knowledge of different body systems and their place in our daily life • Learn about physical and emotional changes of puberty
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Grade 5

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Fifth graders truly become scientists as they have the opportunity to guide their learning and design experimental opportunities. Part of what makes fifth grade science engaging is the hands on approach to understanding scientific concepts and ideas that they come across in the real world.

Units of Study- Key Content--Essential Questions

- Models and Designs:** Physical models, conceptual models, black boxes, go-carts.
- How do scientists use models in science (and other related areas) and how do they help them understand concepts, objects, etc. in the world? How do concepts of engineering and design connect to each other and how do we apply skills to gain deeper understanding of content?
- Environments:** Biomes, ecosystems, terrariums, water tolerance.
- What environments exist in various locations in the world and how does the environment impact living things? What is the range of tolerance for various plants? How do variables impact experiments?
- Solar Energy:** Temperature, heat retention, energy transfer
- How does a scientist design an experiment to address the desired question and answer the questioned posed to the situation? How does the sun's movement affect the transfer of light/solar energy and which materials absorb solar energy most quickly?

Concepts, Understandings, and Skills

- Follow scientific procedures accurately
- Make hypotheses and support them with substantial reasons
- Articulate scientific ideas and supports them with evidence
- Maintains orderly science notes and records
- Organizes and analyzes data from investigations

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Grade 6

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Sixth grade is the year when students really begin individual and independent scientific inquiry. Through the maintenance of an extensive lab journal, students are responsible for organizing and communicating the scientific ideas behind an experiment, documenting all of its steps and to the creation of new questions. Additionally, students are introduced to chemistry concepts and begin to make their own connections between the various areas of science. In this process, they discover that the processes learned in chemistry directly impact all of their earth science studies both past and present. In the introductory physics unit on flight, we apply these concepts to a new branch of science and, as a result, come away with a solid understanding of basic scientific principles and laws.

Units of Study- Key Content--Essential Questions

- Chemistry:** Mixtures and Solutions, Atomic Structure, Periodic Table
- What is the structure of matter and how does matter change form? Why is that matter cannot be either created or destroyed, but only transformed? Why is it necessary to accurately design, implement and record scientific experimentation and why is reproducibility so important in investigations? How do these laws inform my understanding of other branches of science?
- Geology:** Rock Cycle, Geologic Time, River/Land Formations, Integration of Judaic Studies (Creation)
- How does the formation of the earth, rocks and other landforms as well influence today's world? How do we understand the complexities of geology,

Concepts, Understandings, and Skills

- Formulate increasingly sophisticated questions
- Create experiments to prove/disprove student-generated hypotheses
- Control for variables
- Read, interpret & develop a variety of charts, tables, graphs and text to effectively communicate information
- Maintains orderly science notes and journal
- Articulate conclusions orally and in writing
- Understand connections between phases of

geologic time and global climate change? What does Judaism teach me about the use of the land?

Astronomy: Laws of Newton & Kepler, Gravity , Star Formation and Constellations, Integration of Judaic Studies (Creation)

- How/when did galaxies and solar systems form and why is gravity so important in understanding how the systems of the universe operate? How do the laws of Kepler and Newton help us understand the universe? Can the scientific theories and Jewish Studies teachings be connected and understood together?

Flight: What are the main scientific principles that must work for objects to be airborne? How do these principles function in other areas of scientific inquiry?

matter and their environment

- Understand, articulate and use the ideas that the basic principles of science, the laws that govern how science works apply across the branches and are not limited to only one area.
- Why is it important to understand how systems function?

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Grade 7

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In seventh grade, science students are introduced to many different facets of organisms in various learning environments. Over the course of the year the students' scientific skills, conceptual knowledge of biological sciences and their understanding of ethical issues will be enhanced. Instruction includes hands-on experiments, class discussions and group work. Additionally we focus on different investigative methodologies, presentation skills, and working collaboratively with others.

Units of Study- Key Content--Essential Questions and Skills

Concepts, Understandings,

<p>Organisms-Introduction to Biological Skills: Human Body Organ Systems (Digestive, Excretory, Respiratory, Circulatory, Skeletal, Nervous, Muscular) Life Science (Cells, Diversity of Organisms, Human Organism, Communities)</p> <ul style="list-style-type: none"> • How do the systems in our bodies interact with each other and what is the purpose of each function within our bodies? What are the parts of a cell and what function do they perform in our everyday lives? How do various communities function with each other? <p>Biological Evolution: Genetics, History and Nature of Science (Scientific World View,</p>	<p>Develop the scientific skills:</p> <ul style="list-style-type: none"> • Formulate increasingly sophisticated questions • Maintain orderly scientific notes and records • Organizes and analyzes data from investigations • Research • Perform experiments/investigations that involve use of the microscope/dissection • Lab reports/writing
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Scientific Inquiry) Life Science (Heredity, Biological Population Change Over Time, Human Organism) Classification (Compare organisms, Grouping) Kingdoms (Bacteria, Protozoa, Plants, Animals, Fungi)

- What are the ethical questions surrounding genetic testing and cloning? What are the significant factual differences between each kingdom and why are there so many different classifications of animals?

- Use Excel and other software to report and record data/make presentations
- Work in groups/projects
- Manage long term projects

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Grade 8

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The eighth grade year provides extensive lab experiences related to chemistry that enhances the students' scientific skills, conceptual knowledge and their understanding of properties of substances. They will create their own labs (e.g., determine what the best paper towel is) as well as learn specific lab techniques (e.g., fractional distillation) and form connections between science and industry. The students will have increased lab report writing requirements that incorporate graph and math skills. The labs connect to laws of science as well as the chemistry concepts covered will expand their analytical and synthesizing skills. Instruction will include hands-on experiments, class discussions and group work.

Units of Study- Key Content--Essential Questions

Chemistry (Volume & Mass. Paper Towel Analysis, Mass Changes, Characteristic Properties, Solubility, Separation of Mixtures, Sludge Analysis, Compounds & Elements) **Physical Science** (Chemical Reactions, Bonding. Ionic & Covalent Bonding) **History and Nature of Science** (Scientific World View, Scientific Inquiry)

- What are safe lab procedures and what are the sections of a lab report? How do you measure the volume of regular and irregular shaped objects? How is mass measured and how does temperature/pressure affect volume and mass? What is the law of the conservation of mass? How are substances identified? How do the laws of nature differ than the laws of society? What is the difference between mixtures and compounds and the difference between elements and compounds? How do you separate a mixture and how do you separate compounds? What are the building blocks of matter?

Concepts, Understandings, and Skills

Develop the scientific skills:

- Formulate increasingly sophisticated questions using analytical skills and synthesis
- Lab reports/writing
- Maintain orderly scientific notes and records
- Organizes and analyzes data from investigations
- Use Excel and other software to report and record data/make presentations
- Research
- Perform experiments demonstrating safe laboratory procedures
- Work in groups/projects
- Manage long term projects