

Fairbanks North Star Borough School District

Science Curriculum



Grades 6 – 8

2023-24 Revision – Draft 1

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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

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Philosophy & Mission Statement

Graduates should be



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

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. <u>https://education.alaska.gov/standards</u>

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

<u>nups.//education.alaska.gov/akstandards/#e5gtabs</u>

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)



Middle School Science Courses



Grades 6-8

Fairbanks North Star Borough School District Science Curriculum

Grade 6 Science

Grade(s): 6	Course Overview :
Length: two semesters	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.
	Adopted Textbook : Into Science: Earth & Space Sciences. HMH, 2022 Volumes: 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.

Units (Recommended Order)					
Semester 1 Semester 2					
• Circulation of Earth's Air and Water	Human Impacts on Earth's Systems				
Weather and Climate	• Patterns in the Solar System				
• The Dynamic Earth	• The Solar System and Universe				
Earth's Natural Hazards	Performance Expectations*				
Resources in Earth's Systems					

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 bet 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:	CIRCUL	ATION	OF EA	RTH'S	AIR &	WATER
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Timing: Semester 1, Quarter 1Teaching Time Required: All estimated teaching times are based on a 45 minute periodTextbook: Into Science book 1: Circulation of Earth's Air and Water

Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Circulation in the Earth's Atmosphere	5 days	• Identify and analyze movements of air masses from regions of high to low pressure (convection currents) and the effects on weather.	 Convection Coriolis Effect Air Pressure Atmosphere Circulation Density Energy System 	• Unit 1 (Book 1, p. 3A) Lesson 1: Circulation in the Earth's Atmosphere
Circulation in the Earth's Oceans	5 days	• Describe the effects of the ocean on Earth's weather.	 Ocean Current Density Salinity Temperature 	• Unit 1 (Book 1, 11A) Lesson 2: Circulation in Earth's Oceans
The Water Cycle	5.5 days	• Describe and illustrate the water cycle, and the forces that drive it (gravity and sunlight).	 Evaporation Condensation Transpiration Crystallization Precipitation Runoff Groundwater Flow 	• Unit 1 (Book 1, 19A) Lesson 3: The Water Cycle
Unit Test/ Labs	2 days			•
Standards List:	MS ESS2-4,	MS ESS2-6	1	

UNIT 2: WEATHER & CLIMATE

Timing: Semester 1, Quarter 1Teaching Time Required: All estimated teaching times are based on a 45 minute periodTextbook: Into Science Unit 2: Weather and Climate

Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Weather and Weather Prediction	5.5 days	 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 	WeatherAir MassFrontWeather Forecast	• Unit 2 (Book 2, pg. 3A) Lesson 1: Weather and Weather Prediction
Influences on Climate	6.5 days	 Describe the enterts of the ocean and the water cycle on the weather. Describe how unequal heating and the rotation of the Earth determines regional climates. 	• Climate	• 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

Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Geologic Change and Surface Processes	5.5 days	• Explain how geoscience processes have changed the Earth's surface at varying time and spatial scales.	 Weathering Sediment Erosion Deposition 	• Unit 3: Lesson 1 Geologic Change and Surface Processes
The Rock Cycle	6.5 days	• Know that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperatures, and the forces that created them.	 Mineral Igneous Rock Sedimentary Rock Metamorphic Rock Rock Cycle 	• Unit 3: Lesson 2 The Rock Cycle
Earth's Plates	5.5 days	• Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	Tectonic PlatePlate TectonicsConvection Current	• Unit 3: Lesson 3 Earth's Plates
Unit Assessments	2.5 days			
Standards List:	MS ESS2-1,	MS ESS2-2, MS ESS2-3		

UNIT 4: EARTH'S NATURAL HAZARDS							
Timing: Semester 1, Teaching Time Requ Textbook: Into Scien	Timing: Semester 1, Quarter 2 Teaching Time Required: All estimated teaching times are based on a 45 minute period Textbook: Into Science Unit 5						
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials			
Natural Hazard Prediction	5.5 days	• Analyze and interpret data on natural hazards to forecast future catastrophic events.	 Natural Disaster Natural Hazard Historical Interpret Likelihood Monitor Prediction 	• Unit 5 Lesson 1: Natural Hazard Prediction p. 3A			
Reducing the Effects of Natural Hazards	5.5 days	• Define criteria and constraints of model for mitigating natural hazards.	 Mitigation Constraint Criterion Engineering Design Process Preparation Recovery Response Solution Technology 	• Unit 5 Lesson 2: Engineer it: Reducing the Effects of Natural Hazards p. 11A			
Unit Assessments	2.5 days						
Standards List:	MS-ESS3-2,	MS-ETS1-1	1	1			

UNIT 5: RESOURCES IN EARTH'S SYSTEMS						
Timing: Semester 2, Teaching Time Requ	Timing: Semester 2, Quarter 3 Teaching Time Required: All estimated teaching times are based on a 45 minute period					
Textbook: Into Scien	nce Unit 6					
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials		
Natural Resources	5.5 days	 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. 	 Natural Resources Renewable Resource Nonrenewable Resource 	Unit 6 Lesson 1: Natural Resources		
Human Population and Resource Use	5 days	• Construct an argument, supported by evidence, for how increases in human population and per- capita consumption of natural resources impact Earth's systems.	 Per Capita Consumption Population	• Unit 6 Lesson 2: Human Population and Resource Use		
Resource Use and Earth's Systems	5.5 days	 Construct an argument, supported by evidence, for how increases in human population and percapita 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. 	 Pollution Deforestation Extinction Greenhouse Gas Resource Use 	• Unit 6 Lesson 3: Resource Use and Earth's Systems		
Unit Materials	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

Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Reducing Human Impacts on the Environment	8.5 days	• Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		• Unit 7: Lesson 1 Engineer It: Reducing Human Impacts on the Environment.
Climate Change	5.5 days	 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. 	• Greenhouse Effect	• Unit 7: Lesson 2 Climate Change
Unit Assessments	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

Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Earth – Sun – Moon	7 days	• Develop and use a model of the Earth-Sun-Moon	• Orbit	• Unit 8 Lesson 1: The
System		system to describe the cyclic patterns of lunar	• Phase	Earth-Sun-Moon
		phases, and eclipses of the sun and moon.	• Eclipse	System, pg. 3A
Seasons	6 days	• Develop and use a model of the Earth-Sun-Moon system to describe the seasons.	• Season	• Unit 8 Lesson 2: Seasons, pg. 15A
Unit Assessments	2.5 days			
Standards List:	MS-ESS1-1			

	UNIT 8: THE SOLAR SYSTEM AND UNIVERSE					
Timing: Semester 2,	Quarter 4		1			
Teaching Time Required: All estimated teaching times are based on a 45 minute period Textbook: Into Science Unit 9: The Solar System and Universe						
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials		
Earth and the Solar System	5 days	• Analyze and interpret data to determine scale properties of objects in the solar system.	 Asteroid Comet Dwarf Planet Meteoroid Parallax Moon Telescope Heliocentric Retrograde Transit 	• Unit 9 Lesson 1: Earth and the Solar System		
Gravity and the Universe	6.5 days	• Describe the role of gravity in the motions within galaxies and the solar system.	 Orbit Chemical Composition Condense Density Inertia Projectile Protoplanetary Disk Satellite Velocity Speed 	• Unit 9 Lesson 2: Gravity and the Universe		
Modeling in Space Science	6.5 days	• Construct and present arguments to support the claim that gravitational interactions are attractive and depend on masses of interacting objects.	 Astronomical Unit Galaxy Light-Year Universe Diameter Distinguish Location Order of Magnitude Ratio Scale 	• Unit 9 Lesson 3: Modeling in Space Science		
Unit Assessment	2.5 days					
Standards List:	MS ESS1-2,	MS ESS1-3, MS PS2-4	1			

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 describe 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

Grade(s): 7	Course Overview :
Length: two semesters	Science 7 is an introductory course designed to expand 7th grade students' understanding of natural world by focusing on the characteristics of living things, cellular organization, the diversity of life, 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.
	Adopted Textbook: Into Science. HMH, 2022

Units (Recommended Order)			
Semester 1 Semester 2			
 Introduction Cells and Organization in Organisms Reproduction, Heredity, and Growth Matter and Energy in Living Systems 	 Ecosystem Dynamics The History of Life on Earth Evolution 		

UNIT 1: CELLS & ORGANIZATION IN ORGANISMS					
Suggested Pacing: S	Suggested Pacing: Semester 1, Quarter 1				
Teaching Time Requ	Teaching Time Required: 15 days				
Textbook: Into Scier	ice				
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
Cell Structure/	5 days	• All living things are made of one or more cells.	Cell Membrane	•	
Function		• Cells can be described by the types of structures	• Cell Wall		
		they are made of.	Chloroplast		
		• The cell membrane serves as a barrier that	Mitochondrion		
		allows matter and energy to enter and exit the	• Nucleus		
		• Students use a model to describe how a cell's	• Organelle		
		• Students use a model to describe now a certs			
		structures.			
Plant Body Systems	5 days	• Students use evidence to support an explanation	• Leaf	•	
		about how the survival needs of plants are met	• Organ		
		by systems working together.	• Organism		
			Organ System		
			• Tissue		
Animal Body	5 days	• Students use evidence to evaluate how survival	Behavior	•	
Systems		needs of animals are met by systems working	• Homeostasis		
		together.	• Memory		
			• Sensory		
			Receptor		
	• MS-LS1-1	Conduct an investigation to provide evidence that living	g things are made of cells; eithe	er one cell or many different	
	numbers an	numbers and types of cells.			
	• MIS-LSI-2	Develop and use a model to describe the function of a c	ten as a whole and ways parts o	I cens contribute to the	
Standards List:	• MS-LS1-3	Use argument supported by evidence for how the body	is a system of interacting subsy	stems composed of groups of	
	cells.	ese argament supported by evidence for now the body	is a system of interacting subsy	stems composed of groups of	
	• MS-LS1-8	Gather and synthesize information that sensory recepto	rs respond to stimuli by sending	g messages to the brain for	
	immediate	behavior or storage as memories.	1		

UNIT 2: REPRODUCTION, HEREDITY, & GROWTH

Timing: Semester 1, Quarter 2 **Teaching Time Required**: 15.5 – 24.5 days **Textbook**: *Into Science*

Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Inheritance and Reproduction	5 – 8 days	• 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.	 Allele Asexual Reproduction Chromosome DNA Gamete Gene Inheritance Offspring Sexual Reproduction Trait Probability 	•
Plant Reproduction & Growth	5 – 8 days	• Students explain how genetic and environmental factors affect the growth and reproduction of plants.	 Pollination Seed Dispersal Environmental Factor Fertilization Genetic Factor Germination 	•
Animal Reproduction & Growth	5.5 – 8.5 days	• Students gather evidence to explain how an animal's behavior influences its reproductive success and survival.	 Asexual Reproduction Behavior Environmental Factor Fertilization Genetic Factor Reproductive Success Sexual Reproduction Variation 	•
Standards List:	 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,	Timing: Semester 1, Quarter 2				
Teaching Time Requ Textbook: Into Scien	Teaching Time Required: 24.5 – 36.5 days Textbook: Into Science				
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
Matter & Energy	6 – 9 days	• Students explain the role of photosynthesis and	Matter Molecule	•	
in Organisms		cellular respiration in the cycling of matter and	• Energy		
		energy within and between organisms.	Chemical Reaction		
			• Photosynthesis		
			Cellular Respiration		
Resource	7-10 days	• Students interpret data to predict the effects of	• Ecosystem	•	
Availability Affects		resource availability on the growth of organisms	Biotic Factor		
Organisms		and populations in an ecosystem.	Abiotic Factor		
			• Species		
			• Population		
.	5 0 1	~	Community		
Interactions in	5-8 days	• Students explain patterns of interaction between	• Predator	•	
Ecosystems		organisms.	• Prey		
			• Herbivore		
			• Symbiosis		
			• Competition		
Matter & Energy in	6.3 - 9.3	• Students develop a model to explain how matter	• Producer	•	
Ecosystems	days	and energy flow through ecosystems.	• Consumer Decomposer		
			• Food Web		
			• Energy Pyramid		
	• PE MS-LS	1-6 Construct a scientific explanation based on evidenc	e for the role of photosynthesis	in the cycling of matter and	
	• PF MS-LS	1-7 Develop a model to describe how food is rearranged	d through chemical reactions for	rming new molecules that	
	support gro	wth and/or release energy as this matter moves through	an organism.	ming new molecules that	
Standards List:	• PE MS-LS	2-1 Analyze and interpret data to provide evidence for t	he effects of resource availabili	ty on organisms and	
	populations	s of organisms in an ecosystem.			
	• PE MS-LS	2-2 Construct an explanation that predicts patterns of in	teractions among organisms act	ross multiple ecosystems.	
	• PE MS-LS	2-3 Develop a model to describe the cycling of matter a	and flow of energy among living	g and nonliving parts of an	
	ecosystem.				

UNIT 4: ECOSYSTEM DYNAMICS				
Timing: Semester 2,	Timing: Semester 2, Quarter 3			
Teaching Time Requ	uired: $13 - 15$ (lays		
Topic	# Days	Objectives	Key Vocabulary	Resources & Materials
Biodiversity in Ecosystems	4 – 5 days	• Students use evidence to support an explanation of how changes in biodiversity can affect ecosystem health.	 Biodiversity Ecological Health Biodiversity Hotspot Influence Disturbance Introduced Species Recovery Stability 	•
Changes in Ecosystems	4 – 5 days	• Students use evidence to support an explanation of how changes in ecosystems cause changes in populations.	 Disturbance Succession Biodiversity Dynamic Gradual Change Interconnected Pioneer Species Recovery 	•
Maintaining Ecosystems	5 days	• Students will be able to evaluate competing design solutions for maintaining biodiversity and ecosystem services.	 Habitat Destruction Habitat Fragmentation Ecosystem Service 	•
Standards List:	 PE MS-LS2 ecosystem af PE MS-LS2 PE MS-ETS constraints o 	 -4 Construct an argument supported by empirical evider fect populations. -5 Evaluate competing design solutions for maintaining s1-2 Evaluate competing design solutions using a system f the problem. 	nce that changes to physical or biodiversity and ecosystem se natic process to determine how	biological components of an rvices. well they meet the criteria and

UNIT 5: THE HISTORY OF LIFE ON EARTH				
Timing : Semester 2,	Timing: Semester 2, Quarter 4			
Teaching Time Required: 17 – 23 days				
Textbook: Into Scien	ice			
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Fossil Record	6 – 8 days	• Students will be able to explain how patterns in fossil data can be used to provide evidence for the history of life on Earth.	 Fossil Radiometric Dating Fossil Record Extinction 	•
Patterns of Change in Life on Earth	5.5 – 7.5 days	• Students will be able to analyze patterns in the fossil record to explain changes in life on Earth over time.	• Extinction	•
Evidence of Common Ancestry	5.5 – 7.5 days	• Students will be able to analyze patterns in data to provide evidence for evolutionary relationships among organisms.	 Evolution Common Ancestry Anatomy Embryology 	•
 Standards List: 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	24.5 davis		
Textbook: Into Scier	iireu: 15.5 – . Ice	24.5 days		
Topic	# Days	Objectives	Key Vocabulary	Resources & Materials
Genetic Change and Traits	5 – 8 days	• Students model analysis of fossil evidence, and explore relative and absolute age.	 Adaptation DNA Gene Mutation Protein Amino Acid Chromosome Environment Sequence Trait 	•
Natural Selection	5 – 8 days	• Students explore evidence of change in life over time, analyze patterns in extinction data, and model analysis of rock and fossil sequences.	 Allele Frequency Evolution Extinction Natural Selection Variation Advantage Distribution Genotype Phenotype Population 	•
Human Influence on Traits	5.5 – 8.5 days	• Students identify patterns of similarities in the anatomy and embryological development across species.	 Artificial Selection Biotechnology Genetic Engineering Genetically Modified Organism (GMO) Disrupt Ethics Individual Selective Breeding Society 	•

Standards List:	 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. 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.
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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 describe 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

Grade(s): 8 Length: two semesters	Course Overview : Science 8 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: Into Science. HMH, 2022

Units (Recommended Order)			
Semester 1	Semester 2		
 Structure of Matter Chemistry of Materials Chemical Process & Equations Energy Ongoing, yearlong learning objects: Scientific Process Skills and Engineering Design Concepts 	 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 Requ	ired: 24 day	S		
Textbook: Into Scien	<i>ice</i> , Unit 3			
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Properties of Matter	6 days	• Investigate and explain that all matter is made up atoms, and understand that substances have physical properties that are unique to each substance.	 Matter Mass Volume Density Solid Liquid Gas 	• Into Science: Physical Science Unit 3 Structure of Matter
Changes of State	5.5 days	• 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.	 Change of State Thermal Energy Temperature Pressure 	• Into Science: Physical Science Unit 3 Structure of Matter
Atoms and Elements	4.5 days	 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. 	ElementAtomPeriodic Table	• Into Science: Physical Science Unit 3 Structure of Matter
Molecules and Extended Structure	5.5 days	 Develop and use models to demonstrate how atoms and elements form molecules and compounds. Classify everyday materials as elements, compounds, or mixtures. 	 Pure Substance Chemical Bond Molecule Compound 	• Into Science: Physical Science Unit 3 Structure of Matter
Unit Tests/ Labs	2.5 days			• Into Science: Physical Science Unit 3 Structure of Matter
Standards List:	MS-PS1-1, N	MS-PS1-4		

UNIT 2: CHEMISRY OF MATERIALS					
Suggested Pacing: Semester 1, Quarter 1					
Teaching Time Required: 13 days					
Textbook: Into Scien	<i>ice</i> Unit 5				
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
Natural and	5.5 days	• Collect information that supports the idea that	Pure Substance	Into Science: Physical	
Synthetic		synthetic materials come from the use of natural	Natural Substance	Science Unit 5 The	
Materials		resources, and analyze the positive and negative	• Polymer	Chemistry of Materials	
		effects of use and development of synthetics on society.	• Synthetic Material		
The Cycle of	5 days	• Recognize the role chemistry has in our everyday		• Into Science: Physical	
Synthetic Materials		lives, including the production of synthetic		Science Unit 5 The	
		materials from natural resources (e.g. soil and		Chemistry of Materials	
		water testing, extraction of minerals, consumer science).			
Unit Tests/ Labs	2.5 days			Into Science: Physical	
				Science Unit 5 The	
				Chemistry of Materials	
Standards List:	MS-PS1-3				

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UNIT 3: CHEMICAL PROCESS & EQUATIONS					
Timing: Semester 1, Quarter 2 Teaching Time Required: 17.5 days Textbook: Into Science Unit 4					
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
Chemical Reactions	5 days	• 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.	Chemical ReactionReactantProduct	Into Science Physical Science Unit 4 Chemical Process & Equations	
Chemical Equations	5 days	• Describe the relationship between atomic mass, atomic number, and location on the periodic table, with chemical properties of the elements.	 Chemical Formula Chemical Equation Law of Conservation of Matter 	Into Science Physical Science Unit 4 Chemical Process & Equations	
Thermal Energy and Chemical Processes	5 days	• Apply scientific principles to design, construct, and test a device that either minimized or maximized thermal energy transfer.	• Heat	• Into Science Physical Science Unit 4 Chemical Process & Equations	
Unit Tests/ Labs	2.5 days	•	•	Into Science Physical Science Unit 4 Chemical Process & Equations	
Standards List:	MS-PS1-2, I	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					
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
Introduction to Energy	5 days	• Identify various sources and forms of energy, and classify them as potential or kinetic.	EnergyPotential EnergyKinetic Energy	• Into Science: Physical Science Unit 1: Energy	
Changes in Energy	5.5 days	• Investigate relationships among the amount of energy transferred, the type of matter, the mass, and the change in temperature of a sample.	Energy TransferSystem	• Into Science: Physical Science Unit 1: Energy	
Transforming Energy	5.5 days	• Apply the engineering and design process.		• Into Science: Physical Science Unit 1: Energy	
Unit Tests/ Labs	2.5 days			• Into Science: Physical Science Unit 1: Energy	
Standards List:	MS-PS3-1, I	MS-PS3-2, MS-PS3-5	<u>.</u>	·	

UNIT 5: ENERGY TRANSFERS					
Timing: Semester 2, Quarter 3 Teaching Time Required: 14.5 days Textbook: Into Science Unit 2					
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
Temperature and Heat	5.5 days	• Examine energy transfers, conservation of energy, and identify energy that is useful vs. energy that is unavailable	TemperatureThermal EnergyHeat	Into Science: Physical Science Unit 2 Energy Transfer	
Thermal Energy Transfers in Systems	6.5 days	 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. 		• Into Science: Physical Science Unit 2 Energy Transfer	
Unit Tests/ Labs	2.5 days			• Into Science: Physical Science Unit 2 Energy Transfer	
Standards List:	MS-PS3-3, N	MS-PS3-4			

		UNIT 6: FORCES & MOTI	ON	
Timing: Semester 2,	Quarter 3			
Teaching Time Requ	ired: 18.5 da	ays		
Textbook: Into Scien	ce Unit 6			
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Introduction to Forces	5.5 days	 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 	 Motion Speed Velocity Acceleration Force Gravity 	• Into Science: Physical Science Unit 6 Forces & Motion
Newton's Laws of Motion	5.5 days	 friction. 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. 	• Inertia	• Into Science: Physical Science Unit 6 Forces & Motion
Collisions Between Objects	5 days	 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. 		• Into Science: Physical Science Unit 6 Forces & Motion
Unit Tests/ Labs	2.5 days			Into Science: Physical Science Unit 6 Forces & Motion
Standards List:	MS-PS2-1,	MS-PS2-2	1	

UNIT 7: ELECTRIC & MAGNETIC FORCES					
Timing: Semester 2, Quarter 4 Teaching Time Required: 24.5 days Textbook: Into Science Unit 7					
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials	
The Magnetic Force	6.5 days	• Ask questions about data to determine the factors that affect the strength of magnetic forces.	MagnetMagnetic ForceMagnetic Domain	• Into Science: Physical Science Unit 7 Electric & Magnetic Forces	
The Electric Force	5.5 days	• Ask questions about data to determine the factors that affect the strength of electric forces.	Electric ChargeElectric Force	• Into Science: Physical Science Unit 7 Electric & Magnetic Forces	
Fields	4.5 days	• Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other, even though the objects are not in contact.	FieldGravitational FieldMagnetic Field	• Into Science: Physical Science Unit 7 Electric & Magnetic Forces	
Electromagnetism	5.5 days	• Demonstrate the relationship between electricity and magnetism.	 Electric Current Electric Field Electromagnetism Electromagnet Electromagnetic Induction 	• Into Science: Physical Science Unit 7 Electric & Magnetic Forces	
Unit Tests/ Labs	2.5 days			• Into Science: Physical Science Unit 7 Electric & Magnetic Forces	
Standards List:	MS-PS2-3 , 1	MS-PS2-5			

UNIT 8: WAVES & INFORMATION TRANSFER				
Timing: Semester 2, Quarter 4				
Teaching Time Required: 24.5 days				
Textbook: Into Scien	<i>ice</i> Unit 8			
Торіс	# Days	Objectives	Key Vocabulary	Resources & Materials
Introduction to Waves	6 days	• 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.	 Wave Medium Amplitude Frequency Wavelength 	• Into Science: Physical Science Unit 8 Waves & Information Transfer
The Behavior of Mechanical Waves	5 days	• Investigate the ways that light and sound interact with matter, expanding on wavelength, color, refraction, and reflection	 Mechanical Wave Absorption Transmission Reflection Refraction 	• Into Science: Physical Science Unit 8 Waves & Information Transfer
The Behavior of Light Waves	5.5 days	• Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	• Electromagnetic Waves	• Into Science: Physical Science Unit 8 Waves & Information Transfer
Information Transfer	5.5 days	• Support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.	 Signal Encoding Analog Signal Digital Signal Noise 	• Into Science: Physical Science Unit 8 Waves & Information Transfer
Unit Tests/ Labs	2.5 days			• Into Science: Physical Science Unit 8 Waves & Information Transfer
Standards List:	MS-PS4-1, N	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 describe 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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