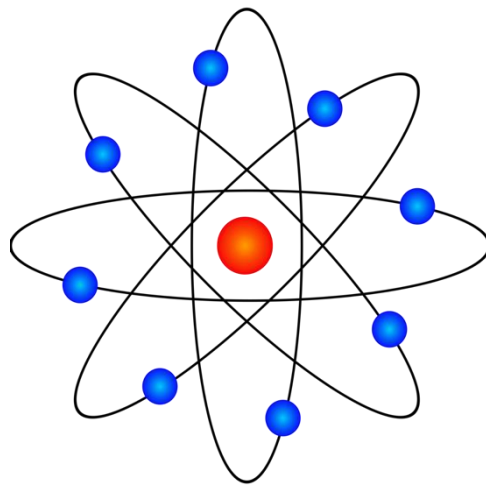




Fairbanks North Star Borough School District

Science Curriculum



Grades 6-8

Adopted June 4, 2024

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Acknowledgements

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Science Researchers

Grades 6-12 science teachers met during professional development in August of 2022 to discuss and begin the research for science curriculum.

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We would also like to recognize

The Board Curriculum Committee, the Fairbanks North Star Board of Education, and the many teachers, administrators, parents, and community members who have provided input during the curriculum revision process.

Philosophy & Mission Statement

Graduates will be

EMPOWERED

critical thinkers who use evidence-based reasoning, and who have a duty to the natural world and their society.

Archived Courses

The following courses have been removed from the science curriculum and archived. If a teacher or school is interested in offering one of these courses in the future, they must fill out a pilot proposal form by the deadline listed at www.k12northstar.org/Page/8841; the course may be offered, pending Teaching and Learning and superintendent approval. If the school would like to look at the old curriculum for the course, contact Teaching and Learning at teachingandlearning@k12northstar.org or (907) 452-2000 ext. 11422.

Archived courses:

- Astrobiology
- Chem Tech
- Conceptual Physics
- Microbiology
- Natural Resources: Biology
- Natural Resources: Physical Science

Explanation of Terms

Alaska Science Standards

Science Standards were adopted by the State Board of Education in 2019. These are general statements of what Alaskans want students to know and be able to do as a result of their public school experience. <https://education.alaska.gov/standards>

Alaska Cultural Standards

Standards endorsed by the State Board of Education that serve to encourage enrichment of the content standards. They are used as a guide to ensure that schools are aware of and sensitive to their surrounding physical and cultural environments.

<https://education.alaska.gov/akstandards/#c3gtabs-cultural>

Objectives

Statements that document specific, essential tasks students are expected to accomplish in a given grade level or course.

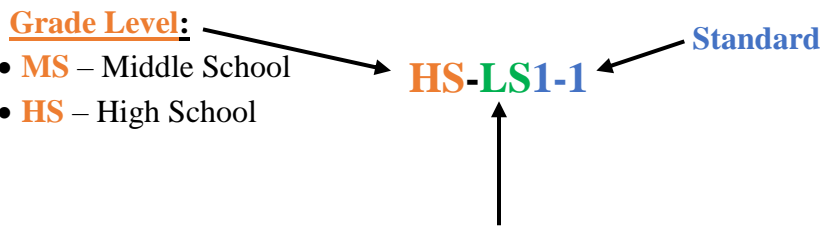
Guaranteed and Viable Curriculum (GVC)

A guaranteed and viable curriculum is one that guarantees equal opportunity for learning for all students. Similarly, it guarantees adequate time for teachers to teach content and for students to learn it. A guaranteed and viable curriculum is one that ensures that the curriculum being taught is the curriculum being assessed. It is viable when adequate time is ensured to teach all determined essential content.

Standards Alignment Coding

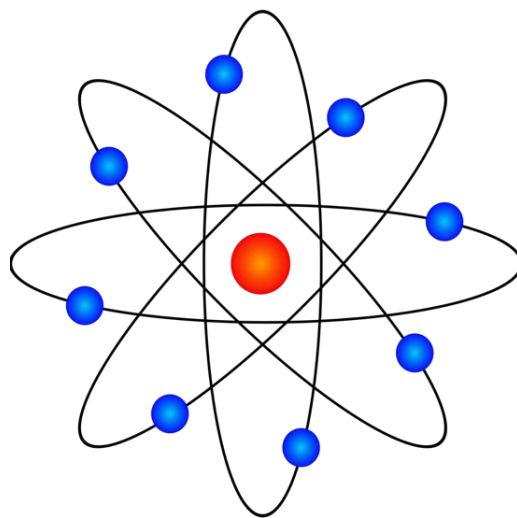
This Science Curriculum is aligned to the Alaska Science Standards adopted in 2019, which are largely the same as the national Next Generation Science Standards (NGSS). The Alaska Science Standards provide a foundation for defining what students should know and be able to do in terms of scientific knowledge and skills.

(<https://education.alaska.gov/akstandards/science/science-standards-for-alaska.pdf>)



| Science Standards for Alaska Disciplinary Core Ideas | |
|--|--|
| <p>Physical Sciences</p> <p>PS1: Matter and its interactions PS2: Motion and stability: Forces and interactions PS3: Energy PS4: Waves and their applications in technologies for information transfer</p> | <p>Life Sciences</p> <p>LS1: From molecules to organisms: Structures and processes LS2: Ecosystems: Interactions, energy, and dynamics LS3: Heredity: Inheritance and variation of traits LS4: Biological evolution: Unity and diversity</p> |
| <p>Earth and Space Sciences</p> <p>ESS1: Earth’s place in the universe ESS2: Earth’s systems ESS3: Earth and human activity</p> | <p>Engineering, Technology, Applications of Science</p> <p>ETS1: Engineering design</p> |

Middle School Science Courses



Grades 6 – 8

Grade 6 Science

| | |
|---|---|
| <p>Grade(s): 6 Length: two semesters</p> | <p>Course Overview: Sixth grade science focuses on Earth’s systems, astronomy, and gravity. In Earth’s systems, students will explore the history of our changing planet through impacts of water, rock, and soil cycles on Earth’s surface processes, and construct weather and climate observations to explain influences on Earth’s surface. In astronomy, the students will model the solar system to observe, describe, and predict the motion of various bodies in our solar system. In gravity, students will investigate Newton’s Third Law of Motion in relation to planetary motion. Throughout the year, interwoven into the curriculum content, students will design and conduct repeatable scientific investigations to continue to develop an awareness that different ways of thinking, curiosity, and the exploration of multiple paths are involved in scientific inquiry.</p> <p>Adopted Textbook: <i>Into Science: Earth & Space Sciences</i>. HMH, 2022 Volumes: <i>Circulation of the Earth’s Air and Water, Weather and Climate, The Dynamic Earth, Earth’s Natural Hazards, Resources in Earth Systems, Human Impacts on Earth Systems, Patterns in the Solar System, The Solar System and Universe.</i></p> |
|---|---|

| Units (Recommended Order) | |
|---|--|
| Semester 1 | Semester 2 |
| <ul style="list-style-type: none"> • Circulation of Earth’s Air and Water • Weather and Climate • The Dynamic Earth • Earth’s Natural Hazards • Resources in Earth’s Systems | <ul style="list-style-type: none"> • Human Impacts on Earth’s Systems • Patterns in the Solar System • The Solar System and Universe • Performance Expectations* |

Notes:

- *The Earth and Space Science* Unit 4 “Earth through Time” book was intentionally skipped, as it is utilized by grade 7.
- *Science process skills are best taught in context. Therefore, the performance expectations will be incorporated into the units below. Not all of these performance expectations will be incorporated into every activity; however, the opportunities to learn these skills will be provided throughout the course.

UNIT 1: CIRCULATION OF EARTH'S AIR & WATER

Timing: Semester 1, Quarter 1

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science* book 1: *Circulation of Earth's Air and Water*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---------------------------------------|----------------------|---|--|--|
| Circulation in the Earth's Atmosphere | 5 days | <ul style="list-style-type: none"> • Identify and analyze movements of air masses from regions of high to low pressure (convection currents) and the effects on weather. | <ul style="list-style-type: none"> • Convection • Coriolis Effect • Air Pressure • Atmosphere • Circulation • Density • Energy System | <ul style="list-style-type: none"> • Unit 1 (Book 1, p. 3A) Lesson 1: Circulation in the Earth's Atmosphere |
| Circulation in the Earth's Oceans | 5 days | <ul style="list-style-type: none"> • Describe the effects of the ocean on Earth's weather. | <ul style="list-style-type: none"> • Ocean Current • Density • Salinity • Temperature | <ul style="list-style-type: none"> • Unit 1 (Book 1, 11A) Lesson 2: Circulation in Earth's Oceans |
| The Water Cycle | 5.5 days | <ul style="list-style-type: none"> • Describe and illustrate the water cycle, and the forces that drive it (gravity and sunlight). | <ul style="list-style-type: none"> • Evaporation • Condensation • Transpiration • Crystallization • Precipitation • Runoff • Groundwater Flow | <ul style="list-style-type: none"> • Unit 1 (Book 1, 19A) Lesson 3: The Water Cycle |
| Unit Test/ Labs | 2 days | | | • |
| Standards List: | MS ESS2-4, MS ESS2-6 | | | |

UNIT 2: WEATHER & CLIMATE

Timing: Semester 1, Quarter 1

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science Unit 2: Weather and Climate*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|--------------------------------|-----------------------------|--|--|--|
| Weather and Weather Prediction | 5.5 days | <ul style="list-style-type: none"> • Identify and analyze movement of air masses from regions of high to low pressure (convection currents), and the effects on the weather. • Describe the effects of the ocean and the water cycle on the weather. | <ul style="list-style-type: none"> • Weather • Air Mass • Front • Weather Forecast | <ul style="list-style-type: none"> • Unit 2 (Book 2, pg. 3A) Lesson 1: Weather and Weather Prediction |
| Influences on Climate | 6.5 days | <ul style="list-style-type: none"> • Describe how unequal heating and the rotation of the Earth determines regional climates. | <ul style="list-style-type: none"> • Climate | <ul style="list-style-type: none"> • Unit 2 (Book 2, pg. 11A) Lesson 2: Influences on Climate |
| Unit Test/ Labs | 2.5 | | | |
| Standards List: | MS-ESS2-5, MS-ESS2-5 | | | |

UNIT 3: THE DYNAMIC EARTH

Timing: Semester 1, Quarter 2

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science* Unit 3

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---------------------------------------|--|---|---|--|
| Geologic Change and Surface Processes | 5.5 days | <ul style="list-style-type: none"> Explain how geoscience processes have changed the Earth's surface at varying times and spatial scales. | <ul style="list-style-type: none"> Weathering Sediment Erosion Deposition | <ul style="list-style-type: none"> Unit 3: Lesson 1 Geologic Change and Surface Processes |
| The Rock Cycle | 6.5 days | <ul style="list-style-type: none"> Know that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperatures, and the forces that created them. | <ul style="list-style-type: none"> Mineral Igneous Rock Sedimentary Rock Metamorphic Rock Rock Cycle | <ul style="list-style-type: none"> Unit 3: Lesson 2 The Rock Cycle |
| Earth's Plates | 5.5 days | <ul style="list-style-type: none"> Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. | <ul style="list-style-type: none"> Tectonic Plate Plate Tectonics Convection Current | <ul style="list-style-type: none"> Unit 3: Lesson 3 Earth's Plates |
| Unit Test/ Labs | 2.5 days | | | |
| Standards List: | MS ESS2-1, MS ESS2-2, MS ESS2-3 | | | |

UNIT 4: EARTH'S NATURAL HAZARDS

Timing: Semester 1, Quarter 2

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science* Unit 5

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---|----------------------|---|--|--|
| Natural Hazard Prediction | 5.5 days | <ul style="list-style-type: none"> Analyze and interpret data on natural hazards to forecast future catastrophic events. | <ul style="list-style-type: none"> Natural Disaster Natural Hazard Historical Interpret Likelihood Monitor Prediction | <ul style="list-style-type: none"> Unit 5 Lesson 1: Natural Hazard Prediction p. 3A |
| Reducing the Effects of Natural Hazards | 5.5 days | <ul style="list-style-type: none"> Define criteria and constraints of model for mitigating natural hazards. | <ul style="list-style-type: none"> Mitigation Constraint Criterion Engineering Design Process Preparation Recovery Response Solution Technology | <ul style="list-style-type: none"> Unit 5 Lesson 2: Engineer it: Reducing the Effects of Natural Hazards p. 11A |
| Unit Test/ Labs | 2.5 days | | | |
| Standards List: | MS-ESS3-2, MS-ETS1-1 | | | |

UNIT 5: RESOURCES IN EARTH'S SYSTEMS

Timing: Semester 2, Quarter 3

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science* Unit 6

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|-----------------------------------|----------------------|---|--|--|
| Natural Resources | 5.5 days | <ul style="list-style-type: none"> • Construct an evidence-based explanation of the formation of natural resources (such as oil, propane, and natural gas) are the result of past geoscience processes. • Gather information and explain how synthetic materials come from natural resources and impact society. | <ul style="list-style-type: none"> • Natural Resources • Renewable Resource • Nonrenewable Resource | <ul style="list-style-type: none"> • Unit 6 Lesson 1: Natural Resources |
| Human Population and Resource Use | 5 days | <ul style="list-style-type: none"> • Construct an argument, supported by evidence, for how increases in human population and per-capita consumption of natural resources impact Earth's systems. | <ul style="list-style-type: none"> • Per Capita Consumption • Population | <ul style="list-style-type: none"> • Unit 6 Lesson 2: Human Population and Resource Use |
| Resource Use and Earth's Systems | 5.5 days | <ul style="list-style-type: none"> • Construct an argument, supported by evidence, for how increases in human population and per-capita consumption of natural resources impact Earth's systems • Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. | <ul style="list-style-type: none"> • Pollution • Deforestation • Extinction • Greenhouse Gas • Resource Use | <ul style="list-style-type: none"> • Unit 6 Lesson 3: Resource Use and Earth's Systems |
| Unit Test/ Labs | 2.5 days | | | |
| Standards List: | MS ESS3-1, MS ESS3-2 | | | |

UNIT 6: HUMAN IMPACTS ON EARTH'S SYSTEMS

Timing: Semester 2, Quarter 3

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science* Unit 7

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---|--|---|---|--|
| Reducing Human Impacts on the Environment | 8.5 days | <ul style="list-style-type: none"> Apply scientific principles to design a method for monitoring and minimizing human impact on the environment. | | <ul style="list-style-type: none"> Unit 7: Lesson 1 Engineer It: Reducing Human Impacts on the Environment. |
| Climate Change | 5.5 days | <ul style="list-style-type: none"> Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. | <ul style="list-style-type: none"> Greenhouse Effect | <ul style="list-style-type: none"> Unit 7: Lesson 2 Climate Change |
| Unit Test/ Labs | 2.5 days | | | |
| Standards List: | MS-ESS3-3, MS-ESS3-5, MS-ETS1-2 | | | |

UNIT 7: PATTERNS IN THE SOLAR SYSTEM

Timing: Semester 2, Quarter 4

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science* Unit 8

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---------------------------|-----------|---|---|--|
| Earth – Sun – Moon System | 7 days | <ul style="list-style-type: none"> • Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, and eclipses of the sun and moon. | <ul style="list-style-type: none"> • Orbit • Phase • Eclipse | <ul style="list-style-type: none"> • Unit 8 Lesson 1: The Earth-Sun-Moon System, pg. 3A |
| Seasons | 6 days | <ul style="list-style-type: none"> • Develop and use a model of the Earth-Sun-Moon system to describe the seasons. | <ul style="list-style-type: none"> • Season | <ul style="list-style-type: none"> • Unit 8 Lesson 2: Seasons, pg. 15A |
| Unit Test/ Labs | 2.5 days | | | |
| Standards List: | MS-ESS1-1 | | | |

UNIT 8: THE SOLAR SYSTEM AND UNIVERSE

Timing: Semester 2, Quarter 4

Teaching Time Required: All estimated teaching times are based on a 45 minute period.

Textbook: *Into Science Unit 9: The Solar System and Universe*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|----------------------------|---------------------------------------|--|--|---|
| Earth and the Solar System | 5 days | <ul style="list-style-type: none"> Analyze and interpret data to determine scale properties of objects in the solar system. | <ul style="list-style-type: none"> Asteroid Comet Dwarf Planet Meteoroid Parallax Moon Telescope Heliocentric Retrograde Transit | <ul style="list-style-type: none"> Unit 9 Lesson 1: Earth and the Solar System |
| Gravity and the Universe | 6.5 days | <ul style="list-style-type: none"> Describe the role of gravity in the motions within galaxies and the solar system. | <ul style="list-style-type: none"> Orbit Chemical Composition Condense Density Inertia Projectile Protoplanetary Disk Satellite Velocity Speed | <ul style="list-style-type: none"> Unit 9 Lesson 2: Gravity and the Universe |
| Modeling in Space Science | 6.5 days | <ul style="list-style-type: none"> Construct and present arguments to support the claim that gravitational interactions are attractive and depend on masses of interacting objects. | <ul style="list-style-type: none"> Astronomical Unit Galaxy Light-Year Universe Diameter Distinguish Location Order of Magnitude Ratio Scale | <ul style="list-style-type: none"> Unit 9 Lesson 3: Modeling in Space Science |
| Unit Test/ Labs | 2.5 days | | | |
| Standards List: | MS ESS1-2, MS ESS1-3, MS PS2-4 | | | |

SCIENTIFIC PROCESS SKILLS

Timing: All year

Teaching Time Required: Varies

Textbook: Embedded throughout

Objectives

- Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate.
- Plan and carry out scientific investigations of various types (such as systematic observations or experiments), identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
- Select appropriate tools for collecting qualitative and quantitative data and record measurements (volume, mass, distance) in metric units.
- Develop a model describing phenomenon.
- Conduct research to learn how the local environment is used by a variety of competing interests (e.g. competition for habitat/resources, tourism, oil, mining companies, and hunting groups).
- Use standard safety practices for all classroom laboratory and field investigations.

Grade 7 Science

| | |
|---|---|
| <p>Grade(s): 7 Length: two semesters</p> | <p>Course Overview: <i>Science 7</i> is an introductory course designed to expand seventh grade students' understanding of the natural world by focusing on the characteristics of living things, cellular organization, the diversity of life, and how organisms and populations change over time in terms of biological adaptation, heredity and genetics, evolution, natural selection, and changes over time in Earth's history.</p> <p>Adopted Textbook: <i>Into Science</i>. HMH, 2022</p> |
|---|---|

| Units (Recommended Order) | |
|--|---|
| Semester 1 | Semester 2 |
| <ul style="list-style-type: none"> • Introduction • Cells and Organization in Organisms • Reproduction, Heredity, and Growth • Matter and Energy in Living Systems | <ul style="list-style-type: none"> • Ecosystem Dynamics • The History of Life on Earth • Evolution |

UNIT 1: CELLS & ORGANIZATION IN ORGANISMS

Suggested Pacing: Semester 1, Quarter 1

Teaching Time Required: 17 days

Textbook: *Into Science*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|-----------------------------|--------|---|--|---|
| Cell Structure/ Function | 5 days | <ul style="list-style-type: none"> • All living things are made of one or more cells. • Cells can be described by the types of structures in which they are made. • The cell membrane serves as a barrier that allows matter and energy to enter and exit the cell. • Students use a model to describe how a cell's functions are performed by specific cell structures. | <ul style="list-style-type: none"> • Cell Membrane • Cell Wall • Chloroplast • Mitochondrion • Nucleus • Organelle | <ul style="list-style-type: none"> • <i>Into Science: Life Science</i> Unit 1 Cells and Organization in Organisms – Lesson 1 Cell Structure and Function |
| Plant Body Systems | 5 days | <ul style="list-style-type: none"> • Students use evidence to support an explanation about how the survival needs of plants are met by systems working together. | <ul style="list-style-type: none"> • Leaf • Organ • Organism • Organ System • Tissue | <ul style="list-style-type: none"> • <i>Into Science: Life Science</i> Unit 1 Cells and Organization in Organisms – Lesson 2 Plant Body Systems |
| Animal Body Systems | 5 days | <ul style="list-style-type: none"> • Students use evidence to evaluate how the survival needs of animals are met by systems working together. | <ul style="list-style-type: none"> • Behavior • Homeostasis • Memory • Sensory • Receptor | <ul style="list-style-type: none"> • <i>Into Science: Life Science</i> Unit 1 Cells and Organization in Organisms – Lesson 3 Animal Body Systems |
| Unit Test/ Labs | 2 days | | | |
| Standards List: | | <ul style="list-style-type: none"> • MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. • MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function • MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. • MS-LS1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. | | |

UNIT 2: REPRODUCTION, HEREDITY, & GROWTH

Timing: Semester 1, Quarter 2

Teaching Time Required: 17.5 – 26.5 days

Textbook: *Into Science*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|------------------------------|--|--|--|---|
| Inheritance and Reproduction | 5 – 8 days | <ul style="list-style-type: none"> Students investigate how genetic factors influence an organism’s traits, describe how asexual reproduction results in offspring with identical genetic information, and how sexual reproduction results in offspring with genetic variation. | <ul style="list-style-type: none"> Allele Asexual Reproduction Chromosome DNA Gamete Gene Inheritance Offspring Sexual Reproduction Trait Probability | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 2 Reproduction, Heredity, and Growth – Lesson 1 Inheritance and Reproduction |
| Plant Reproduction & Growth | 5 – 8 days | <ul style="list-style-type: none"> Students explain how genetic and environmental factors affect the growth and reproduction of plants. | <ul style="list-style-type: none"> Pollination Seed Dispersal Environmental Factor Fertilization Genetic Factor Germination | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 2 Reproduction, Heredity, and Growth – Lesson 2 Plant Reproduction and Growth |
| Animal Reproduction & Growth | 5.5 – 8.5 days | <ul style="list-style-type: none"> Students gather evidence to explain how an animal’s behavior influences its reproductive success and survival. | <ul style="list-style-type: none"> Asexual Reproduction Behavior Environmental Factor Fertilization Genetic Factor Reproductive Success Sexual Reproduction Variation | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 2 Reproduction, Heredity, and Growth – Lesson 3 Animal Reproduction and Growth |
| Unit Test/ Labs | 2 days | | | |
| Standards List: | <ul style="list-style-type: none"> MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. | | | |

UNIT 3: MATTER & ENERGY IN LIVING SYSTEMS

Timing: Semester 1, Quarter 2

Teaching Time Required: 26.5 – 38.5 days

Textbook: *Into Science*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---|---|--|--|---|
| Matter & Energy in Organisms | 6 – 9 days | <ul style="list-style-type: none"> Students explain the role of photosynthesis and cellular respiration in the cycling of matter and energy within and between organisms. | <ul style="list-style-type: none"> Matter Molecule Energy Chemical Reaction Photosynthesis Cellular Respiration | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 3 Matter and Energy in Living Systems – Lesson 1 Matter and Energy in Organisms |
| Resource Availability Affects Organisms | 7 – 10 days | <ul style="list-style-type: none"> Students interpret data to predict the effects of resource availability on the growth of organisms and populations in an ecosystem. | <ul style="list-style-type: none"> Ecosystem Biotic Factor Abiotic Factor Species Population Community | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 3 Matter and Energy in Living Systems – Lesson 2 Resource Availability Affects Organisms |
| Interactions in Ecosystems | 5 – 8 days | <ul style="list-style-type: none"> Students explain patterns of interaction between organisms. | <ul style="list-style-type: none"> Predator Prey Herbivore Symbiosis Competition | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 3 Matter and Energy in Living Systems – Lesson 3 Interactions in Ecosystems |
| Matter & Energy in Ecosystems | 6.5 – 9.5 days | <ul style="list-style-type: none"> Students develop a model to explain how matter and energy flow through ecosystems. | <ul style="list-style-type: none"> Producer Consumer Decomposer Food Web Energy Pyramid | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 3 Matter and Energy in Living Systems – Lesson 4 Matter and Energy in Ecosystems |
| Unit Test/ Labs | 2 days | | | |
| Standards List: | <ul style="list-style-type: none"> PE MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. PE MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. PE MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. PE MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. PE MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. | | | |

UNIT 4: ECOSYSTEM DYNAMICS

Timing: Semester 2, Quarter 3

Teaching Time Required: 15 – 17 days

Textbook: *Into Science*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|----------------------------|--|---|--|---|
| Biodiversity in Ecosystems | 4 – 5 days | <ul style="list-style-type: none"> Students use evidence to support an explanation of how changes in biodiversity can affect ecosystem health. | <ul style="list-style-type: none"> Biodiversity Ecological Health Biodiversity Hotspot Influence Disturbance Introduced Species Recovery Stability | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 4 Ecosystem Dynamics – Lesson 1 Biodiversity in Ecosystems |
| Changes in Ecosystems | 4 – 5 days | <ul style="list-style-type: none"> Students use evidence to support an explanation of how changes in ecosystems cause changes in populations. | <ul style="list-style-type: none"> Disturbance Succession Biodiversity Dynamic Gradual Change Interconnected Pioneer Species Recovery | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 4 Ecosystem Dynamics – Lesson 2 Changes in Ecosystems |
| Maintaining Ecosystems | 5 days | <ul style="list-style-type: none"> Students will be able to evaluate competing design solutions for maintaining biodiversity and ecosystem services. | <ul style="list-style-type: none"> Habitat Destruction Habitat Fragmentation Ecosystem Service | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 4 Ecosystem Dynamics – Lesson 3 Maintaining Ecosystems |
| Unit Test/ Labs | 2 days | | | |
| Standards List: | <ul style="list-style-type: none"> PE MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. PE MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. PE MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. | | | |

UNIT 5: THE HISTORY OF LIFE ON EARTH

Timing: Semester 2, Quarter 4

Teaching Time Required: 19 – 25 days

Textbook: *Into Science*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|-------------------------------------|---|--|---|--|
| Fossil Record | 6 – 8 days | <ul style="list-style-type: none"> Students will be able to explain how patterns in fossil data can be used to provide evidence for the history of life on Earth. | <ul style="list-style-type: none"> Fossil Radiometric Dating Fossil Record Extinction | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 5 History of Life on Earth – Lesson 1 Fossil Record |
| Patterns of Change in Life on Earth | 5.5 – 7.5 days | <ul style="list-style-type: none"> Students will be able to analyze patterns in the fossil record to explain changes in life on Earth over time. | <ul style="list-style-type: none"> Extinction | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 5 History of Life on Earth – Lesson 2 Patterns of Change in Life on Earth |
| Evidence of Common Ancestry | 5.5 – 7.5 days | <ul style="list-style-type: none"> Students will be able to analyze patterns in data to provide evidence for evolutionary relationships among organisms. | <ul style="list-style-type: none"> Evolution Common Ancestry Anatomy Embryology | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 5 History of Life on Earth – Lesson 3 Evidence of Common Ancestry |
| Unit Test/ Labs | 2 days | | | |
| Standards List: | <ul style="list-style-type: none"> MS-LS4-1: Students who demonstrate understanding can: Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. MS-LS4-2: Students who demonstrate understanding can: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. MS-LS4-3: Students who demonstrate understanding can: Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. | | | |

UNIT 6: EVOLUTION

Timing: Semester 2, Quarter 4

Teaching Time Required: 17.5 – 26.5 days

Textbook: *Into Science*

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---------------------------|---|--|---|---|
| Genetic Change and Traits | 5 – 8 days | <ul style="list-style-type: none"> Students model analysis of fossil evidence, and explore relative and absolute age. | <ul style="list-style-type: none"> Adaptation DNA Gene Mutation Protein Amino Acid Chromosome Environment Sequence Trait | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 6 Evolution – Lesson 1 Genetic Change and Traits |
| Natural Selection | 5 – 8 days | <ul style="list-style-type: none"> Students explore evidence of change in life over time, analyze patterns in extinction data, and model analysis of rock and fossil sequences. | <ul style="list-style-type: none"> Allele Frequency Evolution Extinction Natural Selection Variation Advantage Distribution Genotype Phenotype Population | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 6 Evolution – Lesson 2 Natural Selection |
| Human Influence on Traits | 5.5 – 8.5 days | <ul style="list-style-type: none"> Students identify patterns of similarities in the anatomy and embryological development across species. | <ul style="list-style-type: none"> Artificial Selection Biotechnology Genetic Engineering Genetically Modified Organism (GMO) Disrupt Ethics Individual Selective Breeding Society | <ul style="list-style-type: none"> <i>Into Science: Life Science</i> Unit 6 Evolution – Lesson 3 Human Influence on Traits |
| Unit Test/ Labs | 2 days | | | |
| Standards List: | <ul style="list-style-type: none"> MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. | | | |

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|--|--|
| | <ul style="list-style-type: none"> • MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. • MS-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. • MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. |
|--|--|

| SCIENTIFIC PROCESS SKILLS | |
|--|--|
| <p>Timing: All year Teaching Time Required: Varies Textbook: Embedded throughout</p> | |
| Objectives | |
| <ul style="list-style-type: none"> • Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate. • Plan and carry out scientific investigations of various types (such as systematic observations or experiments), identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. • Select appropriate tools for collecting qualitative and quantitative data and record measurements (volume, mass, distance) in metric units. • Develop a model describing phenomenon. • Conduct research to learn how the local environment is used by a variety of competing interests (e.g. competition for habitat/resources, tourism, oil, mining companies, and hunting groups). • Use standard safety practices for all classroom laboratory and field investigations. | |

Grade 8 Science

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|--|---|
| Grade(s): 8 Length: two semesters | Course Overview: <i>Science 8</i> is designed to expand student investigation of physics and chemistry. Aspects of physics are studied through laboratory investigations including sound, light, electricity, mechanics, motion, and energy. Aspects of chemistry are studied based on the Periodic Table of the Elements and through basic chemical laboratory investigations. Laboratory work, laboratory reporting, and engineering design will be included and is an integral part of the learning process. Adopted Textbook: <i>Into Science</i> . HMH, 2022 |
|--|---|

| Units (Recommended Order) | |
|--|--|
| Semester 1 | Semester 2 |
| <ul style="list-style-type: none"> • Structure of Matter • Chemistry of Materials • Chemical Process & Equations • Energy • Ongoing, yearlong learning objects: Scientific Process Skills and Engineering Design Concepts | <ul style="list-style-type: none"> • Energy Transfer • Forces and Motion • Eclectic and Magnetic Forces • Waves and Information Transfer |

UNIT 1: STRUCTURE OF MATTER

Timing: Semester 1, Quarter 1
Teaching Time Required: 24 days
Textbook: *Into Science*, Unit 3

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|----------------------------------|--------------------|---|---|--|
| Properties of Matter | 6 days | <ul style="list-style-type: none"> Investigate and explain that all matter is made up of atoms, and understand that substances have physical properties that are unique to each. | <ul style="list-style-type: none"> Matter Mass Volume Density Solid Liquid Gas | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 3 Structure of Matter |
| Changes of State | 5.5 days | <ul style="list-style-type: none"> Investigate changes that occur in physical and chemical properties of matter using a qualitative description of changes on a molecular level, including conservation of matter. | <ul style="list-style-type: none"> Change of State Thermal Energy Temperature Pressure | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 3 Structure of Matter |
| Atoms and Elements | 4.5 days | <ul style="list-style-type: none"> Describe the relationship between atomic mass, atomic number, and location on the periodic table, with chemical properties of the elements. Structure of atoms and how atoms combine into compounds. | <ul style="list-style-type: none"> Element Atom Periodic Table | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 3 Structure of Matter |
| Molecules and Extended Structure | 5.5 days | <ul style="list-style-type: none"> Develop and use models to demonstrate how atoms and elements form molecules and compounds. Classify everyday materials as elements, compounds, or mixtures. | <ul style="list-style-type: none"> Pure Substance Chemical Bond Molecule Compound | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 3 Structure of Matter |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 3 Structure of Matter |
| Standards List: | MS-PS1-1, MS-PS1-4 | | | |

UNIT 2: CHEMISTRY OF MATERIALS

Suggested Pacing: Semester 1, Quarter 1

Teaching Time Required: 13 days

Textbook: *Into Science* Unit 5

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|----------------------------------|-----------------|---|--|---|
| Natural and Synthetic Materials | 5.5 days | <ul style="list-style-type: none"> Collect information that supports the idea that synthetic materials come from the use of natural resources, and analyze the positive and negative effects of use and development of synthetics on society. | <ul style="list-style-type: none"> Pure Substance Natural Substance Polymer Synthetic Material | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 5 The Chemistry of Materials |
| The Cycle of Synthetic Materials | 5 days | <ul style="list-style-type: none"> Recognize the role chemistry has in our everyday lives, including the production of synthetic materials from natural resources (e.g. soil and water testing, extraction of minerals, and consumer science). | | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 5 The Chemistry of Materials |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 5 The Chemistry of Materials |
| Standards List: | MS-PS1-3 | | | |

UNIT 3: CHEMICAL PROCESS & EQUATIONS

Timing: Semester 1, Quarter 2

Teaching Time Required: 17.5 days

Textbook: *Into Science* Unit 4

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|---------------------------------------|------------------------------|---|--|--|
| Chemical Reactions | 5 days | <ul style="list-style-type: none"> Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. | <ul style="list-style-type: none"> Chemical Reaction Reactant Product | <ul style="list-style-type: none"> <i>Into Science Physical Science</i> Unit 4 Chemical Process & Equations |
| Chemical Equations | 5 days | <ul style="list-style-type: none"> Describe the relationship between atomic mass, atomic number, and location on the periodic table, with chemical properties of the elements. | <ul style="list-style-type: none"> Chemical Formula Chemical Equation Law of Conservation of Matter | <ul style="list-style-type: none"> <i>Into Science Physical Science</i> Unit 4 Chemical Process & Equations |
| Thermal Energy and Chemical Processes | 5 days | <ul style="list-style-type: none"> Apply scientific principles to design, construct, and test a device that either minimize or maximize thermal energy transfer. | <ul style="list-style-type: none"> Heat | <ul style="list-style-type: none"> <i>Into Science Physical Science</i> Unit 4 Chemical Process & Equations |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> <i>Into Science Physical Science</i> Unit 4 Chemical Process & Equations |
| Standards List: | MS-PS1-2, MS-PS1-5, MS-PS1-6 | | | |

UNIT 4: ENERGY

Timing: Semester 1, Quarter 2
Teaching Time Required: 18.5 days
Textbook: *Into Science* Unit 1

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|------------------------|------------------------------|--|--|--|
| Introduction to Energy | 5 days | <ul style="list-style-type: none"> Identify various sources and forms of energy, and classify them as potential or kinetic. | <ul style="list-style-type: none"> Energy Potential Energy Kinetic Energy | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 1: Energy |
| Changes in Energy | 5.5 days | <ul style="list-style-type: none"> Investigate relationships among the amount of energy transferred, the type of matter, the mass, and the change in temperature of a sample. | <ul style="list-style-type: none"> Energy Transfer System | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 1: Energy |
| Transforming Energy | 5.5 days | <ul style="list-style-type: none"> Apply the engineering and design process. | | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 1: Energy |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 1: Energy |
| Standards List: | MS-PS3-1, MS-PS3-2, MS-PS3-5 | | | |

UNIT 5: ENERGY TRANSFERS

Timing: Semester 2, Quarter 3
Teaching Time Required: 14.5 days
Textbook: *Into Science* Unit 2

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|------------------------------------|--------------------|--|---|--|
| Temperature and Heat | 5.5 days | <ul style="list-style-type: none"> • Examine energy transfers, conservation of energy, and identify energy that is useful vs. energy that is unavailable | <ul style="list-style-type: none"> • Temperature • Thermal Energy • Heat | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 2 Energy Transfer |
| Thermal Energy Transfer in Systems | 6.5 days | <ul style="list-style-type: none"> • Differentiate between renewable and non-renewable energy resources. • Investigate how energy is produced and used, including alternative energy sources in Alaska. Evaluate the impact of energy production methods on the environment. | | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 2 Energy Transfer |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 2 Energy Transfer |
| Standards List: | MS-PS3-3, MS-PS3-4 | | | |

UNIT 6: FORCES & MOTION

Timing: Semester 2, Quarter 3
Teaching Time Required: 18.5 days
Textbook: *Into Science* Unit 6

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|----------------------------|---------------------------|--|---|--|
| Introduction to Forces | 5.5 days | <ul style="list-style-type: none"> • Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. • Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. • Investigate through experimentation and “real-life” examples the relationship among (1) force, mass, acceleration, and gravity, (2) speed, distance, time and acceleration, (3) force and friction. | <ul style="list-style-type: none"> • Motion • Speed • Velocity • Acceleration • Force • Gravity | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 6 Forces & Motion |
| Newton’s Laws of Motion | 5.5 days | <ul style="list-style-type: none"> • Describe gravity as an attractive force between two objects that depends on the mass of the interacting objects. Explain how the orbital motion of planets provides evidence for this force. • Explain “real-life” examples of linear and rotational motion using Newton’s Laws of Motion. | <ul style="list-style-type: none"> • Inertia | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 6 Forces & Motion |
| Collisions Between Objects | 5 days | <ul style="list-style-type: none"> • Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other, even though the objects are not in contact. • Describe gravity as an attractive force between two objects that depends on the mass of the interacting objects. Explain how the orbital motion of planets provides evidence for this force. | | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 6 Forces & Motion |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 6 Forces & Motion |
| Standards List: | MS-PS2-1, MS-PS2-2 | | | |

UNIT 7: ELECTRIC & MAGNETIC FORCES

Timing: Semester 2, Quarter 4
Teaching Time Required: 24.5 days
Textbook: *Into Science* Unit 7

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|------------------------|--------------------|---|--|---|
| The Magnetic Force | 6.5 days | <ul style="list-style-type: none"> • Ask questions about data to determine the factors that affect the strength of magnetic forces. | <ul style="list-style-type: none"> • Magnet • Magnetic Force • Magnetic Domain | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 7 Electric & Magnetic Forces |
| The Electric Force | 5.5 days | <ul style="list-style-type: none"> • Ask questions about data to determine the factors that affect the strength of electric forces. | <ul style="list-style-type: none"> • Electric Charge • Electric Force | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 7 Electric & Magnetic Forces |
| Fields | 4.5 days | <ul style="list-style-type: none"> • Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other, even though the objects are not in contact. | <ul style="list-style-type: none"> • Field • Gravitational Field • Magnetic Field | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 7 Electric & Magnetic Forces |
| Electromagnetism | 5.5 days | <ul style="list-style-type: none"> • Demonstrate the relationship between electricity and magnetism. | <ul style="list-style-type: none"> • Electric Current • Electric Field • Electromagnetism • Electromagnet • Electromagnetic Induction | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 7 Electric & Magnetic Forces |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> • <i>Into Science: Physical Science</i> Unit 7 Electric & Magnetic Forces |
| Standards List: | MS-PS2-3, MS-PS2-5 | | | |

UNIT 8: WAVES & INFORMATION TRANSFER

Timing: Semester 2, Quarter 4
Teaching Time Required: 24.5 days
Textbook: *Into Science* Unit 8

| Topic | # Days | Objectives | Key Vocabulary | Resources & Materials |
|----------------------------------|------------------------------|---|---|---|
| Introduction to Waves | 6 days | <ul style="list-style-type: none"> Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. | <ul style="list-style-type: none"> Wave Medium Amplitude Frequency Wavelength | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 8 Waves & Information Transfer |
| The Behavior of Mechanical Waves | 5 days | <ul style="list-style-type: none"> Investigate the ways that light and sound interact with matter, expanding on wavelength, color, refraction, and reflection. | <ul style="list-style-type: none"> Mechanical Wave Absorption Transmission Reflection Refraction | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 8 Waves & Information Transfer |
| The Behavior of Light Waves | 5.5 days | <ul style="list-style-type: none"> Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. | <ul style="list-style-type: none"> Electromagnetic Waves | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 8 Waves & Information Transfer |
| Information Transfer | 5.5 days | <ul style="list-style-type: none"> Support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. | <ul style="list-style-type: none"> Signal Encoding Analog Signal Digital Signal Noise | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 8 Waves & Information Transfer |
| Unit Tests/ Labs | 2.5 days | | | <ul style="list-style-type: none"> <i>Into Science: Physical Science</i> Unit 8 Waves & Information Transfer |
| Standards List: | MS-PS4-1, MS-PS4-2, MS-PS4-3 | | | |

SCIENTIFIC PROCESS SKILLS

Timing: All year

Teaching Time Required: Varies

Textbook: Embedded throughout

Objectives

- Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate.
- Plan and carry out scientific investigations of various types (such as systematic observations or experiments), identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
- Select appropriate tools for collecting qualitative and quantitative data and record measurements (volume, mass, distance) in metric units.
- Develop a model describing phenomenon.
- Conduct research to learn how the local environment is used by a variety of competing interests (e.g. competition for habitat/resources, tourism, oil, mining companies, and hunting groups).
- Use standard safety practices for all classroom laboratory and field investigations.



The Fairbanks North Star Borough School District is an equal employment and educational opportunity institution, as well as tobacco and nicotine-free learning and work environment.

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