Kenai Peninsula School District

SCIENCE CURRICULUM GUIDE

K-12

Fall 2008

KENAI PENINSULA BOROUGH SCHOOL DISTRICT
148 N. Binkley
Soldotna, AK 99669

SCIENCE CURRICULUM
K - 12

Fall 2008

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Kenai Peninsula School District

ELEMENTARY SCIENCE

CONCEPTS	KINDERGARTEN SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Observe and describe their world to answer simple questions
Attitudes and approaches to scientific inquiry	3. Answer "how do you know?" questions with reasonable answers with teacher guidance
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Observe plants and animals in a local environment
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Classify matter according to color, size, and shape
Energy can be transformed, transferred, and conserved	2. Identify various ways that people stay warm
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that the sun warms the land, air and water
Motions, forces, their characteristics, relationships, and effects	4. Describe how things move in different ways

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Sort / match baby animals and mothers 2. Describe traits of Alaskan animals
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Distinguish between plants and animals based on appearances 4. Animals have features that relate to the five senses
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Animals need food, water, air and shelter 6. Understand that animals eat plants and other animals
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Sort rocks by color, size, and shape 2. Describe sources of water
Forces that shape Earth	3. Identify land and water features in the local area
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	4. Identify the four seasons
Theories regarding the origin and evolution of the universe	5. Recognize that objects can be made to look larger 6. Recognize that objects (e.g. sun, moon, stars) can be observed and described 7. Recognize and use a hand-lens
SCIENCE & TECHNOLOGY	**(SE)**
Solving problems involves different ways of thinking, perspectives, and curiosity	1. Recognize that tools help people do things better or more easily

CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Explore local or traditional stories that explain a natural event (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Compare the results of multiple observations of a single local event (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	2. Ask questions about the natural world

CONCEPTS	1st GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Observe and describe their world to answer simple questions
Attitudes and approaches to scientific inquiry	3. Answer "how do you know?" questions with reasonable answers with teacher guidance
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Observe local conditions that impact animals
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Classify matter according to color, size, shape and texture
Energy can be transformed, transferred, and conserved	2. Identify the materials that help people or animals stay warm or cool
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that seasonal temperatures cause changes in the land, air and water
Motions, forces, their characteristics, relationships, and effects	4. Describe how movement can be changed with a push or pull

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Sort animals based on physical characteristics 2. Describe traits of animals
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Sort animals into groups based on appearances 4. Identify external features of animals
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Describe a simple animal habitat 6. Describe a simple predator / prey relationship
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Sort, classify, and compare rocks by color, size, shape, and texture 2. Describe how water moves on different earth surfaces (e.g., waves)
Forces that shape Earth	3. Identify land and water features in Alaska
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	4. Describe the changes that occur during the four seasons
Theories regarding the origin and evolution of the universe	5. Recognize that objects at a distance can be made to look larger 6. Recognize that change in objects (e.g., sun, moon, stars) can be observed and described 7. Recognize and use a spotting scope or binocular

SCIENCE & TECHNOLOGY	**(SE)**
Solving problems involves different ways of thinking, perspectives, and curiosity	1. Recognize that tools help people do things better or more easily
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Explore local or traditional stories that explain a natural event (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Compare the results of multiple observations of a single local event (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	2. Ask questions about the natural world

CONCEPTS	2nd GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Observe and describe their world to answer simple questions
Attitudes and approaches to scientific inquiry	3. Answer "how do you know?" questions with reasonable answers with teacher guidance
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Observe local conditions that impact plants
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Classify matter according to color, size, shape, texture, and weight
Energy can be transformed, transferred, and conserved	2. Explore materials that can be used as insulators or conductors (i.e., fur, metal, wood, plastic)
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that a specific temperature change causes water to freeze or melt
Motions, forces, their characteristics, relationships, and effects	4. Describe how magnets can be used to make things move without being touched

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Sort plants based on physical characteristics 2. Describe traits of plants
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Sort plants into groups based on appearances 4. Identify external features of plants
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Describe a simple plant habitat 6. Describe simple producer / consumer relationship
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Sort, classify and describe rocks by color, size, shape, texture, and weight 2. Create a simple illustration that depicts understanding of the water cycle
Forces that shape Earth	3. Identify land and water features on the Earth
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	4. Identify and record patterns that occur during the four seasons (e.g., weather, daylight)
Theories regarding the origin and evolution of the universe	5. Recognize that small objects can be magnified. 6. Recognize the objects (e.g., sun, moon, stars) have patterns of change that can be observed and described 7. Recognize and use a simple microscope

SCIENCE & TECHNOLOGY	**(SE)**
Solving problems involves different ways of thinking, perspectives, and curiosity	1. Recognize that tools help people do things better or more easily
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Identify tools used in everyday life.
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Explore local or traditional stories that explain a natural event (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	2. Ask questions about the natural world

CONCEPTS	3rd GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Observe and describe their world to answer simple questions
Attitudes and approaches to scientific inquiry	3. Answer "how do you know?" questions with reasonable answers
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Observe local conditions that determine which plants and/or animals survive (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Classify matter according to physical properties (i.e., color, size, shape, texture, weight, and flexibility)
Energy can be transformed, transferred, and conserved	2. Classify materials as insulators or conductors (i.e., fur, metal, wood, plastic) and identify their applications
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that temperature changes cause changes in phases of substances (i.e., ice changing to a liquid, water changing to a vapor, vice versa)
Motions, forces, their characteristics, relationships, and effects	4. Recognize that objects can be moved without being touched (i.e., using magnets, falling objects, static electricity)

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Sort Alaskan plants and/or animals using physical characteristics (i.e., leaves, beaks) (LOCAL) 2. Describe how some traits (i.e., claws, teeth, camouflage) of living organisms have helped them survive as a species
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Sort animals and plants into groups based on appearance and behaviors 4. Observe and compare external features of plants and of animals that may help them grow, survive, and reproduce
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Identify and sort examples of living and no-living things in the local environment (LOCAL) 6. Organize a simple food chain of familiar plants and animals (LOCAL)
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Recognize that most rocks are composed of combinations of different substances 2. Describe the water cycle to show that water circulates through the crust, oceans, and atmosphere of Earth
Forces that shape Earth	3. Identify and compare a variety of Earth's land features (i.e., rivers, deltas, lakes, glaciers, mountains, valleys, islands)
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	4. Use recorded weather patterns (i.e., temperature, cloud cover, or precipitation) to make reasonable predictions (LOCAL)
Theories regarding the origin and evolution of the universe	5. Recognizes that objects appear smaller the farther away they are 6. Recognize that objects (e.g., sun, moon, stars) have properties, locations, and movements that can be observed and described 7. Recognize and use appropriate instruments of magnification (e.g., binoculars and telescopes) (LOCAL)

SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology to address problems	1. Identify local problems and discuss solutions (LOCAL)
Solving problems involves different ways of thinking, perspectives, and curiosity	2. Identify local tools and materials used in everyday life (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	3. List the positive and negative effects of single technological development in the local community (i.e., fish trap, fish wheel, four-wheeler, computer) (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Explore local and traditional stories that explain a natural event (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Compare the results of multiple observations of a single local event (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	2. Ask questions about the natural world

CONCEPTS	4th GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Observe, measure & collect data from explorations and use this information to classify, predict, & communicate
Attitudes and approaches to scientific inquiry	3. Support their ideas with observations and peer review (LOCAL)
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Identify the local limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Identify and compare the characteristics of gases, liquids, and solids
Energy can be transformed, transferred, and conserved	2. Investigate the effectiveness of different insulating and conducting materials with respect to hear flow and record the results. (LOCAL)
Interactions between matter and energy and the effects of these interactions on systems	3. Explain that temperature changes cause changes in phases of substances (e.g., ice changing to liquid, water changing to water vapor, and vice versa)
Motions, forces, their characteristics, relationships, and effects	4. Simulate that changes in speed or direction of motion are caused by forces. (LOCAL)

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Show the relationship between physical characteristics of Alaskan organisms and the environment in which they live 2. Describe fossil evidence (e.g. casts, track ways, imprints, etc.) of extinct organisms
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Choose appropriate tools (i.e. hand lens, microscopes, ruler, balance) to examine the basic structural components (e.g. stems, leaves, fish scales, wings) of living things 4. Describe the basic characteristics and requirements of living things
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Identify examples of living and non-living things and the relationship between them (e.g., living things need water, herbivores need plants) 6. Identify a simple food chain and diagram how energy flows through it and describe the effects of removing one link
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Describe that most smaller rocks come from the breaking and weathering of larger rocks as part of the rock cycle 2. Recognize the physical properties of water as they relate to the rock cycle
Forces that shape Earth	3. Observe models of how waves, wind, water, ice shape and reshape the Earth's surface by eroding rock and soil 4. Identify causes (i.e., earthquakes, tsunamis, volcanoes, floods, landslides, and avalanches) of rapid changes on the surface
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	5. Recognize changes to length of daylight over time and its relationship to seasons 6. Observe that heat flows from one object to another (LOCAL)

Theories regarding the origin and evolution of the universe	7. Recognize that stars are like the sun but are so far away that they look like points of light 8. Recognize that objects have properties, locations, and movements that can be observed and described 9. Recognize and use appropriate instruments of magnification (e.g., binoculars and telescopes) (LOCAL)
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology to address problems	1. Recognize that tools (e.g., spear, hammer, hand lens, kayak, computer) and processes (e.g., drying fish, sewing, photography) are an important part of human cultures
Solving problems involves different ways of thinking, perspectives, and curiosity	2. Identify the function of a variety of tools (e.g., spear, hammer, hand lens, kayak, computer): 3. Identify multiple explanations (e.g., oral traditions, folklore, scientific theory) of everyday events (e.g., weather, seasonal changes) (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. List the positive and negative effects of a scientific discovery
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Connect observations of nature to a local or traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Recognize the need for repeated measurements
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	2. Use an account of a discovery to recognize that an individual's (e.g., George Washington Carver, Marie Curie) curiosity led to advancements in science

CONCEPTS	5th GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Use quantitative & qualitative observations to create their own inferences & predictions
Attitudes and approaches to scientific inquiry	3. Support their statements with facts from a variety of resources & identify their resources (LOCAL)
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Identify the limiting factors that determine which plants and/or animals survive (e.g., weather, human influence, species interactions (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Compare models that represent matter as solids, liquids, or gases and the changes from one state to another (LOCAL)
Energy can be transformed, transferred, and conserved	2. Classify the changes (i.e. heat, light, sound, and motion) that electrical energy undergoes in common household appliances (i.e., toaster, blender, radio, light bulb, heater)
Interactions between matter and energy and the effects of these interactions on systems	3. Identify physical and chemical changes based on observable characteristics (e.g., tearing paper vs. burning paper)
Motions, forces, their characteristics, relationships, and effects	4. Investigate that the greater the force acting on an object, the greater the change in motion will be (LOCAL)

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Contrast inherited traits (e.g., flower color, number of limbs) with those that are not (riding a bike, scar from an accident) 2. Make reasonable inferences about fossil organisms based on physical evidence
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Identify and sort animals into groups using basic external and internal features 4. Explain how external features and internal systems (i.e., respiratory, excretory, skeletal, circulatory, and digestive) of plants and animals may help them grow, survive, and reproduce 5. Recognize that organisms are composed of cells
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	6. Diagram how matter and energy are transferred within and between living and nonliving things 7. Organize a simple food chain of familiar plants and animals that traces the source of the energy back to sunlight
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Observe a model of the rock cycle showing that smaller rocks come from the breaking and weathering of larger rocks and that smaller rocks (e.g., sediments and sands) may combine with plat materials to form soils (LOCAL)
Forces that shape Earth	2. Describe how wind and water tear down and build up the Earth's surface resulting in new land formations (i.e., deltas, moraines, canyons)

Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	3. Observe a model that shows how the regular and predictable motion of the Earth and moon determine the apparent shape (phases) of the moon over time (LOCAL) 4. Compare heat absorption and loss by land and water
Theories regarding the origin and evolution of the universe	5. Distinguish between stars, planets, moons, comets, and meteors (LOCAL) 6. Recognize that the earth is in regular and predictable motion and this motion explains the length of a day and year 7. Recognize and use appropriate instruments of magnification (e.g., binoculars and telescopes) (LOCAL)
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology to address problems	1. Identify a community problem or issue and describe the information needed to develop a scientific solution (LOCAL)
Solving problems involves different ways of thinking	2. Investigate a problem or project over a specified period of time and identify the tools and processes used in that project. (LOCAL) 3. Compare multiple explanations (e.g., oral traditions, folklore, scientific theory) of everyday events (e.g., weather, seasonal changes)
Scientific discoveries and technological innovations affect our lives and society	4. Describe the various effects of an innovation (e.g., snow machines, airplanes, immunizations) on the safety, health, and environment of the local community (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Tell a local or traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) AND relate it to a scientific explanation

HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Review and record results of investigations into the natural world
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	2. Investigate that scientists' curiosity led to advancements in science (L)

CONCEPTS	6th GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Collaborate to design and conduct simple repeatable investigations
Attitudes and approaches to scientific inquiry	3. Identify and differentiate fact from opinion
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Gather data to build a knowledge base that contributes to the development of questions about the local environment (e.g., moose browsing, trail usage, river erosion) (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Use models to represent matter as it changes from one state to another
Energy can be transformed, transferred, and conserved	2. Recognize that energy can exist in many forms (i.e., heat, light, chemical, electrical, mechanical)
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that most substances can exist as a solid, liquid, or gas depending on temperature

CONCEPTS	MASTERY CORE OBJECTIVES
Cont. **PHYSICAL SCIENCE**	**(SB)**
Motions, forces, their characteristics, relationships, and effects	1. State that every object exerts gravitational force on every other object 2. Recognize that electric currents and magnets can exert a force on each other 3. Make waves move through a variety of media (LOCAL)
LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Recognize sexual and asexual reproduction 2. Recognize that species survive by adapting to changes in their environment
Structure, function, behavior, development, life cycles, and diversity of living organisms	3. Use a dichotomous key to classify animals and plants into groups using external or internal features 4. Identify basic behaviors (e.g., migration, communication, hibernation) used by organisms to meet the requirements of life
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Recognize that organisms can cause physical and chemical changes (e.g., digestion, growth, respiration, photosynthesis) to matter and recognize the importance of energy transfer in these changes 6. Organize a food web using familiar plants and animals

CONCEPTS	MASTERY CORE OBJECTIVES
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Explore the rock cycle and its relationship to igneous, metamorphic, and sedimentary rocks 2. Identify the physical properties of water within the stages of the water cycle 3. Explain the water cycle's connection to changes in the Earth's surface 4. Apply knowledge of the water cycle to explain changes in the Earth's surface
Forces that shape Earth	5. Describe the formation and composition (i.e., sand, silt, clay, organics) of soils 6. Identify strategies (e.g., reforestation, dikes, wind breaks, off road activity guidelines) for minimizing erosion 7. Identify and describe its layers (i.e., crust, mantle, core)
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	8. Connect the water cycle to weather phenomena 9. Identify that energy transfer is affected by surface conditions (e.g., snow cover, asphalt, vegetation) and that this affects weather
Theories regarding the origin and evolution of the universe	10. Compare and contrast characteristics of planets and stars (i.e., light reflecting, light emitting, orbiting, orbited, composition) 11. Create models of the solar system illustrating size, location/position, composition, moons/rings, and conditions (LOCAL)

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology to address problems	1. Recognize that technology cannot always provide successful solutions for problems or fulfill every human need
Solving problems involves different ways of thinking	2. Identify and design a solution to a problem 3. Compare the student's work to the work of peers in order to identify multiple paths that can be used to investigate a question or problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Describe the various effects of an innovation on a global level
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Tell a local of traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) and relate it to a scientific explanation (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Recognize differences in results of repeated experiments

Kenai Peninsula School District

SECONDARY SCIENCE

The high school science curriculum has been developed to address the Alaska state standards by identifying the grade level expectations which will be covered in each course. These grade level expectations will be used in the context of the course content. Through professional development activities and networking with local agencies, KPBSD science teachers will gain knowledge and skills for implementing the curriculum in a meaningful manner.

CONCEPTS	7th GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Collaborate to design and conduct simple repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings (LOCAL)
Attitudes and approaches to scientific inquiry	3. Identify and evaluate the sources used to support scientific statements
Interactions with the environment provide an opportunity for understanding scientific concept	4. Design and conduct a simple investigation about the local environment (LOCAL)
LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Compare and contrast sexual and asexual reproduction 2. Describe the role of genes in sexual reproduction (i.e., traits of the offspring) 3. Describe possible outcomes of mutations (i.e., no effect, damage, benefit)
Structure, function, behavior, development, life cycles, and diversity of living organisms	4. Describe the basic structure and function of plant and animal cells 5. Place vertebrates into correct classes of taxonomy based on external, observable features 6. Identify the seven levels of classification of organisms 7. Explain that most organisms utilize inherited and learned behaviors to meet the basic requirements of life

	8. Describe the levels of organization within a human body (i.e., cells, tissues, organs, systems) 9. Identify and describe the functions of human organs (i.e., heart, lungs, brain) 10. Describe the functions and interdependence of human body systems (i.e., circulatory, respiratory, nervous)
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	11. Organize a food web that shows the cycling of matter 12. Recognize and explain that organisms can cause physical and chemical changes (e.g., digestive, growth, respiration, photosynthesis) to matter and recognize and explain the importance of energy transfer in these changes. 13. State that energy flows and that matter cycles but is conserved within an ecosystem 14. Classify organisms within a food web as producers, consumers, or decomposers
EARTH SCIENCE	**(SD)**
Forces that shape Earth	1. Interpret topographical maps to identify features (i.e., rivers, lakes, mountains, valleys, islands, and tundra)
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	2. Describe the weather using accepted meteorological terms (e.g., pressure systems, fronts, precipitation)
Theories regarding the origin and evolution of the universe	3. Define a light year 4. Use light years to describe distances between objects in the universe 5. Compare the brightness of a star to its distance and size

SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology to address problems	1. Describe how public policy affects the student's life (e.g., public waste disposal) (LOCAL)
Solving problems involves different ways of thinking	2. Identify, design, test, and revise solutions to a local problem (LOCAL) 3. Compare the student's work to the work of the peers in order to identify multiple paths that can be used to investigate a question or problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Recognize the effects of a past scientific discover, invention, or scientific breakthrough (e.g., DDT, internal combustion engine)
CULTURAL, SOCIAL, PERSONAL PERSPECTIVES & SCIENCE	**(SF)**
Relationships among scientific, cultural, social, and personal perspectives	1. Investigate the basis of local knowledge (e.g., describe and predict weather) and share that information (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Explain differences in results of repeated experiments
Scientific knowledge is ongoing and subject to change.	2. Revise a personal idea when presented with experimental/observation data inconsistent with that personal idea (e.g., the rates of falling bodies of different masses) (LOCAL)

CONCEPTS	8th GRADE SCIENCE MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, observe, describe, measure, classify, make generalizations, infer, and communicate 2. Collaborate to design and conduct simple repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings (LOCAL)
Attitudes and approaches to scientific inquiry	3. Recognize and analyze differing scientific explanations and models
Interactions with the environment provide an opportunity for understanding scientific concept	4. Conduct research to learn how the local environment is used by a variety of competing interests (e.g., competition for habitat/resources, tourism, oil and mining companies, hunting groups) (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Use physical properties and chemical (i.e., density, boiling point, freezing point, conductivity, flammability) to differentiate among materials (i.e., elements, compounds, and mixtures)
Energy can be transformed, transferred, and conserved	2. Explain that energy (heat, light, chemical, electrical, mechanical) can change form. 3. Identify the initial source and resulting change in forms of energy in common phenomena (sun to tree to wood to stove to cabin heat)
Interactions between matter and energy and the effects of these interactions on systems	4. Recognize that most substances can exist as a solid, liquid, or gas depending on the motion of their particles 5. Exploring changes of state with increase or decrease or particle speed associated with heat transfer (LOCAL)

	6. Explore through a variety of models (e.g., gumdrops and toothpicks) how atoms may bond together into well defined molecules or bond together in large arrays (LOCAL)
Motions, forces, their characteristics, relationships, and effects	7. Illustrate that unbalanced forces will cause an object to accelerate 8. Demonstrate (LOCAL)) and explain circular motion 9. Describe the interactions between charges 10. Describe the characteristics of a wave (i.e., amplitude, wavelength, and frequency)
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Describe the rock cycle and its relationship to igneous, metamorphic, and sedimentary rocks 2. Make connections between components of the locally observing geologic environment and the rock cycle (LOCAL)
Forces that shape Earth	3. Describe how the movement of the tectonic planes results in both slow changes (e.g., formation of mountains, ocean floors, and basins) and short-term events (e.g., volcanic eruptions, seismic waves, and earthquakes) on the surface 4. Use models to show the relationship between convection currents within the mantle and the large-scale movement of the surface (LOCAL) 5. Describe how the surface can change rapidly as a result of geological activities (i.e., earthquakes, tsunamis, volcanoes, floods, landslides, avalanches)
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	6. Recognize the relationship between the seasons and earth's tilt relative to the sun and describe the day/night cycle as caused by the rotation of the Earth every 24 hours 7. Recognize the relationship between phase changes (i.e., sublimation, condensation, evaporation) and energy transfer

	8. Recognize types of energy transfer (convection, conduction, and radiation) and how they affect weather
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology to address problems	1. Describe how public policy affects the student's life (e.g., public waste disposal) and participate diplomatically in evidence-based discussions relating to the student's community (LOCAL)
Solving problems involves different ways of thinking	2. Identify, design, test, and revise solutions to a local problem (LOCAL) 3. Compare the student's work to the work of the peers in order to identify multiple paths that can be used to investigate and evaluate potential solutions to a question or problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Predict the possible effects of a recent scientific discovery, invention, or scientific breakthrough (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSPECTIVES & SCIENCE	**(SF)**
Relationships among scientific, cultural, social, and personal perspectives	1. Describe how local knowledge, culture, and the technologies of various activities (e.g., hunting, fishing, subsistence) influence the development of scientific knowledge (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Bases of the advancement of scientific knowledge	1. Describe how repeating experiments improves the likelihood of accurate results.
Scientific knowledge is ongoing and subject to change.	2. Revise a personal idea when presented with experimental/observation data inconsistent with that personal idea (e.g., the rates of falling bodies of different masses) (LOCAL)

BIOLOGY

Grade(s): 9+
Length: Two semesters
Recommended Prerequisites: (none)

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL)
Attitudes and approaches to scientific inquiry	3. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions
Interactions with the environment provide an opportunity for understanding scientific concepts	4. Conduct research and communicate results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)
Energy can be transformed, transferred, and conserved	2. Examine energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that a chemical reaction has taken place 4. Describe the behavior of electrons in chemical bonding

	5. Explain that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system 6. Recognize that radioactivity is a result of the decay of unstable nuclei 7. Recognize that atoms emit and absorb electromagnetic radiation 8. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., visible, infrared, microwaves, radio)
Motions, forces, their characteristics, relationships, and effects	9. Recognize that the gravitational attraction between objects is proportional to their masses and decrease with their distance 10. Explain that different kinds of materials respond to electric and magnetic forces (i.e., conductors, insulators, magnetic, and non-magnetic materials)
LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection and biological evolution	1. Recognize that all organisms have chromosomes made of DNA and that DNA determines traits 2. Use probabilities to recognize patterns of inheritance (e.g., Punnett Squares) 3. Explain how the processes of natural selection can cause speciation and extinction 4. Infer evolutionary pathways from evidence (e.g., fossils, geologic samples, recorded history) 5. Examine issues related to genetics
Structure, function, behavior, development, life cycles, and diversity of living organisms	6. Describe and compare the characteristics of phyla/divisions from each kingdom 7. Describe the structure-function relationship (e.g., joints, lungs) 8. Explain that cells have specialized structures in which chemical reactions occur

	9. State the function of major physiological systems (i.e., circulatory, excretory, digestive, respiratory, reproductive, nervous, immune, endocrine, musculoskeletal, and integumentary 10. Explain the functions of organs of major systems (i.e., respiratory, digestive, circulatory, reproductive, nervous, musculoskeletal, and excretory) 11. Trace the pathways of the digestive, circulatory, and excretory systems
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	12. Describe the carbon and nitrogen cycle within an ecosystem and how the continual input of energy from sunlight keeps the process going (LOCAL) 13. Relate the carbon cycle to global climate change 14. Explore ecological relationships (e.g., competition, niche, feeding relationships, symbiosis) (LOCAL) 15. Identify dynamic factors (e.g., carrying capacity, limiting factors, biodiversity, and productivity) that affect population size
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Describe their interrelationships (i.e., water cycle, carbon cycle, oxygen cycle)
Forces that shape Earth	2. Recognize the dynamic interaction of erosion and deposition including human causes 3. Describe how the theory of plate tectonics explains the dynamic nature of its surface
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	4. Describe causes, effects, preventions, and mitigations of human impact on climate
Theories regarding the origin and evolution of the universe	5. Explain that the position of stars changes in the expanding universe

SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology	1. Recognize that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska) 2. Identify that progress in science and invention is highly interrelated to what else is happening in society
Solving problems involves different ways of thinking, perspectives, and curiosity	3. Question, research, model, simulated, and test multiple solutions to a problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Predict and evaluate the possible effects of a recent scientific discovery, invention, or scientific breakthrough (LOCAL) 5. Research a current problem, identify possible solutions, and evaluate the impact of each solution (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Describe the scientific principles involved in a subsistence activity (e.g., hunting, fishing, gardening) (LOCAL) 2. Analyze the competition for resources by various user groups to describe these interrelationships
HISTORY & NATURE OF SCIENCE	**(SG)**
Changes in historical perspectives of science	1. Identify and describe those perspectives (i.e., political, religious, philosophical) that have impacted the advancement of science

Bases of the advancement of scientific knowledge	2. Explain the importance of innovation (i.e., microscope, immunization, computer) 3. Use an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson & Crick, Newton)
Scientific knowledge is ongoing and subject to change	4. Describe the role of serendipity in scientific discoveries 5. Use experimental or observational data to evaluate a hypothesis
Advancements in science depend on curiosity, creativity, imagination, and broad knowledge base	6. Recognize the role of these factors on scientific advancements

PHYSICAL SCIENCE

Grade(s): 10+
Length: Two semesters
Recommended Prerequisites: Algebra I or A

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Hypothesize, design a controlled experiment, make qualitative and quantitative observations, interpret data, and use this information to communicate conclusions 3. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL)
Attitudes and approaches to scientific inquiry	4. Formulate conclusions that are logical and supported by evidence 5. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Describe atoms and their base components (i.e., protons, neutrons, electrons) 2. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)

Energy can be transformed, transferred, and conserved	3. Apply the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings 4. Examine energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy 5. Recognize simple electrical circuits
Interactions between matter and energy and the effects of these interactions on systems	6. Recognize that a chemical reaction has taken place 7. Describe the behavior of electrons in chemical bonding 8. Explain that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system 9. Recognize that radioactivity is a result of the decay of unstable nuclei 10. Recognize that atoms emit and absorb electromagnetic radiation 11. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)
Motions, forces, their characteristics, relationships, and effects	12. Explain the relationship of motion to an object's mass and the applied force 13. Recognize that when one thing exerts a force on another, an equal amount of force is exerted back on it 14. Recognize that the gravitational attraction between objects is proportional to their masses and decreases with their distance 15. Explain that different kinds of materials respond to electric and magnetic forces (i.e., conductors, insulators, magnetic, and non-magnetic materials) 16. Describe the interactions of waves (i.e., reflection, refraction, wave addition)

LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution	1. Recognize that all organisms have chromosomes made of DNA and that DNA determines traits 2. Use probabilities to recognize patterns of inheritance (e.g., Punnett Squares) 3. Explain how the processes of natural selection can cause speciation and extinction
Structure, function, behavior, development, life cycles, and diversity of living organisms	4. Explain that cells have specialized structures in which chemical reactions occur
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	5. Relate the carbon cycle to global climate change 6. Identify dynamic factors (e.g., carrying capacity, limiting factors, biodiversity, and productivity) that affect population size
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Use a model to demonstrate the rock cycle (LOCAL)
Forces that shape Earth	2. Recognize the dynamic interaction of erosion and deposition including human causes 3. Describe how the theory of plate tectonics explains the dynamic nature of its surface
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	4. Explain the phenomena of the aurora
Theories regarding the origin and evolution of the universe	5. Recognize that a star changes over time 6. Recognize phenomena in the universe (i.e., black holes, nebula) 7. Explain that the position of stars changes in the expanding universe 8. Identify and describe the Big Bang Theory

SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology	1. Recognize that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska) 2. Identify that progress in science and invention is highly interrelated to what else is happening in society
Solving problems involves different ways of thinking, perspectives, and curiosity	3. Question, research, model, simulated, and test multiple solutions to a problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Predict and evaluate the possible effects of a recent scientific discovery, invention, or scientific breakthrough (LOCAL) 5. Research a current problem, identify possible solutions, and evaluate the impact of each solution (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Describe the scientific principles involved in a subsistence activity (e.g., hunting, fishing, gardening) (LOCAL) 2. Analyze the competition for resources by various user groups to describe these interrelationships
HISTORY & NATURE OF SCIENCE	**(SG)**
Changes in historical perspectives of science	1. Identify and describe those perspectives (i.e., political, religious, philosophical) that have impacted the advancement of science
Bases of the advancement of scientific knowledge	2. Explain the importance of innovation (i.e., microscope, immunization, computer)

	3. Use an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson & Crick, Newton)
Scientific knowledge is ongoing and subject to change	4. Describe the role of serendipity in scientific discoveries 5. Use experimental or observational data to evaluate a hypothesis
Advancements in science depend on curiosity, creativity, imagination, and broad knowledge base	6. Recognize the role of these factors on scientific advancements

EARTH SCIENCE

Grade(s): 11+
Length: Two semesters
Recommended Prerequisites: Physical Science

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Hypothesize, design a controlled experiment, make qualitative and quantitative observations, interpret data, and use this information to communicate conclusions 3. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL) 4. Recognize and analyze multiple explanations and models, use this information to revise student's own explanation or model if necessary (LOCAL)
Attitudes and approaches to scientific inquiry	5. Formulate conclusions that are logical and supported by evidence 6. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions 7. Evaluate the credibility of cited sources when conducting the student's own scientific investigation (LOCAL)

Interactions with the environment provide an opportunity for understanding scientific concepts	8. Conduct research and communicate results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (LOCAL)
PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Describe atoms and their base components (i.e., protons, neutrons, electrons) 2. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)
Interactions between matter and energy and the effects of these interactions on systems	3. Recognize that a chemical reaction has taken place 4. Describe the behavior of electrons in chemical bonding 5. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)
LIFE SCIENCE	**(SC)**
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	1. Describe the carbon and nitrogen cycle within an ecosystem and how the continual input of energy from sunlight keeps the process going (LOCAL) 2. Relate the carbon cycle to global climate change
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Use a model to explain the processes (i.e., formation, sedimentation, erosion, reformation) of the rock cycle 2. Create a model to demonstrate the rock cycle (LOCAL)

	3. Apply knowledge of the water cycle to explain changes in the Earth's surface 4. Describe their interrelationships (i.e., water cycle, carbon cycle, oxygen cycle) 5. Integrate knowledge of the water cycle and biogeochemical cycling to explain changes in the Earth's surface (LOCAL)
Forces that shape Earth	6. Recognize the dynamic interaction of erosion and deposition including human causes 7. Describe how the theory of plate tectonics explains the dynamic nature of its surface
Cycles influenced by energy from the sun and by Earth's position and motion in our solar system	8. Recognize the effect of the moon and sun on tides 9. Describe causes, effects, preventions, and mitigations of human impact on climate 10. Explain the phenomena of the aurora 11. Explore causes and effects related to phenomena (e.g., the aurora, solar winds, Coriolis Effect) (LOCAL)
Theories regarding the origin and evolution of the universe	12. Recognize that a star changes over time 13. Recognize and describe phenomena in the universe (i.e., black holes, nebula) 14. Use evidence to explain that the position of stars changes in the expanding universe 15. Identify and describe the Big Bang Theory 16. Explore the evidence that supports the Big Bang Theory (LOCAL)

SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology	1. Recognize that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska) 2. Identify that progress in science and invention is highly interrelated to what else is happening in society 3. Research how social, economic, and political forces strongly influence which technology will be developed and used (LOCAL)
Solving problems involves different ways of thinking, perspectives, and curiosity	4. Question, research, model, simulated, and test multiple solutions to a problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	5. Predict and evaluate the possible effects of a recent scientific discovery, invention, or scientific breakthrough (LOCAL) 6. Research a current problem, identify possible solutions, and evaluate the impact of each solution (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Describe the scientific principles involved in a subsistence activity (e.g., hunting, fishing, gardening) (LOCAL) 2. Analyze the competition for resources by various user groups to describe these interrelationships 3. Investigate the influences of societal and/or cultural beliefs on science (LOCAL)

HISTORY & NATURE OF SCIENCE	**(SG)**
Changes in historical perspectives of science	1. Identify and describe those perspectives (i.e., political, religious, philosophical) that have impacted the advancement of science
Bases of the advancement of scientific knowledge	2. Explain the importance of innovation (i.e., microscope, immunization, computer) 3. Use an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson & Crick, Newton) 4. Describe the importance of logical arguments (i.e., thought experiments by Einstein, Hawking, Newton)
Scientific knowledge is ongoing and subject to change	5. Describe the role of serendipity in scientific discoveries 6. Use experimental or observational data to evaluate a hypothesis 7. Investigate instances when scientists' observations were not in accord with prevailing ideas of the time (LOCAL)

CHEMISTRY

Grade(s): 10+
Length: Two semesters
Prerequisites: Algebra 2

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL) 3. Recognize and analyze multiple explanations and models, use this information to revise student's own explanation or model if necessary (LOCAL)
Attitudes and approaches to scientific inquiry	4. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions 5. Evaluate the credibility of cited sources when conducting the student's own scientific investigation (LOCAL)
Interactions with the environment provide an opportunity for understanding scientific concepts	6. Conduct research and communicate results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (LOCAL)

PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons) 2. Predict the properties of an element (i.e., reactivity, metal, non-metal) use the periodic table and verify the predictions through experimentation (LOCAL)
Energy can be transformed, transferred, and conserved	3. Examine and demonstrate energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy (entrophy) (LOCAL)
Interactions between matter and energy and the effects of these interactions on systems	4. Describe the behavior of electrons in chemical bonding 5. Predict how an atom can interact with other atoms based on its electron configuration and very the results 6. Recognize that radioactivity is a result of the decay of unstable nuclei 7. Research applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (i.e., $E=MC^2$) (LOCAL) 8. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)
LIFE SCIENCE	**(SC)**
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	1. Relate the carbon cycle to global climate change

EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Describe their interrelationships (i.e., water cycle, carbon cycle, oxygen cycle) 2. Integrate knowledge of the water cycle and biogeochemical cycling to explain changes in the Earth's surface (LOCAL)
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology	1. Identify that progress in science and invention is highly interrelated to what else is happening in society 2. Research how social, economic, and political forces strongly influence which technology will be developed and used (LOCAL)
Solving problems involves different ways of thinking, perspectives, and curiosity	3. Question, research, model, simulated, and test multiple solutions to a problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Research a current problem, identify possible solutions, and evaluate the impact of each solution (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Analyze the competition for resources by various user groups to describe these interrelationships 2. Investigate the influences of societal and/or cultural beliefs on science (LOCAL)

HISTORY & NATURE OF SCIENCE	**(SG)**
Changes in historical perspectives of science	1. Describe how those perspectives (i.e., political, religious, philosophical) that have impacted the advancement of science
Bases of the advancement of scientific knowledge	2. Use an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson & Crick, Newton) 3. Describe the importance of logical arguments (i.e., thought experiments by Einstein, Hawking, Newton)
Scientific knowledge is ongoing and subject to change	4. Use experimental or observational data to evaluate a hypothesis 5. Investigate instances when scientists' observations were not in accord with prevailing ideas of the time (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	6. Recognize the role of these factors on scientific advancements

PHYSICS

Grade(s): 11+
Length: Two semesters
Recommended Prerequisites: Math Analysis

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL) 3. Recognize and analyze multiple explanations and models, use this information to revise student's own explanation or model if necessary (LOCAL)
Attitudes and approaches to scientific inquiry	4. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions 5. Evaluate the credibility of cited sources when conducting the student's own scientific investigation (LOCAL)
Interactions with the environment provide an opportunity for understanding scientific concepts	6. Conduct research and communicate results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (LOCAL)

PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons) 2. Predict the properties of an element (i.e., reactivity, metal, non-metal) use the periodic table and verify the predictions through experimentation (LOCAL)
Energy can be transformed, transferred, and conserved	3. Examine and demonstrate energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy (entrophy) (LOCAL) 4. Recognize simple electrical circuits
Interactions between matter and energy and the effects of these interactions on systems	5. Describe the behavior of electrons in chemical bonding 6. Research applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (i.e., $E=MC^2$) (LOCAL) 7. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)
Motions, forces, their characteristics, relationships, and effects	8. Recognize that when one thing exerts a force on another, an equal amount of force is exerted back on it 9. Conduct an experiment to demonstrate that when one thing exerts a force on another, an equal amount of force is exerted back on it (LOCAL) 10. Explain that different kinds of materials respond to electric and magnetic forces (i.e., conductors, insulators, magnetic, and non-magnetic materials) 11. Conduct an experiment to explore the relationship between magnetic forces and electric forces to show that they can be thought of as different aspects of a single electromagnetic force (e.g., generators and motors) (LOCAL)

LIFE SCIENCE	**(SC)**
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	1. Analyze the potential impacts of changes (e.g., climate change, habitat loss/gain, cataclysms, human activities) within an ecosystem
EARTH SCIENCE	**(SD)**
Cycles influences by energy from the sun and by Earth's position and motion in our solar system	1. Explore causes and effects related to phenomena (e.g., the aurora, solar winds, Coriolis Effect) (LOCAL)
Theories regarding the origin and evolution of the universe	2. Describe phenomena in the universe (i.e., black holes, nebula) 3. Use evidence to explain how the position of stars changes in the expanding universe
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology	1. Identify that progress in science and invention is highly interrelated to what else is happening in society 2. Research how social, economic, and political forces strongly influence which technology will be developed and used (LOCAL)
Solving problems involves different ways of thinking, perspectives, and curiosity	3. Question, research, model, simulated, and test multiple solutions to a problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Research a current problem, identify possible solutions, and evaluate the impact of each solution (LOCAL)

CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Analyze the competition for resources by various user groups to describe these interrelationships 2. Investigate the influences of societal and/or cultural beliefs on science (LOCAL)
HISTORY & NATURE OF SCIENCE	**(SG)**
Changes in historical perspectives of science	1. Describe how those perspectives (i.e., political, religious, philosophical) have impacted the advancement of science
Bases of the advancement of scientific knowledge	2. Use an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson & Crick, Newton) 3. Describe the importance of logical arguments (i.e., thought experiments by Einstein, Hawking, Newton)
Scientific knowledge is ongoing and subject to change	4. Use experimental or observational data to evaluate a hypothesis 5. Investigate instances when scientists' observations were not in accord with prevailing ideas of the time (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	6. Recognize the role of these factors on scientific advancements

ANATOMY

Grade(s): 10+
Length: Two semesters
Recommended Prerequisites: Biology

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL) 3. Recognize and analyze multiple explanations and models, use this information to revise student's own explanation or model if necessary (LOCAL)
Attitudes and approaches to scientific inquiry	4. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions 5. Evaluate the credibility of cited sources when conducting the student's own scientific investigation (LOCAL)
Interactions with the environment provide an opportunity for understanding scientific concepts	6. Conduct research and communicate results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (LOCAL)

PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Describe atoms and their base components (i.e., protons, neutrons, electrons) 2. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)
Energy can be transformed, transferred, and conserved	3. Apply the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings 4. Examine energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy
Interactions between matter and energy and the effects of these interactions on systems	5. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)
Motions, forces, their characteristics, relationships, and effects	6. Recognize that when one thing exerts a force on another, an equal amount of force is exerted back on it
LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution	1. Recognize that all organisms have chromosomes made of DNA and that DNA determines traits
Structure, function, behavior, development, life cycles, and diversity of living organisms	2. Describe the structure-function relationship (e.g., joints, lungs) 3. Explain that cells have specialized structures in which chemical reactions occur 4. Explain the functions of organs of major systems (i.e., respiratory, digestive, circulatory, reproductive, nervous, musculoskeletal, and excretory

	5. Describe the functions and interdependencies of the organs within the immune system and within the endocrine system 6. Trace the pathways of the digestive, circulatory, and excretory systems
SCIENCE & TECHNOLOGY	**(SE)**
Integrate scientific knowledge and technology	1. Identify that progress in science and invention is highly interrelated to what else is happening in society 2. Research how social, economic, and political forces strongly influence which technology will be developed and used (LOCAL)
Solving problems involves different ways of thinking, perspectives, and curiosity	3. Question, research, model, simulated, and test multiple solutions to a problem (LOCAL)
Scientific discoveries and technological innovations affect our lives and society	4. Research a current problem, identify possible solutions, and evaluate the impact of each solution (LOCAL)
CULTURAL, SOCIAL, PERSONAL PERSEPECTIVES & SCIENCE	**(SF)**
Dynamic relationships among scientific, cultural, social, and personal perspectives	1. Analyze the competition for resources by various user groups to describe these interrelationships 2. Investigate the influences of societal and/or cultural beliefs on science (LOCAL)

HISTORY & NATURE OF SCIENCE	**(SG)**
Changes in historical perspectives of science	1. Identify and describe how those perspectives (i.e., political, religious, philosophical) have impacted the advancement of science
Bases of the advancement of scientific knowledge	2. Use an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson & Crick, Newton) 3. Describe the importance of logical arguments (i.e., thought experiments by Einstein, Hawking, Newton)
Scientific knowledge is ongoing and subject to change	4. Use experimental or observational data to evaluate a hypothesis 5. Investigate instances when scientists' observations were not in accord with prevailing ideas of the time (LOCAL)
Advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base	6. Recognize the role of these factors on scientific advancements

MARINE BIOLOGY

Grade(s): 11+
Length: Two semesters
Recommended Prerequisites: Biology

CONCEPTS	MASTERY CORE OBJECTIVES
SCIENCE AS INQUIRY AND PROCESS	**(SA)**
Process of science	1. Ask questions, predict, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate 2. Review pertinent literature, hypothesize, make qualitative and quantitative observations, control experimental variables, analyze data statistically (i.e., mean, median, mode), and use this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (LOCAL) 3. Recognize and analyze multiple explanations and models, use this information to revise student's own explanation or model if necessary (LOCAL)
Attitudes and approaches to scientific inquiry	4. Formulate conclusions that are logical and supported by evidence 5. Examine methodology and conclusions to identify bias and determine if evidence logically supports the conclusions 6. Evaluate the credibility of cited sources when conducting the student's own scientific investigation (LOCAL)
Interactions with the environment provide an opportunity for understanding scientific concepts	7. Conduct research and communicate results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (LOCAL)

PHYSICAL SCIENCE	**(SB)**
Structure and properties of matter	1. Describe atoms and their base components (i.e., protons, neutrons, electrons) 2. Use the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons) 3. Predict the properties of an element (i.e., reactivity, metal, non-metal) use the periodic table and verify the predictions through experimentation (LOCAL)
Energy can be transformed, transferred, and conserved	4. Apply the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings 5. Examine and demonstrate energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy (entrophy) (LOCAL)
Interactions between matter and energy and the effects of these interactions on systems	6. Recognize that a chemical reaction has taken place 7. Describe the behavior of electrons in chemical bonding 8. Predict how an atom can interact with other atoms based on its electron configuration and verify the results (LOCAL) 9. Compare the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)
Motions, forces, their characteristics, relationships, and effects	10. Explain the relationship of motion to an object's mass and the applied force 11. Recognize that when one thing exerts a force on another, an equal amount of force is exerted back on it 12. Conduct an experiment to demonstrate that when one thing exerts a force on another, an equal amount of force is exerted back on it (LOCAL)

	13. Recognize that the gravitational attraction between objects is proportional to their masses and decreasing with their distance 14. Describe the interactions of waves (i.e., reflection, refraction, wave addition)
LIFE SCIENCE	**(SC)**
Science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution	1. Recognize that all organisms have chromosomes made of DNA and that DNA determines traits 2. Relate the structure of DNA to characteristics of an organism 3. Use probabilities to recognize patterns of inheritance (e.g., Punnett Squares) 4. Explain how the processes of natural selection can cause speciation and extinction 5. Research how the processes of natural selection cause changes in species over time (LOCAL)
Structure, function, behavior, development, life cycles, and diversity of living organisms	6. Describe and compare the characteristic of phyla/divisions from each kingdom 7. Describe the structure-function relationship (e.g., joints, lungs) 8. Explain that cells have specialized structures in which chemical reactions occur 9. Describe the learned behaviors (e.g., classical conditioning, imprinting, trial and error) that are utilized by living organisms to meet the requirements of life 10. State the function of major physiological systems (i.e., circulatory, excretory, digestive, respiratory, reproductive, nervous, immune, endocrine, musculoskeletal, and integumentary 11. Explain the functions of organs of major systems (i.e., respiratory, digestive, circulatory, reproductive, nervous, musculoskeletal, and excretory

	12. Describe the functions and interdependencies of the organs within the immune system and within the endocrine system 13. Trace the pathways of the digestive, circulatory, and excretory systems
All organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy	14. Describe the carbon and nitrogen cycle within an ecosystem and how the continual input of energy from sunlight keeps the process going (LOCAL) 15. Relate the carbon cycle to global climate change 16. Identify dynamic factors (e.g., carrying capacity, limiting factors, biodiversity, and productivity) that affect population size 17. Explore ecological relationships (e.g., competition, niche, feeding relationships, symbiosis) (LOCAL) 18. Analyze the potential impacts of changes (e.g., climate change, habitat loss/gain, cataclysms, human activities) within an ecosystem
EARTH SCIENCE	**(SD)**
Geochemical cycles	1. Use a model to explain the processes (i.e., formation, sedimentation, erosion, reformation) of the rock cycle 2. Apply knowledge of the water cycle to explain changes in the Earth's surface 3. Describe their interrelationships (i.e., water cycle, carbon cycle, oxygen cycle) 4. Integrate knowledge of the water cycle and biogeochemical cycling to explain changes in the Earth's surface (LOCAL)

Forces that shape Earth	5. Recognize the dynamic interaction of erosion and deposition including human causes 6. Describe how the theory of plate tectonics explains the dynamic nature of its surface
Cycles influences by energy from the sun and by Earth's position and motion in our solar system	7. Recognize the effect of the moon and sun on tides 8. Describe causes, effects, preventions, and mitigations of human impact on climates
SCIENCE & TECHNOLOGY	**(SE)**
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