

**Integrated Sciences 9**

**Curriculum Guide**

**Anchorage School District**

**Working Version**  
**June/2006**

## 9<sup>th</sup> Grade Integrated Science Integrated Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 IS 1	<p>The scientific method is a process people use to understand and predict natural phenomena.</p> <p>9 IS 1 – 3 = 8 days</p>	<p><i>Science as Inquiry: Content Standard A, grades 9 - 12: Developing Student Abilities and Understand</i></p> <p>As a result of activities, all student should develop</p> <ul style="list-style-type: none"> <li>• abilities necessary to do scientific inquiry.</li> <li>• understandings about scientific inquiry.</li> </ul>	<p><i>SA</i> Students develop an understanding of the processes and applications of scientific inquiry.</p> <p><i>SA1</i> Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations and defend scientific arguments.</p>	<p>The student demonstrates an understanding of science by</p> <p>[9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating. *</p> <p>[9] SA1.2 hypothesizing, designing a controlled experiment, making qualitative and quantitative observations, interpreting data, and using this information to communicate conclusions.</p> <p>* same GLE as 8<sup>th</sup> grade but at a higher level</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• utilize scientific equipment properly and correctly in an appropriate and safe manner. (application)</li> <li>• create an experiment, using the scientific method, that identifies independent and dependent variables, and recognize other variables to be help constant. (synthesize)</li> <li>• organize their data in table, graphs, and flow charts to identify the relationships among the data. (synthesize)</li> <li>• assess the reliability of their data. (evaluate)</li> <li>• generate conclusions based on their observations. (synthesize)</li> <li>• Evaluate the benefits and limitations in the use of models (synthesis)</li> </ul>		<p>Students will design and carry out an experiment that follows the steps of the scientific method. Additionally, students will be able to assess the validity of the data collected.</p> <p>Participation in school science fair or Alaska State Science and Engineering Fair.</p>	<p>NSTA: <u><a href="#">The Truth About Science: A Curriculum for Developing Young Scientists</a></u></p> <p>Activities from Tik Lim can be modified for investigation. <u><a href="#">Invitations to Science Inquiry</a></u> ISBN: 1-878-10621-X</p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Content Standard	Grade Level Expectations
9 IS 2	<p>Scientific principles are demonstrated in daily life.</p> <p>9 IS 1 – 3 = 8 days</p> <p>(Incorporate into other frameworks.)</p>		<p><i>SF</i> Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.</p> <p><i>SF1</i> Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.</p> <p><i>SF2</i> Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.</p> <p><i>SF3</i> Students develop an understanding of the importance of recording and validating cultural knowledge.</p>	<p>The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by:</p> <p><i>[9] SF1.1-SF3.1</i> investigating the basis of local knowledge (e.g., describing and predicting weather) and sharing that information. (L)</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>

## 9<sup>th</sup> Grade Integrated Science Integrated Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Content Standard	Grade Level Expectations
9 IS 3	<p>Many perspectives must be taken into consideration when analyzing the competition for resources.</p> <p>9 IS 1 – 3 = 8 days</p>		<p><i>SF</i> Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.</p> <p><i>SF1</i> Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.</p> <p><i>SF2</i> Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.</p> <p><i>SF3</i> Students develop an understanding of the importance of recording and validating cultural knowledge.</p>	<p>The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by:</p> <p><i>[10] SF1.1-SF3.1</i> analyzing the competition for resources by various user groups to describe these interrelationships.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>

## 9<sup>th</sup> Grade Integrated Science Life Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 1	<p>Cells have specialized structures for the transport of materials, energy capture and release, protein building, waste disposal, information feedback, as well as movement.</p> <p>9 LS 1 – 2 = 10 days</p>	<p><i>Life Science Content Standard C, grades 9 - 12: Structure and Function in Living Systems</i></p> <p>All students should develop an understanding of the cell.</p> <p>Cells have particular structures that underlie their functions. Every cell is surrounded by a membrane that separates it from the outside world. Inside the cell is a concentrated mixture of thousands of different molecules which form a variety of specialized structures that carry out such cell functions as energy productions, transport of molecules, waste disposal, synthesis of new materials, and the storage of genetic material.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC2</i> Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.</p>	<p>The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by</p> <p><i>[10] SC2.2</i> explaining that cells have specialized structures in which chemical reactions occur.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>investigate and identify cellular parts and processes. (analyze, knowledge)</li> <li>compare and contrast cells from different kingdoms. (analyze)</li> <li>compare the interrelationships of cells, tissue, organs and organ systems. (apply, analyze)</li> </ul>	<p>Use prepared slides or micro-viewer to observe different types of cells</p> <p>Observe and draw living organisms and describe any organelles you might see in the cell (elodea, cheek cells).</p> <p>Demonstrate the correct use of microscopes and slide preparation.</p> <p>Label the parts of a cell on a diagram (computer, worksheet, poster, magnetic models).</p> <p>.</p>	<p>Write or demonstrate a cellular analogy.</p> <p>Make a poster of model of a cell and organelles (out of paper, clay, Lego, wire, food, or cardboard).</p>	<p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Life Science</u>, Chapters 2-3, 2-4</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0311 – Cell Theory scn-0322 – Cellular Respiration</p> <p>ASD VHS 203487 <u>Cell: Structural Unit of Life</u></p> <p>ASD VHS 208604 <u>Cell Processes</u></p> <p>ASD VHS 205778 <u>DNA and the Protein Express</u></p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 2	<p>In addition to the basic cellular functions common to all cells, most cells in multi-cellular organisms perform some special functions that others do not.</p> <p>9 LS 1 - 2 = 10 days</p>	<p><i>Life Science Content Standard C, grades 9 - 12: Structure and Function in Living Systems</i></p> <p>All students should develop an understanding of the cell.</p> <p>Cells have particular structures that underlie their functions. Every cell is surrounded by a membrane that separates it from the outside world. Inside the cell is a concentrated mixture of thousands of different molecules which form a variety of specialized structures that carry out such cell functions as energy productions, transport of molecules, waste disposal, synthesis of new materials, and the storage of genetic material.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC2</i> Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.</p>	<p>The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by</p> <p>[11] SC2.1 describing the structure-function relationship</p>

Objectives (Bloom's) – Students will be able to:	Representative Activities	Assessments/Evaluations	References
			<p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Life Science</u>, Chapters 2-3, 2-4</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0311 – Cell Theory scn-0322 – Cellular Respiration</p> <p>ASD VHS 203487 <u>Cell: Structural Unit of Life</u></p> <p>ASD VHS 208604 <u>Cell Processes</u></p> <p>ASD VHS 205778 <u>DNA and the Protein Express</u></p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 3	<p>Complex organisms have systems that carry out specific functions. These systems also interact with each other.</p> <p>LS 3 – 4 = 10 days</p>	<p><i>Life Science: Content Standard B, grades 5-8: Structure and Function of in Living Systems</i></p> <p>The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC2</i> Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.</p>	<p>The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by</p> <p><i>[9] SC2.3</i> stating the function of major physiological systems (i.e., circulatory, excretory, digestive, respiratory, reproductive, nervous, immune, endocrine, musculoskeletal, and integumentary).</p> <p><i>[10] SC2.1</i> describing the structure-function relationship (i.e., joints, lungs).</p> <p><i>[10] SC2.3</i> explaining the functions of organs of major systems (i.e., respiratory, digestive, circulatory, reproductive, nervous, musculoskeletal, and excretory).</p> <p><i>[10] SC2.4</i> tracing the pathways of the digestive, circulatory, and excretory systems.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>interpret the functions of the systems in the human body. These may include circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory and immune. (comprehend)</li> <li>analyze and identify the characteristics of the human body systems. (analyze)</li> <li>compare the interrelationships of the organ systems to the entire human body. (analyze)</li> <li>assess how an organ/organ system malfunction would impact the human body. (evaluate)</li> </ul>	<p>On giant paper, create a human body showing the overlapping of body systems.</p> <p>Chicken wing lab (came from University of Oklahoma website)</p> <p>Heart rate and breathing lab.</p> <p>Dissect a small animal.</p> <p>Look at 3-D human anatomy models.</p> <p>www.Innerbody.com</p>	<p>Prepare a class presentation on a body system.</p> <p><u>Making No Bones</u> about it 1998 by Forensic; The Center for Applied Research in Education.</p> <p>Design a game of Pictionary.</p> <p>Create a brochure on a particular disease.</p>	<p>Glencoe <u>Life Science</u>; Chapters 21, 22, 23, 24, 25, 26, 27</p> <p><a href="http://www.innerbody.com">www.innerbody.com</a>, body systems website</p> <p>Glencoe <u>Science Interactions</u>, Chapters 20,21, 22</p> <p>Your school nurse.</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a></p> <p>scn-0411 – Body Systems  scn-0415 – Skin  scn-0423 – Digestion  scn-0434 – Cardiovascular Problems  scn- 0442 – Respiratory Disorders  scn-0443 – Excretion  scn-0472 – Reproductive System</p> <p>ASD Kit 207255  <u>GeoKit 1: Human Body; digestive, circulatory, respiratory, immune</u></p> <p>ASD Kit 207256  <u>Geokit 2; Human Body; nervous, skeletal, reproductive</u></p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 4	<p>The genetic information in DNA molecules provides instructions for assembling protein molecules. The code used is virtually the same for all life forms. Genes are segments of DNA molecules, which contain instructions for specific proteins.</p> <p>LS 3 – 4 = 10 days</p>	<p><i>Life Science Content Standard C, grades 9 - 12: Structure and Function in Living Systems</i></p> <p>Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.</p> <p>Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC1</i> Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, and the process of natural selection. (evolution)</p>	<p>The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, and the process of natural selection by:</p> <p>[9] <i>SC1.1</i> recognizing that all organisms have chromosomes made of DNA and that DNA determines traits.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>point to DNA as being the genetic code for all living organisms. (analyze)</li> <li>know the relationship between DNA, chromosomes, and genes. (know)</li> </ul>	<p>Describe, using illustrations or models, the structure and function of DNA including complementary base pairs.</p> <p>Design an animal diversity web, based on observable traits.</p> <p>Put a dot on a string and then coil the string, relate this to DNA, chromosomes, and genes.</p> <p>Students determine what characteristics a hereditary molecule would need to have, then teacher can lead a discussion towards actual characteristics of DNA (semi-conservative, readable code)</p> <p>Compare and contrast the DNA and chromosomes from two different organisms (What is the same and what is different?).</p> <p>Glencoe Life Science; reading pg 104-107; observable traits</p>	<p>Students should be able to locate DNA in a cell</p> <p>Construct a work of art showing DNA, chromosomes and or genes.</p> <p>Write a letter to a grandparent explaining how student's DNA was derived from the grandparents DNA strands.</p>	<p>www.glencoe.com</p> <p>Exploring the Environment website, <a href="http://www.cotf.edu/ete/modules/modules.html">www.cotf.edu/ete/modules/modules.html</a></p> <p>Glencoe <u>Life Science</u> reading pg 104-107</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0341 – Genetics</p> <p>ASD VHS 205778 <u>DNA and the Protein Express</u></p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 5	<p>In an ecosystem, relationships amongst individuals and populations affect energy flow, as well as survival.</p> <p>9 LS 5 - 6 = 10 days</p>	<p><i>Life Science: Content Standard C, grades 9-12: Populations and Ecosystems</i></p> <p>The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quality of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystems.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC3</i> Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.</p>	<p>The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by</p> <p><i>[10] SC3.2</i> exploring ecological relationships (e.g., competition, niche, feeding relationships, symbiosis, etc.)</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• investigate the flow of energy through the interactions in an ecosystems, emphasizing food chains, food webs and food pyramids, and other organism interactions. (analyze)</li> <li>• recognize a variety of ecological relationships (e.g., competition, niche, symbiosis, etc.)</li> </ul>	<p>Plant guide, land use project worldbiomes.com/accessexcellence</p> <p>Project Wild: Who Eats Whom?; How Many Bears Can Live in this Forrest?; Oh! Moose (aka Oh Deer!);</p>	<p>Build an ecosystem, or a model of an ecosystem</p>	<p>Glencoe <u>Science Interactions</u> Chapters 4-6, 8, 9,11,14</p> <p>Exploring the Environment website, www.cotf.edu/ete/modules/modules.html</p> <p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Life Science</u>; Chapters 18, 19, 20</p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 6	<p>The amount of life any environment can support is determined by the dynamic relationships between biotic and abiotic factors.</p> <p>9 LS 5 - 6 = 10 days</p>	<p><i>Life Science: Content Standard C, grades 9-12: Populations and Ecosystems</i></p> <p>The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quality of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystems.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC3</i> Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.</p>	<p>The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer of matter and energy by science.</p> <p>[9] <i>SC 3.3</i> identifying dynamic factors (e.g., carrying capacity, limiting factors, biodiversity, and productivity) that affect population size.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• identify and illustrate that long-term survival of species in different biomes is dependent on a resource base that may be limited. (investigate)</li> <li>• appraise how human activities can change the flow and reduce the usability of earth's resources. (evaluate)</li> </ul>	<p>Plant guide, land use project worldbiomes.com/accessexcellence</p> <p>Project Wild: Who Eats Whom?; How Many Bears Can Live in this Forrest?; Oh! Moose (aka Oh Deer!);</p> <p>Here Today, Gone Tomorrow project wild. Zero population growth (zpg); Apple Ocean activity</p> <p>Study Alaska resource issues and their sustainability.</p>		<p>Glencoe <u>Science Interactions</u> Chapters 4-6, 8, 9,11,14</p> <p>Exploring the Environment website, www.cotf.edu/ete/modules/modules.html</p> <p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Life Science</u> Chapters 18, 19, 20</p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 LS 7	<p>Driven by the Sun's energy, the abiotic components within an ecosystem (i.e., water, carbon, oxygen and nitrogen) flow through cycles.</p> <p>9 LS 7 = 5 days</p>	<p><i>Life Science: Content Standard C, grades 9-12: Populations and Ecosystems</i></p> <p>The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quality of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystems.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC3</i> Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.</p> <p><i>SD1</i> Students develop an understanding of Earth's geochemical cycles.</p>	<p>The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by</p> <p><i>[9] SC3.1</i> describing the carbon and nitrogen cycle within an ecosystem and how the continual input of energy from sunlight keeps the process going. (L)</p> <p>The student demonstrates an understanding of geochemical cycles by</p> <p><i>[10] SD1.2</i> describing their interrelationships (i.e., water cycle, carbon cycle, oxygen cycle).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• analyze the flow of energy through various cycles including the carbon, nitrogen and water cycles. (analyze)</li> <li>• identify situations where geochemical cycles interrelate.</li> </ul>	Plant guide, land use project <a href="http://worldbiomes.com/accessexcellence">worldbiomes.com/accessexcellence</a>	Create a carbon cycle comic strip.  Write a story about the water cycle. Include in your story water reclamation.	Glencoe <u>Science Interactions</u> Chapters 4-6, 8, 9,11,14  Exploring the Environment website, <a href="http://www.cotf.edu/ete/modules/modules.html">www.cotf.edu/ete/modules/modules.html</a>  <a href="http://www.glencoe.com">www.glencoe.com</a>  Glencoe <u>Life Science</u> Chapters 18, 19, 20

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 1	<p>The universe contains galaxies, black holes and nebula. Each galaxy contains many billions of stars.</p> <p>9 ES 1 – 5 days</p>	<p><i>Earth and Space Science Content Standard D grades 9 – 12: The Origin and Evolution of the Universe</i></p> <p>All students should develop an understanding of the origin and evolution of the universe,</p> <p>Early in the history of the universe, matter, primarily the light atoms hydrogen and helium, clumped together by gravitational attraction to form countless trillions of stars. Billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass in the universe.</p> <p>Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium, These and other processes in stars have led to the formation of all the other elements.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD4</i> Students develop an understanding of the theories regarding the evolution of the universe.</p>	<p>The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by:</p> <p><i>[10] SD 4.1</i> recognizing phenomena in the universe (i.e., black holes, nebula)</p> <p><i>[10] SD 4.2</i> explaining that the position of stars changes in the expanding universe.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
	<p>Discuss supernovas, black holes (gravity related).</p> <p>View website, "Powers of Ten".</p> <p>Activity 10Huh? About the powers of ten, see <a href="http://www.iit.edu/~smile/ph8804.html">www.iit.edu/~smile/ph8804.html</a></p>		<p>Glencoe <u>Earth Science</u> Chapter 24</p> <p><a href="http://www.education.nasa.gov">www.education.nasa.gov</a> Hubble Telescope link</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0644 – Galaxies</p> <p>ASD VHS 206226 <u>The Solar Sea</u></p> <p>ASD VHS Series <u>The Mechanical Universe</u> (A series-check catalog for titles)</p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 2	<p>The current theory of the origin and evolution of the universe is called the Big Bang.</p> <p>9 ES 2 = 2 days</p>	<p><i>Earth and Space Science Content Standard D grades 9 – 12: The Origin and Evolution of the Universe</i></p> <p>All students should develop an understanding of the origin and evolution of the universe,</p> <p>Early in the history of the universe, matter, primarily the light atoms hydrogen and helium, clumped together by gravitational attraction to form countless trillions of stars. Billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass in the universe.</p> <p>Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium, These and other processes in stars have led to the formation of all the other elements.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD4</i> Students develop an understanding of the theories regarding the evolution of the universe.</p>	<p>The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by</p> <p>[9] <i>SD4.2</i> explaining that the position of stars changes in the expanding universe.</p> <p>[9] <i>SD4.4</i> identifying the Big Bang Theory.</p> <p>[10] <i>SD 4.2</i> explaining that the position of stars changes in the expanding universe. *</p> <p>[10] <i>SD 4.4</i> describing the Big Bang Theory</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
			Glencoe <u>Earth Science</u> ; Chapter 24  <a href="http://www.education.nasa.gov">www.education.nasa.gov</a> ; Hubble Telescope link  ASD VHS <u>The Mechanical Universe</u> (A series–check catalog for titles)

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 3	<p>Stars have a life cycle.</p> <p>9 ES 3 = 5 days</p>	<p><i>Earth and Space Science Content Standard D grades 9 – 12: The Origin and Evolution of the Universe</i></p> <p>All students should develop an understanding of the origin and evolution of the universe,</p> <p>Early in the history of the universe, matter, primarily the light atoms hydrogen and helium, clumped together by gravitational attraction to form countless trillions of stars. Billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass in the universe.</p> <p>Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium, These and other processes in stars have led to the formation of all the other elements.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD4</i> Students develop an understanding of the theories regarding the evolution of the universe.</p>	<p>The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by</p> <p>[9] <i>SD4.1</i> recognizing that a star changes over time.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• explain the relationship between life cycles of stars and formation of planets and solar systems. (comprehend)</li> <li>• relate that the deaths of stars create all the naturally occurring elements in the periodic table. (synthesize)</li> </ul>	<p>Discuss supernovas, black holes (gravity related).</p> <p>Invent a series of cars or candy bars based on the names of the stages of a star's life (as in white dwarf). Describe the characteristics of the cars or candy bars and how their name is appropriate for its characteristics. What would a "Mature Star Bar" look and taste like?</p> <p>Design posters/drawings of different star stages of the cycle.</p> <p>View website, "Powers of Ten".</p> <p>Activity 10Huh? About the powers of ten, see <a href="http://www.iit.edu/~smile/ph8804.html">www.iit.edu/~smile/ph8804.html</a></p>	<p>Write a story or a song about the birth, life, and death of a star.</p>	<p>Glencoe <u>Earth Science</u>; Chapter 24</p> <p><a href="http://www.education.nasa.gov">www.education.nasa.gov</a> ; Hubble Telescope link</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0644 – Galaxies</p> <p>ASD VHS 206226 <u>The Solar Sea</u></p> <p>ASD VHS 208012 <u>Death Star</u></p> <p>ASD VHS <u>The Mechanical Universe</u> (A series–check catalog for titles)</p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 4	<p>Stars differ from each other in size, temperature and age, but they appear to be made up of the same elements that are found on Earth and behave according to the same physical principles. Most stars are in system of two or more stars orbiting around one another. The Sun is a medium-sized star located near the edge of a disk shaped galaxy of stars.</p> <p>9 ES 4 = 3 days</p>	<p><i>Earth and Space Science Content Standard D grades 9 – 12: The Origin and Evolution of the Universe</i></p> <p>All students should develop an understanding of the origin and evolution of the universe,</p> <p>Early in the history of the universe, matter, primarily the light atoms hydrogen and helium, clumped together by gravitational attraction to form countless trillions of stars. Billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass in the universe.</p> <p>Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium, These and other processes in stars have led to the formation of all the other elements.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD4</i> Students develop an understanding of the theories regarding the evolution of the universe.</p>	<p>The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by</p> <p>[9] <i>SD4.1</i> recognizing that a star changes over time.</p> <p>[9] <i>SD4.2</i> explaining that the position of stars changes in the expanding universe.</p> <p>[10] <i>SD 4.2</i> explaining that the position of stars changes in the expanding universe. *</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
	<p>Discuss supernovas, black holes (gravity related).</p> <p>Invent a series of cars or candy bars based on the names of the stages of a star's life (as in white dwarf). Describe the characteristics of the cars or candy bars and how their name is appropriate for its characteristics. What would a "Mature Star Bar" look and taste like?</p> <p>Design posters/drawings of different star stages of the cycle.</p> <p>View website, "Powers of Ten".</p> <p>Activity 10Huh? About the powers of ten, see <a href="http://www.iit.edu/~smile/ph8804.html">www.iit.edu/~smile/ph8804.html</a></p>		<p>Glencoe <u>Earth Science</u>; Chapter 24</p> <p><a href="http://www.education.nasa.gov">www.education.nasa.gov</a> ; Hubble Telescope link</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0644 – Galaxies</p> <p>ASD VHS 206226 <u>The Solar Sea</u></p> <p>ASD VHS 208012 <u>Death Star</u></p> <p>ASD VHS <u>The Mechanical Universe</u> (A series–check catalog for titles)</p>

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 5	<p>Certain phenomena that occur on or near Earth are caused by interactions within the Sun, Earth, and Moon system.</p> <p>9 ES 5 = 5 days</p>	<p><i>Earth and Space Science Content Standard D, grades 5-8: Earth in the Solar System</i></p> <p>Gravity is the force that keeps planets in orbit around the sun and govern the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.</p> <p>The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.</p> <p>Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the ocean holds a large amount of heat.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD4</i> Students develop an understanding of the theories regarding the evolution of the universe.</p>	<p>The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by</p> <p>[9] <i>SD3.1</i> recognizing the effect of the moon and sun on tides.</p> <p>[9] <i>SD3.2</i> explaining the phenomena of the aurora.</p> <p>[11] <i>SD3.2</i> exploring causes and effects related to phenomena (e.g., the aurora, solar winds, Coriolis effect).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• describe the relationship of the sun's energy to life on Earth. (comprehend)</li> <li>• relate the cause of the aurora to the sun. (apply)</li> <li>• examine relationship between energy provided by sun to cycles on earth, including seasons. (evaluate)</li> </ul>	<p>Discuss, as a class, native American stories based on aurora.</p> <p>Concept mapping and diagrams of carbon cycles.</p> <p>Demonstrate an aurora by charging a vacuum tube (rarified gas) with a tesla coil (solar wind). Alternatively, compare the aurora to the workings of a fluorescent light tube (classroom light).</p> <p>Look at pictures of the sun on websites and identify sunspots and solar flares.</p>	<p>Diagram water and carbon cycles.</p> <p>Research stories of natural events on earth and create your own myth. (I-search)</p> <p>Make a poster or brochure illustrating how the aurora occurs.</p>	<p>Glencoe <u>Earth Science</u>, Chapter 24</p> <p>Glencoe <u>Life Science</u>, Chapter 18 and Chapter 3</p> <p><u>The Aurora Explained</u> (video)</p> <p><u>Aurora Alive</u> (CD)</p>

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 6	<p>Earth's lithosphere consists of separate plates that ride on a denser, hot, and gradually deformable layer of the earth. The crust sections move very slowly, which form a variety of geologic features and cause geologic events.</p> <p>9 ES 6 - 7 = 10 days</p>	<p><i>Earth and Space Science Content Standard D, grades 5-8: Structure of the Earth System</i></p> <p>Lithospheric plates on the scales of continents and oceans constantly move at rate of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate movements.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD2</i> Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.</p>	<p>The student demonstrates an understanding of the forces that shape Earth b:</p> <p>[9] SD2.2 describing how the theory of plate tectonics explains the dynamic nature of its surface.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• list and explain at least 4 types of evidence for plate tectonics. (knowledge)</li> <li>• relate effects of plate tectonics to earthquakes and volcanoes. (analyze)</li> <li>• develop an explanation for the causes of plate tectonics (convection current). (synthesize)</li> <li>• create model demonstrating an understanding of the mechanisms of plate tectonics.</li> </ul>	<p>Map puzzles – past and present continental positions.</p> <p>Website activities and films; class trip to Earthquake Park and Earthquake Museum.</p> <p>Tracking volcano and earthquake activity around the world.</p> <p>Make a colloid suspension, and relate to plate tectonics.</p> <p>Lava layering, Hawaii Volcanoes observatory website</p> <p>Demonstrate a convection current, relate to earth's crust movements.</p>	<p>Write an essay on evidences of plate tectonics.</p> <p>Create a multimedia project explaining the effect of plate tectonics on the earth.</p> <p>Predict the future movements of earth's plates. Where will the continents be and what mountain ranges will form?</p>	<p>Glencoe <u>Earth Science</u> Chapter 11 and Chapter 19</p> <p>U.S.G.S website; <a href="http://www.usgs.gov">www.usgs.gov</a></p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0841 – Plate Tectonics scn-1013 – Continental Drift</p> <p>ASD GeoKit 207260 <u>Dynamic Earth</u></p> <p>ASD Teacher Guide 807260 <u>Dynamic Earth</u></p> <p>ASD VHS 206222 (Planet Earth Series) <u>Living Machine</u></p>

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 7	<p>The theory of continental drift, first proposed in the 1600's and reintroduced in the early 1900's by Alfred Wegener, was not fully accepted until the 1960's when further evidence had accumulated in support of it.</p> <p>9 ES 6 – 7 = 10 days</p>	<p><i>Earth and Space Science Content Standard G, grades 9-12; Nature of Scientific Knowledge</i></p> <p>Scientific explanations must meet certain criteria. First and foremost, they must be consistent with experimental and observational evidence about nature, and must make accurate predictions, when appropriate, about systems being studied. They should be logical respect the rules of evidence, be open to criticism, report methods and procedures, and make knowledge public. Explanations on how the natural world changes based on myths, personal beliefs, religious values, mystical inspiration, superstition, or authority may be personally useful and socially relevant, but they are scientific.</p> <p>Occasionally, there are advances in science and technology that have important and long-lasting effects on science and society. Examples of such advances include Plate Tectonics.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD2</i> Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.</p> <p><i>SG</i> Students develop an understanding of the history and nature of science.</p> <p><i>SG2</i> Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.</p> <p><i>SG3</i> Students develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).</p>	<p>The student demonstrates an understanding of the forces that shape Earth by:</p> <p><i>[10] SD2.2</i> describing how the theory of plate tectonics explains the dynamic nature of its surface. *</p> <p>Students demonstrate an understanding of the bases of the advancement of scientific knowledge by:</p> <p><i>[10] SG2.1</i> using an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson &amp; Crick, Newton).</p> <p>The student demonstrates an understanding that scientific knowledge is ongoing and subject to change by:</p> <p><i>[10] SG3.1</i> using experimental or observational data to evaluate a hypothesis.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
	<p>Map puzzles – past and present continental positions.</p>	<p>Write an essay on evidences of plate tectonics.</p> <p>Predict the future movements of earth's plates. Where will the continents be and what mountain ranges will form?</p>	<p>Glencoe <u>Earth Science</u> Chapter 11 and Chapter 19</p> <p>U.S.G.S website; <a href="http://www.usgs.gov">www.usgs.gov</a> <a href="http://www.scilinks.org">www.scilinks.org</a> scn-0841 – Plate Tectonics scn-1013 – Continental Drift</p> <p>ASD GeoKit 207260 <u>Dynamic Earth</u></p> <p>ASD Teacher Guide 807260 <u>Dynamic Earth</u></p> <p>ASD VHS 206222 (Planet Earth Series) <u>Living Machine</u></p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 8	<p>There are processes (i.e., formation, sedimentation, erosion, reformation) that drive the rock cycle.</p> <p>9 ES 8 – 9 = 5 days</p>	<p><i>Earth and Space Science Content Standard D grades 5 - 8: Structure of the Earth's System</i></p> <p>Some changes in the solid earth can be described as the "rock cycle." Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.</p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD1</i> Students develop an understanding of Earth's geochemical cycles.</p> <p><i>SD2</i> Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.</p>	<p>The student demonstrates an understanding of geochemical cycles by</p> <p>[9] <i>SD1.1</i> using a model to demonstrate the rock cycle. (L)</p> <p>[10] <i>SD1.1</i> using a model to explain the processes (i.e., formation, sedimentation, erosion, reformation) of the rock cycle.</p> <p>The student demonstrates an understanding of the forces that shape Earth by:</p> <p>[9] <i>SD2.1</i> recognizing the dynamic interaction of erosion and deposition including human causes.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 9	<p>Changes in Earth's surface are the result of human impact, geologic processes, and the effects of water.</p> <p>9 ES 8 – 9 = 5 days</p>	<p><i>Earth and Space Science Content Standard D grades 9 – 12: Energy in the Earth's System</i></p>	<p><i>SD</i> Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p><i>SD1</i> Students develop an understanding of Earth's geochemical cycles.</p> <p><i>SD2</i> Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.</p>	<p>The student demonstrates an understanding of geochemical cycles by</p> <p>[9] <i>SD1.2</i> applying knowledge of the water cycle to explain changes in the Earth's surface.</p> <p>The student demonstrates an understanding of the forces that shape Earth by:</p> <p>[9] <i>SD2.1</i> recognizing the dynamic interaction of erosion and deposition including human causes.</p> <p>[10] <i>SD2.2</i> describing how the theory of plate tectonics explains the dynamic nature of its surface.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>

## 9<sup>th</sup> Grade Integrated Science Earth Science

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 10	<p>Climates have sometimes changed abruptly as a result of changes in the earth's crust, such as volcanic eruptions or asteroid collisions. Changes to the atmosphere or ocean, caused by human or natural influences, can have widespread effects on climate.</p> <p>9 ES 10 = 5 days</p>	<p><i>Earth and Space Science Content Standard D grades 9 – 12: Energy in the Earth's System</i></p> <p>Global climate is determined by energy transfer from the sun at and near the earth's surface. The energy transfer is influenced by dynamic processes such as cloud cover and the earth's rotation, and static conditions such as the position of mountain ranges and oceans.</p> <p><i>Science in Personal and Social Perspectives Content Standard F grades 9 – 12: Natural and Human-Induced Hazards</i></p> <p>Human activities can enhance potential for hazards. Acquisition of resources, urban growth, and waste disposal can accelerate rates of natural change.</p>	<p>SC Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p>SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.</p> <p>SD Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</p> <p>SD3 Students develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system.</p>	<p>The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by:</p> <p>[10] SC3.1 relating the carbon cycle to global climate change.</p> <p>The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by</p> <p>[10] SD3.1 describing causes, effects, preventions, and mitigations of human impact on climate.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>differentiate between climate and weather. (evaluate)</li> <li>relate effects of human activities on global climates. (evaluate)</li> <li>separate causes of past climate changes such as cultural and astronomical Earth Vs. human impacts. ie: global warming and ice ages. (evaluate)</li> </ul>	<p>Graph average yearly (decades) temperatures. Compare with graph of CO<sub>2</sub> levels. Graph and analyze ice ages.</p> <p>Collect newspaper and every day reports of changes in storm patterns, ocean currents, jet stream, etc.</p> <p>Exploring the environment: <a href="http://www.cotf.edu">www.cotf.edu</a></p> <p>Study El Nino and Global warming websites.</p> <p>Use globes and flashlights to learn about angle of incidence and differential heating of the earth (Solar angles lab).</p> <p>GLOBE</p>	<p>I-Search paper.</p> <p>Debate the Kyoto Protocol: should the US have signed it?</p> <p>Create a brochure for a South American Fisherman showing the impact of El Nino and La Nina.</p> <p>Create a public awareness campaign on global warming in the Arctic.</p>	<p>Glencoe <u>Earth Science</u>, Chapter 16</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0942 – Climates of the World</p> <p>globe.gov</p> <p>ASD VHS 205553 <u>Global Warming: Hot Time Ahead</u></p> <p>ASD VHS 207327 <u>Chasing El Nino</u></p>

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 11	<p>Thousands of layers of sedimentary rock confirm the long history of the earth's changing surface and the changing lifeforms whose remains are found in successive layers. Because of geologic processes, the youngest layers are not always found on top.</p> <p>9 ES 11 - 12 = 10 days</p>	<p><i>Earth and Space Science Content Standard D, grades 9-10: The Origin and Evolution of the Earth System</i></p> <p>Geologic time can be estimated by observing rock sequences at various locations.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC1</i> Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, and the process of natural selection. (evolution)</p>	<p>The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, and the process of natural selection by</p> <p><i>[9] SC1.3</i> inferring evolutionary pathways from evidence (e.g., fossils, geologic samples, recorded history).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• determine the order of events involved in the formation of a given geologic profile. (evaluate)</li> <li>• predict the type of environment that produces the most fossils. (apply)</li> </ul>		<p>Have students create a travel brochure through geologic time that describes changes in the environment and changing life forms.</p> <p>Create a geologic time line using adding machine tape.</p>	

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ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 ES 12	<p>Current fossil evidence is consistent with the idea that modern species, including humans, evolved from earlier species.</p> <p>9 ES 11 – 12 = 10 days</p>	<p><i>Earth &amp; Space Science Content Standard D; grades 5-8: Earth's History</i></p> <p>Fossils provide important evidence of how life and environmental conditions have changed.</p>	<p><i>SC</i> Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.</p> <p><i>SC1</i> Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, and the process of natural selection. (evolution)</p>	<p>The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, and the process of natural selection by</p> <p><i>[9] SC1.3</i> inferring evolutionary pathways from evidence (e.g., fossils, geologic samples, recorded history).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• order fossils according to changes that have occurred. (comprehend)</li> <li>• determine the placement of a “new” fossil. (synthesize)</li> </ul>	<p>Turtle activity, placement</p> <p>Fossil Find</p> <p>Choose a fossil and trace it to its most recent life form.</p>	<p>Design a poster that shows how a specific organism has changed over time.</p>	<p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-0741 - Fossils</p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Chemistry

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSC 1	<p>Mendeleev developed a prototype of the modern Periodic Table. Mendeleev’s predictions of the existence of undiscovered elements to fill in the empty spaces in his table were later verified.</p> <p>9 PSC 1 = 2 days</p>	<p><i>Physical Science Content Standard B, grades 9-12: Structure of Atoms</i></p> <p>All students should develop an understanding of the structure of atoms and the structure and properties of matter.</p>	<p><i>SG</i> Students develop an understanding of the history and nature of science.</p> <p><i>SG2</i> Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.</p>	<p>Students demonstrate an understanding of the bases of the advancement of scientific knowledge by:</p> <p><i>[10] SG2.1</i> using an account of an event to recognize the processes of science used by historically significant scientists (e.g., Goodall, Watson &amp; Crick, Newton).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
•		Producing a timeline starting with alchemy.	

## 9<sup>th</sup> Grade Integrated Science Physical Science - Chemistry

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSC 2	<p>Information contained on the periodic table is based upon atomic structure. When elements are listed in order on the periodic table by increasing number of protons, the same sequence of properties appears over and over again in the list. Scientists continue to investigate atoms and have discovered even smaller constituents of which neutrons and protons are made.</p> <p>9 PSC 2 = 5 days</p>	<p><i>Physical Science Content Standard B, grades 9-12: Structure of Atoms</i></p> <p>All students should develop an understanding of the structure of atoms and the structure and properties of matter.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB1</i> Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.</p>	<p>The student demonstrates an understanding of the structure and properties of matter by</p> <p><i>[9] SB1.1</i> describing atoms and their base components (i.e., protons, neutrons, electrons).</p> <p><i>[10] SB1.1</i> using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• determine the number of electrons, neutrons and protons of an element by looking at the periodic table.(apply)</li> <li>• build a model of an element using the information on the periodic table. (know)</li> <li>• compare elements on the periodic table for their repeating chemical and physical properties. (analyze)</li> </ul>	<p>Use a variety of worksheets for students to practice calculation and arrangement of sub atomic particles.</p> <p>Role-play different elements and as a group create a human periodic table.</p> <p>Research and describe the historical development of the atomic theory.</p> <p>Match a list of celebrities to the element which would best represent that celebrity; explain reasoning.</p> <p>Compare and contrast a penny (copper) and a nickel, then later find them on the periodic table. Students should find that they are very similar with many slight differences (hardness, MP, luster, etc.) and this corresponds to their proximity on the periodic table.</p>	<p>Write a story about how it feels to be an element. Which element represents your personality?</p> <p>Given an element and a periodic table determine the number of protons, neutrons, and electrons that element has.</p>	<p>Glencoe <u>Physical Science</u>; Chapter 10</p> <p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-1111 – Describing Matter</p> <p>ASD VHS 205560 <u>The Periodic Table</u></p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Chemistry

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSC 3	<p>In a neutral atom, the number of electrons equals the number of protons, but an atom may acquire a net charge by gaining or losing electrons.</p> <p>9 PSC 3 = 3 days</p>	<p><i>Physical Science Content Standard B, grades 9-12: Structure of Atoms</i></p> <p>All students should develop an understanding of the structure of atoms and the structure and properties of matter.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB1</i> Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.</p>	<p>The student demonstrates an understanding of the structure and properties of matter by:</p> <p><i>[10] SB1.1</i> using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>propose whether or not a particular element is reactive or non-reactive by looking at its sub-atomic particles. (evaluate)</li> </ul>	<p>Given an element and a periodic table, practice determining the number of valence electrons in that element and whether that element would gain or lose electrons to become more stable.</p> <p>Use the periodic table to calculate the number of protons and neutrons in a variety of elements, and then rank these elements according to their stability.</p>		<p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Physical Science</u>; Chapters 10, 11-1, 12-2</p> <p><a href="http://www.atombuilder.com">www.atombuilder.com</a></p> <p>ASD Laser Disk 205806 <u>History in the Making</u></p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Chemistry

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSC 4	<p>Although neutrons have little effect on how an atom interacts with others, they do affect the mass and stability of the nucleus. Isotopes of the same element have the same number of protons but differ in the number of neutrons.</p> <p>9 PSC 4 = 2 days</p>	<p><i>Physical Science Content Standard B, grades 9-12: Structure of Atoms</i></p> <p>All students should develop an understanding of the structure of atoms and the structure and properties of matter.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB1</i> Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.</p>	<p>The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by:</p> <p><i>[11] SB1.1</i> predicting the properties of an element (i.e., reactivity, metal, non-metal) using the periodic table and verifying the predictions through experimentation. (L)</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
	M & M Isotope graphing		<a href="http://www.glencoe.com">www.glencoe.com</a> Glencoe Physical Science; Chapters 10, 11-1, 12-2

## 9<sup>th</sup> Grade Integrated Science Physical Science - Chemistry

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSC 5	<p>An atom's electron configuration, particularly the outermost electrons, determines how the atom can interact with other atoms. Atoms form bonds to other atoms by transferring and sharing electrons.</p> <p>9 PSC 5 = 5 days</p>	<p><i>Physical Science Content Standard B, grades 9-12: Structure of Atoms</i></p> <p>All students should develop an understanding of the structure of atoms and the structure and properties of matter.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB3</i> Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.</p>	<p>The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by</p> <p>[10] <i>SB3.1</i> describing the behavior of electrons in chemical bonding.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
	<p>Given an element and a periodic table, practice determining the number of valence electrons in that element and whether that element would gain or lose electrons to become more stable.</p> <p>Use the periodic table to calculate the number of protons and neutrons in a variety of elements, and then rank these elements according to their stability.</p>		<p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Physical Science</u>; Chapters 10, 11-1, 12-2</p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Chemistry

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSC 6	<p>The nuclei of some isotopes are unstable and spontaneously decay, emitting energy. The energy from these radioactive elements has many uses in medicine, industry, power generation, scientific research and warfare.</p> <p>9 PSC 6 = 5 days</p>	<p><i>Physical Science Content Standard B, grades 9-12: Structure of Atoms</i></p> <p>All students should develop an understanding of the structure of atoms and the structure and properties of matter.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB3</i> Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.</p>	<p>The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by:</p> <p><i>[10] SB3.2</i> recognizing that radioactivity is a result of the decay of unstable nuclei.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>describe types of nuclear reaction such as fission and fusion and their roles in applications such as medicine and energy production. (know)</li> </ul>	<p>M &amp; M Isotope graphing</p> <p>Research on isotope use (e.g., carbon dating, medical isotope use.)</p> <p>Radioactive decay curve lab (using dice, pennies, candy, corn, popcorn). Can be found at <a href="http://www.iit.edu/~smile/ph9495.html">www.iit.edu/~smile/ph9495.html</a></p>	<p>Write a newspaper article describing an atomic discovery or an interview with a scientist involved in an atomic discovery.</p>	<p><a href="http://www.glencoe.com">www.glencoe.com</a></p> <p>Glencoe <u>Physical Science</u>; Chapters 10, 11-1, 12-2</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-1135 – Nuclear Fusion</p> <p>ASD Laser Disk 205806 <u>History in the Making</u></p> <p>ASD VHS 206918 (NOVA) <u>Kaboom</u></p> <p>ASD Laser Disk 500031 <u>Back to Chernobyl</u></p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Physics

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSP 1	<p>Waves can superimpose on one another, refract, reflect, diffuse, be absorbed, and change direction when entering new material. All of these effects vary with wavelength and the type of wave.</p> <p>9 PSP 1 = 5 days</p>	<p><i>Physical Science Content Standard B, grades 5-8 Transfer of Energy</i></p> <p>Light interacts with matter by transmission (including refraction), absorption, or scattering (including refraction). To see an object, light from that object – emitted by or scattered from it – must enter the eye.</p> <p><i>Physical Science Content Standard B (grades 9-12) Interactions of Energy and Matter</i></p> <p>Waves, including sound and seismic waves, waves on water, and light waves, have energy and can transfer energy when they interact with matter.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB4</i> Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.</p>	<p>The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by</p> <p><i>[9] SB4.3</i> describing the interactions of waves (i.e., reflection, refraction, wave addition).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>identify basic wave properties. (knowledge)</li> </ul>	<p>Watch buoys on websites to predict wave height and predict surf patterns.</p> <p>Play a constant tone in stereo and move head in relation to speakers to demonstrate Doppler effect.</p> <p>Use lights, mirrors, and lenses to demonstrate wave properties.</p> <p>Demonstrate wave properties with a ripple tank.</p> <p>Use CBL sound program and graphing calculators to graph pressure vs. time with tuning forks.</p>	<p>Pantomime wave particles.</p> <p>Demonstrate a wave property and have students identify it.</p>	<p>Glencoe <u>Science Interactions</u> Chapter 25-1, 13, 15</p> <p>Glencoe <u>Physical Science</u>, Chapter 18, 20</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-1511 – Waves scn-1514 – Seismic Waves</p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Physics

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSP 2	<p>Atoms emit and absorb electromagnetic radiation. Electromagnetic waves consist of: radio waves, microwaves, radiant heat, visible light, ultraviolet radiation, x-rays, and gamma rays. In empty space, all electromagnetic waves move at the same speed – the “speed of light.”</p> <p>9 PSP 2 = 5 days</p>	<p><i>Physical Science Content Standard B, grades 9 – 12 Interactions of Energy and Matter</i></p> <p>Electromagnetic waves result when a charged object is accelerated or decelerated. Electromagnetic waves include radio waves (longest wavelength), microwaves, infrared radiation (radiant heat), visible light, ultraviolet radiation, x-rays, and gamma rays. The energy of electromagnetic waves is carried in packets whose magnitude is inversely proportional to the wavelength.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB3</i> Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.</p>	<p>The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by</p> <p>[9] <i>SB3.3</i> recognizing that atoms emit and absorb electromagnetic radiation.</p> <p>[10] <i>SB3.3</i> comparing the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• recognize different frequency ranges on the electromagnetic spectrum. (know)</li> <li>• relate a wave's frequency to its energy. (evaluate)</li> <li>• separate visible light into its component colors. (application)</li> <li>• identify visible light as a small range of frequencies within the much larger range of the electromagnetic spectrum. (know)</li> </ul>	<p>Record the temperature changes from the infrared band (near red) from a prism. Compare to a control.</p> <p>Play with radio frequencies.</p> <p>Research the difference between AM and FM.</p> <p>Put a prism in front of an overhead. Place one thermometer next to red (infrared spectrum) and see if it heats up.</p> <p>Graph frequency vs energy for various electromagnetic waves.</p> <p>Have students make a rainbow with lights and prisms. Compare the spectrum produced from white light to colored light or a laser through a prism.</p>	<p>Draw a rainbow and explain why the colors always appear in the same order.</p>	<p>Glencoe <u>Physical Science</u>, Chapter 19</p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Physics

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSP 3	<p>Newton's Laws are based on the concepts of mass, force, and acceleration. Inertia, <math>F=ma</math>, and action/reaction are Newton's Three Laws of Motion.</p> <p>9 PSP 3 = 10 days</p>	<p><i>Physical Science Content Standard B, grades 5- 8 Motion and Forces</i></p> <p>The motion of an object can be described by its position, direction of motion, and speed. The motion can be measured and represented on a graph.</p> <p>An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.</p> <p>If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another.</p> <p><i>Physical Science Content Standard B (grades 9-12) Motion and Forces</i></p> <p>Objects change their motion only when a net force is applied. Laws of motion are used to calculate precisely the effects of forces on the motion of objects. The magnitude of the change in motion can be calculated using the relationship <math>F=ma</math>, which is independent of the nature of the force. Whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB4</i> Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.</p>	<p>The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by</p> <p>[9] <i>SB4.1</i> explaining the relationship of motion to an object's mass, and the applied force.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>• differentiate between mass and weight, velocity and acceleration. (analyze)</li> <li>• predict the motion of objects based on Newton's laws. (evaluate)</li> <li>• calculate the force on an object given its mass and acceleration. (comprehension)</li> <li>• demonstrate Newton's laws of motion. (synthesize)</li> <li>• assess the influence of friction on moving objects. (synthesize)</li> <li>• deduce pressure given an object's surface area and force. (evaluate)</li> </ul>	<p>Toys in Space: <a href="http://www.nasa.gov">http://www.nasa.gov</a></p> <p>Skateboard Lab: 2<sup>nd</sup> Law.</p> <p>Build a mousetrap car.</p> <p>Calculate speed of cars on a nearby road in meter/sec. Convert to mph. See who is speeding</p> <p>Use CBL's, graphing calculators and motion detectors to play a distance/time game (D-T match program).</p> <p>Build a sled and go sledding. Analyze the motion.</p> <p>Newton's Second Law of Motion lab: <a href="http://www.iit.edu/~smile/ph9527.html">http://www.iit.edu/~smile/ph9527.html</a></p>	<p>Motion diagram</p> <p>Concept Map: Newton's Laws of Motion</p>	<p><a href="http://www.education.nasa.gov">www.education.nasa.gov</a></p> <p>Glencoe Physical Science, Chapter 3 and 4</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a></p> <p>scn-1313 – Acceleration  scn-1321 – Force  scn-1322 – Friction  scn-1331 – Fluids and Pressure  scn-1334 – Bernoulli's Principle</p> <p>Bill Nye: <u>Forces – All Pumped Up</u></p> <p>Bill Nye: <u>Simple Machines</u> (friction segment)</p> <p>ASD Videos 205935, 205936, &amp;205937  <u>Newton's Law 1,2&amp;3</u></p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Physics

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSP 4	<p>Gravitational force is an attraction between masses. The strength of the force is proportional to the masses and weakens rapidly with increasing distance between them.</p> <p>9 PSP 4 = 2 days</p>	<p><i>Physical Science Content Standard B, grades 9 – 12</i> <i>Motions and Forces</i></p> <p>Gravitation is a universal force that each mass exerts on another mass. The strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB4</i> Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.</p>	<p>The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by</p> <p>[9] <i>SB4.2</i> recognizing that the gravitational attraction between objects is proportional to their masses and decreasing with their distance.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>calculate the force of gravity between 2 objects given the masses and distance apart (gravitational constant is given). (comprehension)</li> <li>explain how the Newtonian model made it possible to account for such diverse phenomena as tides, the orbits of planets and moons, the motion of falling objects and the earth's equatorial bulge. (synthesize)</li> </ul>	<p>Make a timeline of Science, including works of Galileo, Copernicus, Kepler and Newton</p> <p>Compare the force of gravity various planets and moons (given their mass) by generating a table of student's own weight on these bodies.</p> <p>Demonstrate that gravitational acceleration is independent of mass by dropping two objects with the same shape and different masses (for example full and empty plastic bottles).</p> <p>Students calculate the force of gravity for themselves and the earth (this happens to be their weight in Newton's) and compare this to a calculation of the force of gravity for themselves and a close object.</p> <p><i>Toys in Space:</i>  <a href="http://www.nasa.gov">http://www.nasa.gov</a></p>	<p>History; web search on Newton.</p> <p>Historical role-play scientists that contribute to our understanding of gravity.</p> <p>Explain why the times of the high and low tides always change.</p>	<p><a href="http://www.education.nasa.gov">www.education.nasa.gov</a></p> <p>Glencoe <u>Science Interactions</u> Chapter 23-2</p> <p>Glencoe <u>Earth Science</u>, Chapter 8-1, 17, and 21-4</p> <p>Glencoe <u>Physical Science</u>, Chapter 3</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a>  scn-0612 - Gravity</p> <p>ASD VHS 207277  (Bill Nye)  <u>The Moon – Outer Space</u></p> <p>ASD VHS 205215  <u>Ocean Tides</u></p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Physics

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSP 5	<p>Magnetic forces are very closely related to electric forces and can be thought of as different aspects of a single electromagnetic force.</p> <p>9 PSP 5 = 5 days</p>	<p><i>Physical Science Content Standard B, grades 9 - 12 Motions and Forces</i></p> <p>The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel. The strength of the force is proportional to the charges, and, as with gravitation, inversely proportional to the square of the distance between them.</p> <p>Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces. These effects help students to understand electric motors and generators.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB2</i> Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.</p> <p><i>SB4</i> Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.</p>	<p>The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by:</p> <p><i>[10] SB4.2</i> explaining that different kinds of materials respond to electric and magnetic forces (i.e., conductors, insulators, magnetic and non-magnetic materials).</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>organize a set of objects according to their ability to conduct an electric current. (evaluation)</li> </ul>	<p>Electrodog demonstration: Heat hot dogs and pickles using current from a battery. Try a bun - ask students why it won't heat or burn. Predict whether ketchup will or won't conduct electricity.</p> <p>Students trace the production of electricity from familiar wall sockets back to turbines (wires and spinning magnets) at a power plant. This can be done on a poster, drawing, model, or multimedia.</p>	<p>Given a variety of materials make an electric current. More voltage can be a higher grade.</p> <p>Make predictions about how a Van deGraff generator will work, then test your predictions.</p> <p>Teachers should assess students based on their work in representative activities (labs, investigations, and assignments).</p>	<p>Glencoe <u>Physical Science</u>, Chapter 21</p> <p>Glencoe <u>Science Interactions</u>, Chapter 19</p> <p><a href="http://www.scilinks.org">www.scilinks.org</a> scn-1431 – Electromagnetism</p> <p>ASD VHS 206565 <u>Electrical Principles</u></p>

## 9<sup>th</sup> Grade Integrated Science Physical Science - Physics

ASD Science Curriculum Code	ASD Framework and Pacing Guide	National Science Standard	Alaska State Science Content Standard	Grade Level Expectations
9 PSP 6	<p>The useful energy a source provides is always less than the total energy stored in the source.</p> <p>9 PSP 6 = 3 days</p>	<p><i>Physical Science Content Standard B; grades 5-8: Transfer of Energy</i></p> <p>Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.</p>	<p><i>SB</i> Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</p> <p><i>SB2</i> Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.</p>	<p>The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by</p> <p><i>[10] SB2.1</i> examining energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy.</p>

<b>Objectives (Bloom's) – Students will be able to:</b>	<b>Representative Activities</b>	<b>Assessments/Evaluations</b>	<b>References</b>
<ul style="list-style-type: none"> <li>appraise advantages and disadvantages of various sources of energy. (evaluate)</li> </ul>	Research an energy source, and determine its advantages and disadvantages.		