

**Nuna Ilisimman**

**Physical Earth Science**



# Physical Earth Science Curriculum Update

June 2025

# Vision and Narrative

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- Design a Physical Earth Science curriculum that is culturally and placed based while still achieving state science standards.
- This curriculum should deepen students understanding of the knowledge that has been passed through generations, and how that knowledge makes science relevant to their world and community.
- This curriculum will replace the textbooks that are currently in use across the district.
- House the curriculum on Canvas in an online format.

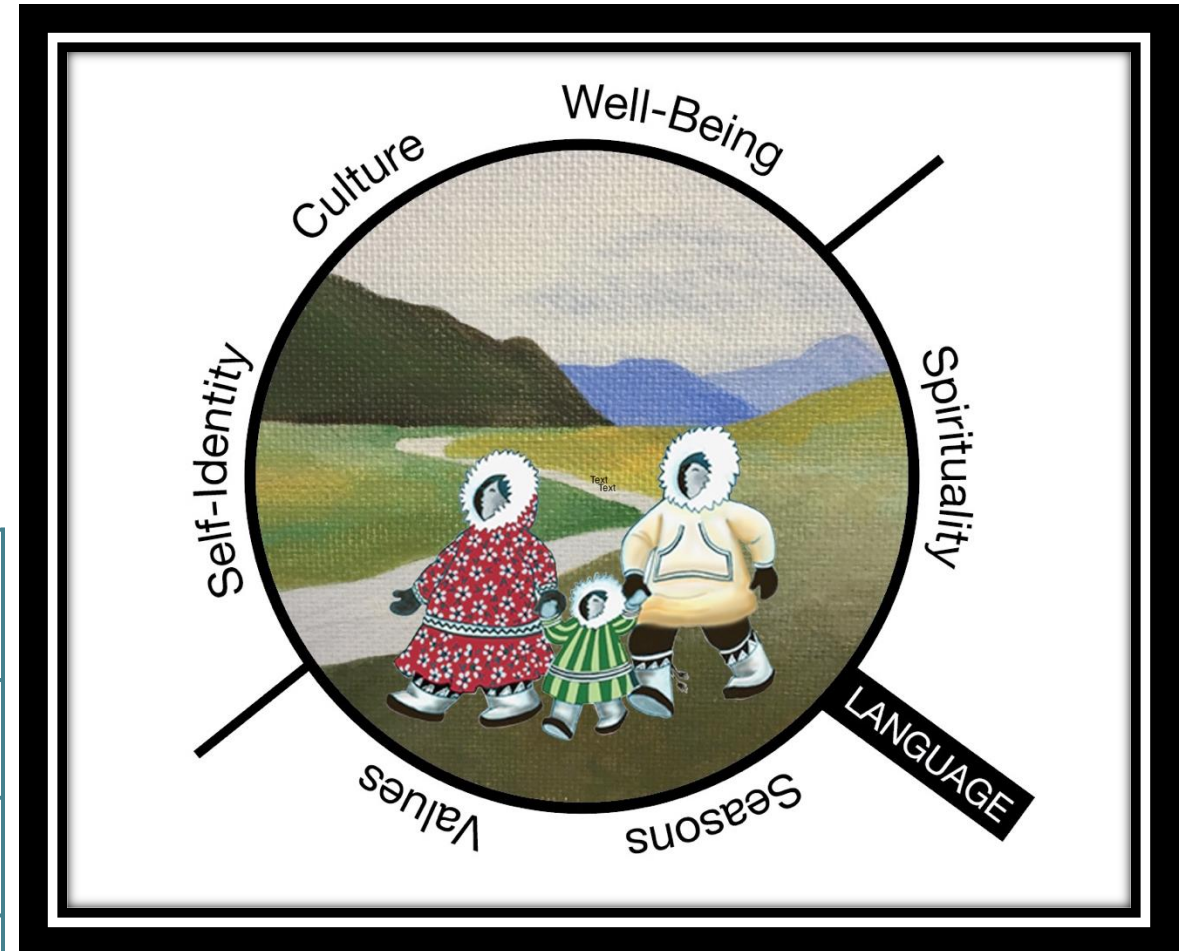
# Incorporating Local Cultural Traditions

## Traditional Seasons

- Auraq: Summer June/July/August
- Ukiaksraaq: Early Fall August/September
- Ukiaksraaq: Fall October/November
- Ukiuq: Winter December/January/February
- Upingaksraaq: Early Spring March/April
- Upingaksraaq: Spring April/May/June

## Iñupiat Iḷitqusiat

<b>Iḷisimaliḡ Iḷagiilḡmik</b> Knowledge of Family Tree	<b>Anayuqaaḡiich Savaaksraḡich</b> Family Roles	<b>Kaḡiqsimauraatiḡ Irrutchikun</b> Spirituality	<b>Quvianniutikun Tipsisaaḡiliḡ</b> Humor
<b>Piḡpaksriliḡ Iḷiḡaanik</b> Love for Children	<b>Aatchuqtuutiḡ Avatmun</b> Sharing	<b>Kamaksriliḡ Utuḡqanaanik</b> Respect for Elders	<b>Kamaksriliḡ Nutim Iḷiḡtanik</b> Respect for Nature
<b>Savaḡatigiḡyujḡ</b> Cooperation	<b>Savvaqtuḡiḡ</b> Hard Work	<b>Kamakkutiḡiḡ</b> Respect for Others	<b>Atchiksuaḡiḡ</b> Humility
<b>Iḷisimaliḡ Uḡapiatiḡmik</b> Knowledge of Language	<b>Iḡuuniaḡatiunik Ikayuutiḡiḡ</b> Responsibility to Tribe	<b>Paaḡsaaḡatautiḡiḡ</b> Avoid Conflict	<b>Kiḡuniḡmi Suraḡatlasiniḡiḡ</b> Domestic Skills
		<b>Anḡunialḡuḡiḡ</b> Hunter Success	



Northwest Arctic Borough School District  
**Cultural Values Drum**

Language is the anchor point for all the other values.



DEPT. OF EDUCATION AND  
EARLY DEVELOPMENT



# SCIENCE STANDARDS FOR ALASKA

- Science and technology have been essential to the people for Alaska in its past, its present, and will be increasingly important in the future.
- Providing a firm foundation in science education for all students in Alaska is a bright opportunity and essential challenge.
- The State's science standards provide the foundation for defining what students should know and be able to do in terms of scientific knowledge and skills

# Why Physical Earth Science

- In the initial vision discussions, it was mentioned that most of our cultural programs are in elementary and middle school.
- By the time students are in high school, they do not see relevance in what they are learning.
- In other words
  - How will they ever use it?
  - How does it apply to their life, etc?
- Science is the perfect course to infuse cultural and place-based knowledge.
- Emphasizing that people have been using science skills in the Northwest Arctic long before it was called science.

# Naming the Course

## Physical Earth Science

- The official name of the course on transcripts and with DEED.
- Students need this course to satisfy Alaska Performance Scholarship requirements.
- Students who transfer between Anchorage/Fairbanks and NWABSD schools will receive credit toward graduation. Most school districts require a physical science course to graduate.

## Nuna Iḷisimman

- Our local name for the course
- The Iñupiaq words mean to study or learn about the Earth.
- Agreed on by the Language Committee, the Iñupiaq teachers, and administration.

# Writing Approach

- The course is Physical Earth Science.
- The lessons are written from an Earth Science perspective.
- Appropriate physical science content is immersed into the lesson.
- This is a change from how this course is traditionally taught.
  - Physical and Earth Science are usually taught as separate parts.
  - This course integrates them together.
- Because this is a change in tradition, we will have to carefully train our teachers to understand we are still meeting standards with this new approach.

# Initial Project Development

- Research Indigenous ways of learning.
- Research to see if complete cultural and place-based science curriculums have been developed any where else.
- Review resources available from the school district.
  - Videos
  - Photos
  - Educational curriculum that can be incorporated
- Begin developing a scope and sequence that aligns with seasons.
- Set the course up so that teachers new to the region have the cultural information imbedded in the course.



# Development Guide

## ASK YOURSELF

- What do I want the learners to know or be able to do at the end of the unit, day, lesson, week, or lab? (Objective)
- How will they show me they are progressing or have mastered the knowledge or skill? (Assessment)
- How can I assist them in getting there? (Materials and Activities)
- Ask how I can use these to better student understanding:

**ENGAGE      EXPLORE      EXPLAIN      EXTEND      EVALUATE**

## Learning Objectives:

- Develop learning objectives for each lesson.

## Course content

- The Earth Science focus, with a connection to Physical Science, was effectively integrated into the lesson.
- How does this relate to our region or community?
- Tie all lessons into our region and Alaska as much as possible.
- Create a reference section; avoid plagiarism. Give credit where credit is due.
- Give credit for images – free images are best.

**Culture and relevance** to our region and Alaska are the key parts of this course.

- What discussions could students have with local knowledge bearers?
- Always tie the lesson back to local, regional, or state knowledge.

**Key Terms:** Identify key terms for units/lessons.

- Identify English key terms.
- Identify Iñupiaq key terms.
- Each lesson must include Iñupiaq words.
- Share the words with Iñupiaq speakers to be sure the correct word is used as it relates to science.

**Dictionary:** Add these words and their definition to a dictionary.

**Assessments:** Develop and embed different types of assessments into lessons.

- Formative examples:
  - Classwork/homework assignments, quick writing, In-class discussions
- Summative examples:
  - Tests, Projects, Essays / Reports

**Activities/Labs:** Develop labs and activities for the unit.

- Cultural Connection/activity
- Identify the Iñupiaq Season and develop activities related to the season whenever possible.
- Teacher guide / Student guide
- Identify safety reviews for labs and activities.
- Identify materials needed for labs and activities

## Standards

- Identify standards for each unit
  - Alaska Science Standards
  - Iñupiat Ijlitqusi

**Multimedia** Link examples:

- Video interviews with community members.
- Other relevant videos.
- Embed the video link in Canvas Studio and add a quiz to the video.

## Thinking Skills

- Develop higher-order thinking skills through the lessons and activities.
- See examples from Bloom's taxonomy in teacher resources.

## Maps:

- USGS / Need a contour map for each village
- Print and laminate copies for each site

## Forms:

- Safety
- Visitor
- Lesson Plan

## Teacher Resources

- Make pages
    - Graphic Organizers
    - Whole Class Choral Reading
    - Academic Conversation Starters
    - Academic sentence frames
    - Using Kinesthetic Activities for Classroom Instruction
    - Building Background Knowledge
    - Activating Prior Knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content.
- <https://esolonline.tki.org.nz/ESOL-Online/Planning-for-my-students-needs/Resources-for-planning/ESOL-teaching-strategies/Thinking-and-metacognition/Activating-prior-knowledge>

## Photo credits:

- Get photo releases

# Why do we need a Scope and Sequence?

The terms *scope* and *sequence* describe what you teach and when you teach it.

When educators follow a solid scope and sequence, no assumptions are made about what students do or do not know, or what they can or cannot learn.

Instead, all students are taught according to a clear and intentional plan in which skills are taught systematically and cumulatively.

# Developing a Scope and Sequence

## **Cultural Research**

- Review Alaska Cultural Standards for Educators and Students.
- Research regional cultural expectations.
- Develop an understanding of what it means to infuse place and culture into a curriculum.

## **Academic Research**

- Research current materials and curriculum.
- Review state science standards in both Physical and Earth Science.
- Understand what is expected for middle school students and then build a curriculum that builds on that prior knowledge.
- How can we rearrange a traditional curriculum scope and sequence into one that fits our cultural calendar as well?

# Scope and Sequence

Iñupiaq Season	Auraaq: Summer July/August		Ukiaksraaq: Early Fall August / September					Ukiaskraaq: Fall October	
Week	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
Unit #	Unit 1		Unit 2		Unit 3			Unit 4	
Unit and Topics	<b>Introduction to Physical Earth Science</b> Scientific Processes, Indigenous Science Knowledge, Measuring and Organizing Scientific Data		<b>Describing our Earth</b> The Spheres of our Earth, The Physical and Chemical Properties of the Earth's Spheres, Ecosystems		<b>Earth Systems of Matter</b> Matter, Atoms, Elements and the Periodic Table, Compounds, Molecules, Solutions, Acids and Bases, Elements of our region			<b>Surface Processes: Water</b> Water Cycle, Atmosphere	<b>Science Skills Review</b>
Unit Learning Objectives	<ul style="list-style-type: none"> <li>Describe how Indigenous Science Knowledge and Western Science are compatible in their study of the world.</li> <li>Examine how our community approaches the study of the world.</li> <li>Determine how scientists take measurements and record data</li> <li>Students will explore the relationship between mass, volume, and density.</li> <li>Students will demonstrate practical skills in measuring mass, volume, and density.</li> </ul>		<ul style="list-style-type: none"> <li>Describe what an Earth system is.</li> <li>Describe the properties and features of the Earth's four main spheres.</li> <li>Describe the shape of the Earth and the forces that shape it.</li> <li>Describe how maps and models help communicate information about the Earth and its systems.</li> <li>Describe spheres and systems where we live.</li> </ul>		<ul style="list-style-type: none"> <li>Distinguish the different properties of matter and how matter is classified.</li> <li>Explain the fundamentals of atomic theory.</li> <li>Describe the features and organization of the periodic table of elements.</li> <li>Identify common elements in our natural surroundings</li> <li>Describe how compounds and molecules are held together.</li> <li>Distinguish between mixtures, solvents, &amp; solutes.</li> <li>Describe the properties of acids and bases.</li> </ul>			<ul style="list-style-type: none"> <li>Describe the distribution of Earth's water resources.</li> <li>Describe the movement of water.</li> <li>Identify the layers and different features of the atmosphere.</li> <li>Describe what happens during a change of state.</li> </ul>	<b>End of Term Wrap-Up and Science Skills Review</b>
Cultural Connections	<ul style="list-style-type: none"> <li>Elder discussions:               <ul style="list-style-type: none"> <li>How traditional knowledge and science helped them survive.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Elder discussions:               <ul style="list-style-type: none"> <li>Ways we describe the Earth.</li> <li>Ways we were able to navigate.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Elder Discussion: TBD</li> </ul>			<ul style="list-style-type: none"> <li>Elder Discussion: TBD</li> </ul>	
Physical & Earth Science Connections	<ul style="list-style-type: none"> <li>Intro. To Science</li> <li>What is Scientific Inquiry?</li> <li>Motion</li> <li>Forces</li> <li>View of the Earth</li> </ul>		<ul style="list-style-type: none"> <li>Motion</li> <li>Forces</li> <li>Spheres of the Earth</li> <li>Shape of the Earth</li> <li>Mapping and Models of the Earth</li> </ul>		<ul style="list-style-type: none"> <li>What is Matter</li> <li>States of Matter</li> <li>Atoms</li> <li>The Periodic Table</li> <li>Investigating Matter</li> </ul>			<ul style="list-style-type: none"> <li>The Structure of Matter</li> <li>Physical and Chemical Properties of Matter</li> <li>The Earth's Atmosphere</li> </ul>	

Iñupiaq Season	Ukiaskraq: Fall October/November						Ukiq: Winter November/December			
Week	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	
Unit #		Unit 5		Unit 6		Unit 7				
Unit and Topics	Surface Processes: Water Water Cycle, Atmosphere	Earth's Oceans The Ocean Floor, Ocean Dynamics Ocean Water, Ocean Life, Regional Ocean Conditions		Weather and Climate Weather, Air Pressure, Meteorology, Climate		Earth's Landscapes and Movement Weathering, Erosion, and Deposition, Glaciation and How Glaciers Work, Local Geological Features Plate Tectonics & Boundaries, Earthquakes, Volcanoes			Science Skills Review	
Unit Learning Objectives		<ul style="list-style-type: none"><li>Describe the ocean floor.</li><li>Identify the sources of salt in our ocean</li><li>Describe factors that affect the density of ocean water.</li><li>Describe how ocean currents develop and how they affect climate.</li><li>Identify local ocean conditions.</li></ul>		<ul style="list-style-type: none"><li>Explain the difference between weather and climate.</li><li>Describe and use gas laws and their impact on weather.</li><li>Explain the influence of air masses on our weather patterns.</li><li>Explain what causes the seasons.</li><li>Describe how our region's climate and seasons differ from other parts of our planet.</li></ul>		<ul style="list-style-type: none"><li>Describe how physical weathering affects rocks.</li><li>Explain the process of erosion.</li><li>Recognize the geological impact of glaciation.</li><li>Describe the formation of geological features in our environment.</li><li>Identify geological features in our local environment.</li></ul>			<ul style="list-style-type: none"><li>Describe how the Earth's interior is structured.</li><li>Objectives are continued in Week 19</li></ul>	End of Term Wrap-Up and Science Skills Review
Cultural Connections		<ul style="list-style-type: none"><li>Elder Discussion:</li><li>How did you know it would be safe to travel on the ocean</li></ul>		<ul style="list-style-type: none"><li>?</li><li>Elder Discussion:</li><li>How have you seen climate change? What impact is it having?</li></ul>		<ul style="list-style-type: none"><li>Elder Discussion:</li><li>When you see cut banks and tundra slumps, how does that impact your subsistence activities?</li></ul>			<ul style="list-style-type: none"><li>Elder Discussion: TBD</li></ul>	
Physical & Earth Science Connections	The Water Cycle Atmospheric Water Running Water Ground Water	The Ocean Floor Ocean Floor Features Seafloor Sediments Resources From the Seafloor The Composition of Seawater		The Atmosphere Heat and Temperature Heating the Atmosphere		Sculpting the Earth's Surface Weathering and Erosion Glaciers Deserts Landscapes Shaped by Wind and Water			Earth's Interior & Plate Tectonics Earthquakes & Volcanoes	

Iñupiaq Season	Ukiq: Winter January/February							Upingaksraaq: Early Spring March		
Week	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	
Unit #	Unit 7	Unit 8		Unit 9		Unit 10				
Unit and Topics	Earth's Landscapes and Movement Continued....	Rocks and Minerals Rocks, Minerals, the Rock Cycle, Classes of Rocks, Minerals of our Region		Our Solar System and the Universe Solar System Formation, the Sun & Stars, Deep Space, Formation of the Universe, Our Regional View of the Stars		Earth Systems of Energy Waves, Sound and Light, Electricity and Magnetism, Aurora Borealis Laws of Thermodynamics Energy Transfer and Temperature			Science Skills Review	
Unit Learning Objectives	<ul style="list-style-type: none"><li>Identify Earth's geological features near plate boundaries.</li><li>Describe the causes of earthquakes and volcanic eruptions</li></ul>	<ul style="list-style-type: none"><li>Describe the materials that form and make up rocks.</li><li>Distinguish the different classifications of rocks.</li><li>Identify the minerals found in our region.</li><li>Elder Discussion: TBD</li></ul>		<ul style="list-style-type: none"><li>Explain where we are in the universe and what its shape and size are in comparison.</li><li>Recognize the objects that make up the solar system.</li><li>Describe the latest theories on the universe's size, shape, and formation.</li><li>Describe how astronomers find planets and know the differences between the different types.</li><li>Explain how we identify what a star is made of.</li></ul>		<ul style="list-style-type: none"><li>Describe the characteristics of waves, how they are generated, and the different types of waves.</li><li>Determine how sound is generated,</li><li>Describe the electromagnetic spectrum and the visible light spectrum.</li><li>Distinguish between electrical charges, currents, and circuits.</li><li>Describe how the Aurora Borealis is created and why we can view it.</li><li>Explain how energy from space impacts energy on Earth.</li><li>Explain how Kepler's Law, Newton's Law, and the Law of Gravity impact Earth.</li></ul>			<ul style="list-style-type: none"><li>Determine how temperature and energy are related to each other.</li><li>Describe methods of energy transfer..</li><li>Identify the Thermodynamic Laws.</li></ul>	End of Term Wrap-Up and Science Skills Review
Cultural Connections				<ul style="list-style-type: none"><li>Elder Discussion:<ul style="list-style-type: none"><li>Identify our region's perspective of the stars.</li></ul></li></ul>		<ul style="list-style-type: none"><li>Elder Discussion: Tell us stories you heard about the Northern Lights.</li></ul>			<ul style="list-style-type: none"><li>Elder Discussion: TBD</li></ul>	
Physical & Earth Science Connections	Forces that shape the Earth	Rocks and Minerals Minerals and Matter The Rock Cycle Types of Rocks		Origin of Astronomy Early Astronomy and the works of Copernicus, Kepler, Galileo, and Newton Movement of the Earth The Earth, Moon, and Sun Inner and Outer Planets Properties of Stars The Universe		Waves / Sound and light / Electricity / Magnetism			Work and Energy Heat and Temp.	Sound and Light



Iñupiaq Season	Upingaksraaq: Early Spring March/April					Upingaksraaq: Spring April/May/June			
Week	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35	Week 36
Unit #	Unit 10	Unit 11			Unit 12			Unit 13	
Units and Topics	Earth Systems of Energy Continued	Earth's Resources Ecosystems, Natural Resources, Fossil Fuels, Renewable/Non-Renewable Resources, Regional Sources of Energy, Alaska and NW Arctic Resources			Humans and Their Impact Carbon Cycle, Anthropogenic Impact, Greenhouse Effect, Pollution, Alaska / NW Arctic Environmental Issues, and the Human Impact on Alaska's Natural Resources			Earth's History and Age Geologic Time/History, Fossils	End of Year Wrap-Up
Unit Learning Objectives	<ul style="list-style-type: none"> <li>Continued....</li> <li>Describe methods of energy transfer..</li> <li>Identify the Thermodynamic Laws.</li> </ul>	<ul style="list-style-type: none"> <li>Describe what makes up an ecosystem and how it maintains stability.</li> <li>Identify our Earth's natural resources.</li> <li>Describe what fossil fuels are and identify the types of fossil fuels.</li> <li>Distinguish the differences between renewable and nonrenewable resources.</li> <li>Identify examples of renewable energy sources in our region.</li> <li>Identify job opportunities in the energy sector in our region and state.</li> </ul>			<ul style="list-style-type: none"> <li>Describe the carbon cycle and how human activity has impacted the cycle.</li> <li>Explain what anthropogenic impact means and what its effect is on our planet.</li> <li>Describe the Greenhouse Effect and how human activity has impacted the process.</li> <li>Identify the various forms of pollution and methods of mitigation.</li> <li>Describe how human activity has impacted Alaska's environment.</li> </ul>			<ul style="list-style-type: none"> <li>Explain, analyze, and interpret geologic time scales and the difference between geologic and human time scales.</li> <li>Discuss how life has evolved and changed along the geologic timeline.</li> <li>What can fossils tell us about Earth's history?</li> </ul>	End of Term Wrap-Up and Science Skills Review
Cultural Connections		<ul style="list-style-type: none"> <li><b>Elder Discussion:</b> Do you think mining in our region impacts the subsistence lifestyle?</li> </ul>			<ul style="list-style-type: none"> <li><b>Elder Discussion:</b> Identify negative/positive benefits our communities have received from human activities.</li> </ul>			<ul style="list-style-type: none"> <li><b>Elder Discussion:</b> Tell us about historical artifacts in our region.</li> </ul>	
Physical & Earth Science Connections	Heat and Temperature	Using Natural Resources Conservation of Energy Energy and Mineral Resources Alternative Energy Water, Air, and Land Resources			Petroleum and Gas Formation Types of Energy Resources Energy Conversion What is an Ecosystem The Carbon Cycle Energy and Resources Alternative Energy Sources Water, Air, and Land Resources Protecting Our Resources			Radioactive Dating Geologic Time Earth's Eras	

# CANVAS

- The CANVAS course is arranged by modules.
- Teachers have access to all modules.
- Students have access only to published items.
- This allows for teacher resources to not be available to students.

## Teacher View

▸ Educator Resources	⊘ ▾ + ⋮
▸ Student Resources	✓ ▾ + ⋮
▸ READ and LEARN: the reading for each unit. May be used as the presentation by the teacher.	✓ ▾ + ⋮
▸ Unit 1 Introduction to Physical Earth Science: Scientific Processes, Indigenous Science Knowledge, Measuring and Organizing Scientific Data	✓ ▾ + ⋮
▸ Unit 2: Describing Our Earth:	✓ ▾ + ⋮
▸ Unit 3: Earth's Systems of Matter and Energy	✓ ▾ + ⋮
▸ Unit 4 Water and the Atmosphere	✓ ▾ + ⋮
▾ Unit 5: Weather and Climate	⊘ ▾ + ⋮


# Student View


The student view has a the same layout, but it only shows items that are published for them to complete.

- Home
- Modules
- Grades
- Lucid (Whiteboard)
- Credentials


▼ Student Resources


How to navigate this course.

 How to find lessons in this course.


 What is Read and Learn?

How To Use Canvas

 How to: Use a Module


 How to submit a text entry


1 pts

 How to upload an assignment

1 pts


Dictionary/Glossary: this will update as new words are added


 Iñupiaq/English Science Dictionary.pdf

 Physical Earth Science Glossary.pdf


▼ Unit 1 Introduction to Physical Earth Science: Scientific Processes, Indigenous Science Knowledge, Measuring and Organizing Scientific Data


How to navigate this course.

 How to find lessons in this course.

 What is Read and Learn?

Unit 1 Lesson 1 WHY STUDY PHYSICAL EARTH SCIENCE? Learning Objectives: 1. Define Physical Earth Science. 2. Describe how using traditional Iñupiaq knowledge will contribute to a better understanding of Physical Earth Science

 Unit 1 Lesson 1 Read & Learn

 1.1 Aakalukput aimmaviṇani pt1

Aug 28, 2024 10 pts

# Educator Resources

## ▼ Educator Resources

⋮  Educator Resources Homepage

⋮  2024.8.27 Lesson Plan Template and Sample.doc

⋮  Unit Preperation Checklist.pdf

⋮  Building Background Knowledge.pdf

⋮  Academic Sentence Frames & Starters.pdf

⋮  Cultural Standards for Educators

⋮  Sample Questions for interviewing Elders and community members

⋮  Science Standards for Alaska: High School Physical Science.pdf

⋮  Science Standards for Alaska: High School Earth and Space.pdf

⋮  Special Education Modifications.pdf

⋮  Vocabulary Activities Guide.pdf

# Unit Modules

- Contain 5-10 lessons
- Have a Knowledge Bearer Discussion in the first or second lesson.
- Are divided into lessons made of:
  - Lesson Objectives
  - Read and Learn
  - Assignments
  - Activities
  - Quizzes

Unit 1 Lesson 5 SCIENTIFIC PROBLEM SOLVING Learning Objectives: 1.Describe why observation and inferring skills are important science skills. 2. Explain how a hypothesis guides the scientific process. 3. What are variables? 4. What is data			✓
Unit 1 Lesson 5 Read & Learn			✓
1.5 Look at those tracks!	0 pts		✓
1.5 MythBusters Variables	0 pts		✓
1.5 Identify Variables	0 pts		✓
1.5 Qualitative / Quantitative	0 pts		✓
Unit 1 Lesson 6 SCIENTIFIC METHOD REVIEW Learning Objectives: 1.Elaborate on the steps of the scientific method. 2.Describe the difference between Facts, Scientific Theories, and Scientific Laws. 3. Explain how a hypothesis guides the scientific process. 4. What are variables? 5. What is data?			✓
Unit 1 Lesson 6 Read & Learn			✓
1.6 Walking in Rain Readings	0 pts		✓
1.6 Variable Review	0 pts		✓
Unit 1 Lesson 7 SCIENCE AND MEASUREMENTS Learning Objectives: 1. Analyze two articles demonstrating the scientific method. 2.Explain why mathematics and measurements are important in data collection during a scientific investigation. 3. Distinguish the different units of measurement and calculate conversions between the units. 4.Demonstrate methods of measuring and converting units of length.			✓
Unit 1 Lesson 7 Read & Learn			✓
1.7 Read: The Case of BeriBeri	0 pts		✓
1.7 Answer Key: The Strange Case of Beriberi			⊘
1.7 Read: Penicillin Discovery	0 pts		✓
1.7 Measuring Length Lab	Oct 31, 2024   29 pts		✓

# Lessons Include:

- Vocabulary in Inupiaq and English
- Objectives
- Knowledge Bearer Discussion
- Science Content
- Examples that tie the lesson back to the region or state.
- Assignments
- Videos
- Activities

Unit 1 Lesson 8 METRIC CONVERSIONS Learning Objectives: 1.Explain the use of derived units in science research. 2.Demonstrate methods of measuring and converting units of volume, mass, temperature, density, and area.



 Unit 1 Lesson 8 Read & Learn



 1.8 Lab: Measuring A/T/V/M/D  
0 pts



Unit 1 Lesson 9 PRACTICING SCIENCE SKILLS Learning Objectives: 1.Students will review metric conversions. 2.Students will perform quantitative and qualitative observations. 3.Students will practice metric measurement skills. 4.Students will practice graphing skills using this data.



 Unit 1 Lesson 9 Read & Learn



 1.9 Skills Rvw Measure Matter  
0 pts



 1.9 Metric Scavenger Hunt  
0 pts



 1.9 Trees Outdoor Activity  
0 pts



Unit 1 Lesson 10 PRECISION IN SCIENCE Learning Objectives: 1.Define accuracy and precision, and differentiate between the two terms. a.Apply the concepts of accuracy and precision to a given situation 2.Tell why significant figures are important for accuracy and precision. 3.What is Scientific Notation and how is it used? a.Determine how scientists handle very large and very small numbers.



 Unit 1 Lesson 10 Read & Learn



 1.10 Read NASA Mars Orbiter  
0 pts



 1.10 Real Accuracy/Precision  
0 pts



 1.10 Write Significant Figures  
0 pts



 1.10 Practice Sci. Notation  
0 pts



 1.10 Quiz Identify SI Units  
0 pts





# Read and Learn

- What is it?
  - This is the content that we are teaching our students.
  - It is set up in a textbook format so that students may follow the sequence easily.
  - The font is a larger font making it easier for students to read.
- How is it used?
  - Teachers may put this onto their smart board and use it like a PowerPoint.
    - Teaching the content of the lesson.
  - Assignments and activities are embedded in the lesson as it is taught rather than waiting until the end of the reading. This allows students to see where it fits in with the content being taught.
  - The lessons are intended to be taught by the teacher with discussions as they go along.

## Unit 6: The Earth's Oceans

### Unit 6 - Lesson 1

### Unit 6 Lesson 1: Why Study the Ocean?

As we study the Earth's systems, it will be impossible to understand the interactions of these systems without understanding the oceans. Earth's systems are interconnected and interact through matter and energy. In the previous unit, we studied how the Earth's atmosphere and ocean interact through the water cycle and its processes. These large bodies of water regulate weather and climate, provide oxygen, and help feed much of our population. Because of their impact on all aspects of life on Earth, it is essential to develop a better understanding of the Earth's Oceans.

The Iñupiaq word **Tagluq** means 1) Salt and 2) Ocean. This is the perfect word to describe the salty waters of the ocean.



#### Learning Objectives

1. Describe why the study of the ocean is important to life on our planet.
2. Identify the main features of the Earth's five oceans.
3. Describe methods of mapping the ocean floor.

#### Vocabulary

- Bathymetry
- Fathom
- Microwave
- Oceanography
- Phytoplankton
- Ring of Fire
- SONAR
- Tagluq
- Topography
- World Ocean

### 6.1 ASSIGNMENT: Knowledge Bearer Discussion - Oceans

Students: take notes and enter into Canvas 5 things you learned today.

#### Teachers' Notes:

- Invite a local knowledge bearer to discuss the ocean's impact on them and the community. If you are not near the ocean, discuss the river and how the ocean impacts it.
- Use some of the following sample questions to help guide your discussion. Give them to your guests in advance so they have time to think about answers and other items they can share with your students.

- ❖ What specific ocean activities were most important to your family? (e.g., fishing, swimming, boating, exploring, etc.)
- ❖ What are some of the most vivid childhood memories or stories about the ocean?
- ❖ Did the ocean significantly influence your family's traditions or celebrations?
- ❖ How did the ocean influence your family's lifestyle or way of life? (e.g., diet, work, recreation)
- ❖ What lessons or insights will you pass on about the ocean to your children or future generations?
- ❖ How do you see the ocean impacted by climate change or other environmental concerns?
- ❖ If you could share one piece of advice about the ocean with others, what would it be?

## Unit 6: The Earth's Oceans

### Unit 6 - Lesson 1

The atmosphere, which controls the weather and climate, is intimately connected to the oceans. The ocean is the primary driver of weather and climate and can give clues to global phenomena such as El Niño. Most of the rain that falls on land comes from the tropical ocean.

**Phytoplankton** are microscopic plant-like organisms that live in oceans, lakes, and rivers. There are a billion billion billion phytoplankton in the world's oceans—more than there are stars in the sky.

Phytoplankton are hugely diverse, with likely 100 thousand different species. They produce almost half the oxygen you inhale and play a vital role in the carbon cycle.

The oceans are also responsible for absorbing 50% of the carbon dioxide humans have released into the atmosphere by burning fossil fuels for energy. (1)

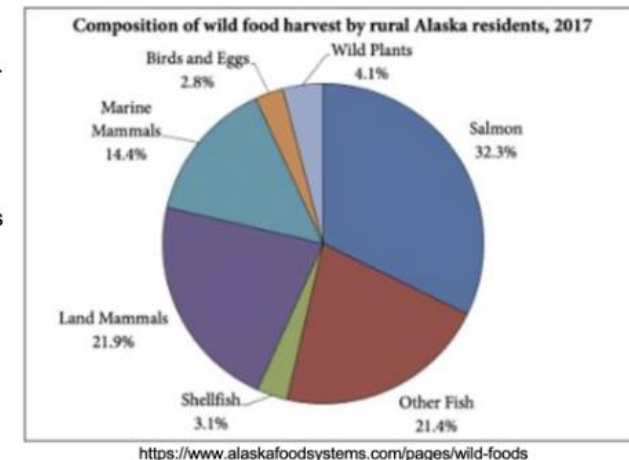
This photo shows Alaska and the Bering Sea on April 25, 1998. Bright aqua and green colors paint the ocean off the coast of Alaska and out into the Bering Sea, indicating a bloom of phytoplankton (algae). Further away from the bloom, the color of the ocean water is a deep sapphire color. The bright aquamarine color is caused by the vast numbers of coccolithophores, a type of phytoplankton that removes carbon from the water. (2)



**Figure 3:** Phytoplankton blooms in the Bering Sea, April, 1998.

The ocean is a source of food for people around the world. In Alaska, the primary source of local food is harvesting wild foods. Subsistence harvests of wild foods contribute to food security, culture, and economic stability among the various user groups. Alaska's rural residents each harvest an average of 295 pounds of wild foods yearly, with wild foods from the ocean contributing over 70%. (3)

In Alaska, the ocean both provides and threatens, making it essential to understand its formation, location, features, motions, shorelines, biomes, and human impacts.



**Figure 4:** Alaska wild food harvest statistics. Notice how much food comes from a water source.



## Unit 6: The Earth's Oceans

### Unit 6 - Lesson 1

#### 4.1 Activity: ELBOW TALK

With your elbow partner, discuss five things that directly impact you, your family, or your community from our ocean.

Be prepared to share with the class.

\*\*\*\*\*



<https://openclipart.org/image/800px/227549>

## Unit 6: The Earth's Oceans

### Unit 6 - Lesson 1

This particular study, cited by the WWF, was led by Iñupiaq hunters from the Native Village of Kotzebue along with scientists at the University of Alaska Fairbanks. It found that over the past 17 years, the hunting season for bearded seals, shrank by one day each year. Bobby Schaeffer is one of the local elders who co-authored the study. To read this article in full, go to:



Bobby Schaeffer  
<https://www.arcticwwf.org/the-circle/stories/retreating-sea-ice-threatens-indigenous-way-of-life/>

<https://www.arcticwwf.org/the-circle/stories/retreating-sea-ice-threatens-indigenous-way-of-life/>

The Iñupiaq word **UGRUK** means  
**Bearded Seal.**

The Bering and Chukchi Seas, known for their large populations of whales and other marine life, are thought to be particularly sensitive to global climate change because these seas are places where steep temperature, salinity, and nutrient gradients in the ocean meet equally steep temperature gradients in the atmosphere. This directly impacts the economy in Alaska because the Bering Sea is home to some of the world's most productive fisheries. Just watch the TV series *Deadliest Catch*.

#### Assignment 4.1.9: Video Sea-Ice Breaker

Let's watch a timelapse video of the U.S. Coast Guard Cutter *Healy* breaking through the ice floe in the Arctic.



This video was shot during the [The Hidden Ocean 2016: Chukchi Borderlands](https://www.noaa.gov/expeditions/the-hidden-ocean-2016-chukchi-borderlands) expedition.

The video is posted in CANVAS and is 1 minute 32 seconds.



<https://www.noaa.gov/expeditions/the-hidden-ocean-2016-chukchi-borderlands>

# Teacher Training

- Vision and goals in teaching a course like this.
- Indigenous knowledge and ways of learning.
- Materials and lesson planning.
- How to teach this course.
- How to use the CANVAS course.
- Wednesday Wonders
- Working with your local bilingual teacher.
- Knowledge bearers in the classroom.
- ETC....

# Lesson planning makes better teachers.



Northwest Arctic Borough School District WEEKLY LESSON PLANS

TEACHER NAME: **SAMPLE LESSON PLAN**

Course Name: Nuna Ilisimman		WEEK OF: August 20-22, 2024		Period: 1 and 3	
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
AK State Standard(s) met this week:					
• AK Cultural Standards for Curriculum: A1, B1, C1, C3, C7 • AK State Standards: HS-ETS1-1 Analyze complex problems			• Iñupiat Ilitqusiat: Iñuuniaqatiunik Ikayutitliq - Responsibility to Tribe, Ilisimatliq Ilagiiḡmik - Knowledge of Family Tree, Savaqatigiitujliq – Cooperation, Kamakkutitliq - Respect for Others		
Learning Objectives: "I Can"					
	•Define Physical Earth Science •Describe how using traditional Iñupiaq knowledge will contribute to a better understanding of Physical Earth Science. •I can state the procedures my teacher has in place to begin class each day.	•I can introduce myself using traditional Inupiaq methods. •Demonstrate language and cultural skills using Iñupiaq introductions. •Define Earth Science. •Define Physical Science.	•Explain how curiosity about the world around us impacts and guides scientific inquiry. •Describe some of the different ways people seek knowledge and make sense of the world around us.	•Demonstrate cultural skills by sharing survival skills learned from elders. •Tell why we study lab safety. •Explain why we study lab safety symbols.	
Instructional Strategies & Student Activities: list in order what you will be doing in class with your students.					
Clarification: What can we expect to see happening in your classroom? Are you transitioning to multiple activities during class?					
Read and Learn Lesson Number					
	1.1 Discuss: •Welcome and Introduction •What this class is and how it is different from others. •What is traditional knowledge and how will it be used in our class. (language, seasons, values, etc.) Watch Video: •Discuss, and answer questions about language and the video. Discuss: •What is the Iñupiat Ilitqusiat? •Discuss, Knowledge of Family and why it is important to know this information, tie back to Iñupiat Ilitqusiat. Discuss: •Classroom Procedures/Champs	1.1, 1.2 Discuss: •Welcome and Review what we discussed yesterday. •Ask if they have thought about what traditional knowledge is. Finish any part of the lesson that was not covered yesterday. Discuss: •How elders passed down information and this is key to surviving winters here. •Since this is day two, assign the elder discussion as a homework assignment. This information will be shared in 2 days. Discuss: •Introductions and why we will use them. Activity: Share your Knowledge of Family •Practice Traditional Introductions Discuss: Earth and Physical Science, Studying Earth's Processes and Spheres	1.2 Discuss: •Welcome and Review what we discussed yesterday. Practice: •Traditional Introductions Finish any part of the lesson that was not covered yesterday. Discuss: •How curiosity impacts and guides Science inquiry. •Describe different ways people seek knowledge. •What is Indigenous Knowledge? •How did Iñupiaq use their knowledge to investigate phenomena. Watch Video: •How an Igloo Keeps You Warm Discuss: •How has Iñupiaq knowledge assisted with scientific studies. Read & write about: •Sharing Traditional Knowledge and Whale Science.	1.2, 1.3 Discuss: •Welcome and Review what we discussed yesterday. Finish any part of the lesson that was not covered yesterday. In-Class Activity: •Sharing traditional survival Information. •With your elbow partner, share this information. Discuss: •Begin discussing why we study lab safety. Watch Video: •Safety Video: Lab Rules Discuss: •Safety Rules •Go over each rule and discuss what it means. •Show the location of safety equipment in the classroom.	
Assignments / Classwork / Homework. If you assign work for a grade, promptly grade it. This gives value to the assignment.					
	•Aakalukput aimmaviniṅ video pt 1 •Aakalukput aimmaviniṅ video pt 2 •Knowledge of Family Tree take home worksheet.	•Elder discussion homework assignment / enter answer into Canvas. •Traditional Introductions worksheet. •Spheres of the Earth	•Video & Quiz: How an Igloo Keeps You Warm •Reading: Sharing Traditional Knowledge and Whale Science.	•Safety Video: Lab Rules	
Assessments (Daily Check-in): what will you use as an assessment for learning today? How will you know they learned it? Success Criteria?					
	Formative assessment built into video, participation in discussion.	Spheres of the Earth Canvas Entry	Exit ticket: write on a paper and hand it to me when they leave, answer this: Have you ever needed to build a snow shelter? Could you safely build one?	Sharing information with elbow partner.	
Resources/Materials used this week: what you will be using during your class. Community resource, textbook pages, internet links, etc. If you are showing a video that is not part of the district-approved curriculum, it must have prior principal approval, this includes YouTube videos. Approval forms are at the end of this document. Read and Learn in Canvas, Canvas Assignments, Community Knowledge Bearers, Science Videos embedded in the course, Iñupiaq Instructor, Internet Link					

How to write a lesson plan that shares the required information and is still meets your organizational needs as a classroom teacher.

# Wednesday Wonders

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A

# A Collaborative Time Shared by all Sites

## Wednesday Wonders

Every Wednesday, as part of Nuna Iļisimman, studying the Earth, schools will participate in a common, district-wide activity.

### Let's Talk Wednesday

- **1st Wednesday:**
  - **Knowledge Bearer Discussion**
    - Use the Questions list from Educator Resources on Canvas
    - Get all background checks completed ASAP after they accept the role
- **3rd Wednesday:**
  - **Language Skills**
    - Review words from the lessons with the Iñupiaq teachers.
    - Iñupiaq Vocabulary Kahoot
      - Multi-school competitions- Is there a site that you can meet and compete with?
      - Class Periods:
        - Noatak: 3rd & 5th (Iñupiaq Studies 4th)
        - Kiana: 5th
        - Kotzebue: 1st, 4th, & 6th
        - Shungnak: 5th Period (Iñupiaq Studies 4th)
        - Deering: 6th



### Data Share Wednesday:


- **2nd and 4th Wednesday:**
  - **Data Collection**
    - Precipitation (Average weekly)
      - Add observation notes unique to each area
    - Temperature
    - Wind speed
    - Cloud coverage
    - Humidity
    - Air quality (Particulates and smog testing kit)
  - Data can be entered into a common site so students can see what is happening around the region.
  - Past Weather Data:
    - <https://www.timeanddate.com/weather/usa/noatak/historic>
  - FAA Cameras
    - <https://weathercams.faa.gov/map/-163.99046,66.99182,-161.9525,67.76195/cameraSite/168/details/camera>



# Collaborating with Bilingual Teachers

- Teachers were asked to present cultural activities that will work in a science classroom.
- These were taken back to the office and are being put into a usable science format taking their knowledge of culture and subsistence and infusing it with science concepts.
- These will be activities that the science teacher and the bilingual teacher can do together with their students.
- We received 30 activity ideas.
- They will be divided for use between the Physical Earth Science Class and in the Biology class.

Iñupiaq Season: Ukiaksraq: Fall September		Lab / Activity: Eskimo Potato	
Guiding Information / Lesson Overview		Directions	
<p><b>Iñupiaq words:</b> Digging: Paksrak Eskimo Potato: Masu (C) or Masru (K) Mouse Cache: Nivit Digging tool called siklaq or masunniun is used to unearth the roots.</p> <p><i>Hedysarum alpinum</i> is a species of flowering plant in the legume family known by the common name alpine sweet vetch. It is called masu or masru in the Iñupiaq language. It has a circumpolar distribution, occurring throughout the northern latitudes of the Northern Hemisphere.</p> <p><b>We will be learning the time and the place to dig for this Eskimo Potato also known as Masru or Masu.</b></p> <p>This plant generally grows in the boreal and northern temperate climates. It occurs in tundra and taiga habitat types, in floodplains, grasslands, and dry forests. It is well adapted to calcareous or limey soils. It is usually not a dominant species, but it is considered dominant in several river deltas and plains in Alaska. It is a pioneer species on floodplains that have been recently scoured by water and ice. It grows with willows and birches along waterways and in forests dominated by spruces It grows on grasslands with grass species.</p> <p>Native Alaskan peoples used and still use the plant for food, particularly the fleshy roots. The roots are said to taste like young carrots. The Iñupiaq people call the plant wild potato and obtain dietary fiber from the roots. They locate stores of roots that have been cached by mice. The roots may be eaten raw or prepared in several ways, including boiling, roasting, and frying in grease. They are stored in seal oil. They are sweeter when stored in seal oil. The seeds should not be eaten raw, or in large quantity. (1)</p> <p><b>Learning Objectives:</b> After completing the lessons in this unit, students will be able to:</p> <ol style="list-style-type: none"><li>1. Know where to find the Masu/Masru.</li><li>2. Know what season to harvest these plants.</li><li>3. Understand the biomes and soil types of these plants live in.</li><li>4. Understand the nutritional value of these plants.</li></ol> <p><b>Teacher Background:</b></p> <p>Plan and do this activity with your bilingual instructor. This is an excellent activity to involve elders and community members. They can show you how to find a mouse cache, how to collect the plants, clean, and prepare the food.</p> <p><b>Materials:</b> § Shovel § Pick Axe § Gloves § Bucket or Burlap Sack § Hand Sanitizer § Photos of the plant § A real plant that has been harvested to show the students what it looks like</p> <p><b>Time Frame:</b> Part of three class periods. Day 1, introduce and discuss the plant. Day 2, harvest the plants. Day 3, prepare the plants for eating.</p> <p><b>Other words to remember:</b> Boreal, Tundra, Taiga, Floodplains, Grasslands, River Delta, Pioneer Species, Mouse Cache, etc.</p> <p><b>Academic Standards:</b> § Iñupiat Iñitqusiāt: Responsibility to Tribe, Hard Work § Alaska Cultural Standards: ○ C.1: Culturally knowledgeable students actively participate in various cultural environments. Students who meet this cultural standard can perform subsistence activities in ways that are appropriate to local cultural traditions. § Science Standards for Alaska: ○ HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p><b>Lesson Developed by:</b> Dolly Custer, Jennifer Greene, Denny Hadley <b>June 27, 2024</b></p>		<p><b>Task:</b></p> <p>Today you will learn about the Eskimo Potato, Masu/Masru. We will talk about where they live, their nutritional value, how to harvest them, and how to prepare them for eating.</p> <p><b>Directions:</b> <b>Day 1</b> § <b>Introduce and discuss the plant.</b> § <b>Where it lives.</b> § <b>Soil types found in.</b> § <b>Nutritional Values</b> § <b>Cultural connections.</b> § <b>Mice caching it.</b></p> <p><b>Day 2</b> § <b>How we will harvest the plants.</b> § <b>Demonstrate safety while harvesting.</b> § <b>How to use a shovel or pick ax</b> § <b>How to clean and carry the harvest.</b> § <b>Respecting the mice by leaving food for them.</b></p> <p><b>Day 3</b> § <b>Prepare the plants for eating.</b> § <b>Prepare for storing.</b> § <b>Safety when eating.</b></p> <p><b>Works Cited:</b></p> <ol style="list-style-type: none"><li>1. <a href="https://en.wikipedia.org/wiki/Hedysarum_alpinum">https://en.wikipedia.org/wiki/Hedysarum_alpinum</a></li><li>2. <a href="https://www.arlis.org/docs/vol1/A/29819325.pdf">https://www.arlis.org/docs/vol1/A/29819325.pdf</a></li></ol>	
			

Iñupiaq Season: Upingaksraq: Spring April/May/June		Lab / Activity: Iłhuaǵniq Smelt Fish									
Guiding Information / Lesson Overview		Directions									
<p><b>Iñupiaq words:</b> Iłhuaǵniq: Smelt Qaaq-saq: To seine</p> <p><i>Osmeridae</i> <i>Osmerus mordax dentex</i> <i>Rainbow smelt</i> <i>Hypomesus olidus</i> <i>Pond Smelt</i> <i>Mallotus villosus</i> <i>melts</i> <i>Capelin</i> (<i>Osmeridae</i>) is a species of fish in the ?????????? family. It is commonly known by the common name smelt. It is called Iłhuaǵniq in the Iñupiaq language. Smelt are found primarily?????????</p> <p><b>We will be learning the time, ways, and places to harvest Iłhuaǵniq.</b></p> <p>Part of learning how and when to harvest smelt is by observing the river. Rivers are impacted by things such as: seasons, temperature, water type, tide, rainfall. These impact the various types of fish that live and move thorough our waters. Various species has different needs.</p> <p>In this case, we are studying smelt. Smelt are important to the Iñupiaq people of the Northwest Arctic for many reasons????????????????</p> <p>Harvesting Iłhuaǵniq /Smelt is a skill that has been passed down from elders. Smelt migrate through our rivers after the ice breaks up from the freezing winter.</p> <p><b>Learning Objectives:</b> After completing the lessons in this unit, students will be able to:</p> <ol style="list-style-type: none"><li>1. Know where to find the Iłhuaǵniq</li><li>2. Know what season to harvest these fish</li><li>3. Understand the biomes and water types that these fish live in.</li><li>4. Understand the nutritional value of these fish.</li></ol> <p><b>Teacher Background:</b></p> <p>Plan and do this activity with your bilingual instructor. This is an excellent activity to involve elders and community members. They can show you how to harvest and prepare the fish.</p> <p><b>Materials:</b></p> <table><tr><td><input type="checkbox"/> Seine Net</td><td><input type="checkbox"/> Throw Net</td><td><input type="checkbox"/> Dip Net</td><td><input type="checkbox"/> Fishing Rod</td></tr><tr><td><input type="checkbox"/> Bucket</td><td><input type="checkbox"/> Hand Sanitizer</td><td><input type="checkbox"/> Photo of Iłhuaǵniq Smelt</td><td></td></tr></table> <p><b>Time Frame:</b> Part of three class periods. Day 1, Introduce and Discuss Day 2, Harvest Day 3, Preparation for storage and eating.</p> <p><b>Vocabulary:</b> Circumpolar, River Delta, etc. <b>Anadromous: which means it lives part of its life in the ocean and part of its life in fresh water.</b></p> <p><b>Academic Standards:</b> § <b>Alaska Cultural Standards:</b> ○ <b>C.1:</b> Culturally knowledgeable students actively participate in various cultural environments. Students who meet this cultural standard can perform subsistence activities in ways that are appropriate to local cultural traditions.</p>		<input type="checkbox"/> Seine Net	<input type="checkbox"/> Throw Net	<input type="checkbox"/> Dip Net	<input type="checkbox"/> Fishing Rod	<input type="checkbox"/> Bucket	<input type="checkbox"/> Hand Sanitizer	<input type="checkbox"/> Photo of Iłhuaǵniq Smelt		<p><b>Task:</b></p> <p>Today you will learn about the Iłhuaǵniq / Smelt Fish We will talk about where they live, their nutritional value, how to harvest them, and how to prepare them for eating.</p> <p><b>Directions:</b> <b>Day 1</b> § <b>Introduce and discuss Iłhuaǵniq.</b> ○ Where it lives. ○ Water type it is found in. ○ Nutritional Values ○ Cultural connections. ○ What eat Iłhuaǵniq.</p> <p><b>Day 2</b> § <b>How we will harvest the Iłhuaǵniq Smelt</b> ○ Demonstrate safety while harvesting. ○ How to use the different types of nets ○ How to clean and carry the harvest. ○ Respecting nature and where the fish live.</p> <p><b>Day 3</b> § <b>Prepare the plants for eating.</b> ○ Prepare for storing. ○ Safety when eating.</p> <p><b>Works Cited:</b></p> <ol style="list-style-type: none"><li>1. <a href="https://en.wikipedia.org/wiki/Hedysarum_alpinum">https://en.wikipedia.org/wiki/Hedysarum_alpinum</a></li></ol> <p>The American Heritage Dictionary defines smelt as "Any of various small silvery marine and freshwater.</p>	
<input type="checkbox"/> Seine Net	<input type="checkbox"/> Throw Net	<input type="checkbox"/> Dip Net	<input type="checkbox"/> Fishing Rod								
<input type="checkbox"/> Bucket	<input type="checkbox"/> Hand Sanitizer	<input type="checkbox"/> Photo of Iłhuaǵniq Smelt									
											

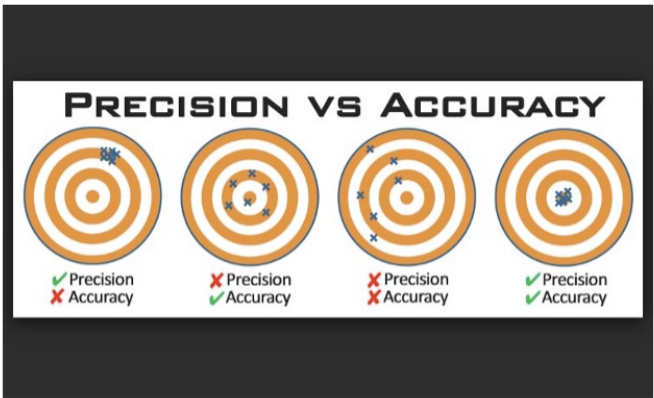
1.10 Real World Accuracy & Precision

Accuracy and Precision: Real-World Applications

Accuracy and precision apply to where you live and work. The following assignment asks you to think about accuracy and precision and how they relate to the various scenarios below about hunters going to the tundra to work their trap lines.

Type the answers for the two questions for each scenario in the text box.

Be sure to number your answers to match the question numbers.



Scenario 1: The hunter checks the weather forecast the night before his trip so that he knows the weather app states that it will be between -10 and -20 degrees (°) Fahrenheit at noon the next day. The actual temperature at noon is -15° F.

- 1. How does this situation illustrate differences between precision and accuracy?
- 2. What would be more important in this situation: accuracy, precision, or both?

Scenario 2: When the hunter's Global Positioning System (GPS) indicates that he is at the location, he goes to check the trap. However, he can't see the trap. The GPS unit that belongs to him is not working properly. After an extensive search, the hunter finds the trap 50 feet away from the location he thought it was.

- 1. How does this situation illustrate differences between precision and accuracy?
- 2. What would be more important in this situation: accuracy, precision, or both?

Scenario 3: While returning to camp, they stop and check the nets they put under the ice. They were able to catch fish that he estimates weighs around 13 pounds. His fellow hunters estimate the weight is 16 pounds. They happen to have a portable scale with them and find the actual weight is 16 pounds.

- 1. How does this situation illustrate differences between precision and accuracy?
- 2. What would be more important in this situation: accuracy, precision, or both?

# Assignment and Activity Samples

2.1 Assignment: Spheres in Kiana

Look at this photo of the beach in Kiana.

- Which of the four major spheres do you see in this image?
- Describe what you see in each sphere.
- Write your answer in the Canvas textbox.



<https://www.flickr.com/photos/sfoanos/50035449741>

2.3 Lab-Falling for Gravity

2.3 Assignment: Lab-Falling for Gravity

Unit 2 Lesson 3 Falling For Gravity.pdf

In this activity, you will calculate the acceleration of gravity using simple materials provided by your teacher.

Your teacher will print out the worksheet for you to write on.

Be sure to turn it in when the lab is complete.

Unit 2 - Lesson 3

Activity: Falling for Gravity "G" that's interesting

Modified from: <https://www.explorelearning.com/activities/falling-gravity>

TEACHERS, PRINT THIS OUT FOR YOUR STUDENTS

General Procedure:

Your teacher will divide you into small groups, and once you are in groups, you will need to:

1. set the experiment up

2. conduct the experiment

3. analyze the data gathered.

Tools and Materials:

• Two-meter measuring tape or two-meter sticks

• Masking tape

• Marker pen

• Small, cheap, rugged flashlight

• Towel, carpeting, or other soft material for the dropped flashlight to land on.

• Digital camera with video capability (the HD camera on the phone should work fine).

• Tripod for your camera/phone, or a safe location to place it for filming.

• Computer with a program that lets you play videos frame by frame (not shown.)

• You can scroll through your video on your computer or phone from frame by frame.

• Pencil and paper to record data (not shown).

Set up your experiment:

1. Locate a wall with a non-reflective surface. This activity will not work in front of a whiteboard or window.

2. Tape the two-meter measuring tape to a flat wall. Position the measuring tape so the 0 cm mark is at the top, and the remainder hangs straight down. (If using meter sticks, tape and stack the two sticks together to make a total length of two meters.)

3. Directly below your measuring tape, place a towel, carpeting, or other material that will soften the impact of dropping the flashlight on the floor.

4. To make the measurements more visible, add extra marks on pieces of masking tape and stick them next to the measuring tape every 5 or 10 centimeters.

5. Set your camera or phone up directly across from the wall assembly at about the 1-meter height.

Conduct your experiment and collect your data

1. Have one partner stand next to the measuring tape.

2. Turn on the flashlight and point it upwards. Make sure your flashlight is in a non-blinking setting.

3. Place the light as close to the 0 cm mark as possible and against the measuring tape.

4. If possible, use only one finger to hold the flashlight still until the time of release.

5. Have someone else film the drop with a digital camera (in HD at 30 frames per second).

a. This is the standard video setting on your phone.

6. Check your video to make sure you got the shot.

7. Digital video is easy to erase and reshoot.

8. Reread if you didn't get a clear view of your flashlight's light falling straight down.

Record your data:

Time Data:

Since your camera records 30 frames per second, each frame represents only 1/30 of a second or about 0.033 seconds. That means each frame will add an additional 0.033 seconds.

Distance Data:

Looking at your video recording, find the frame just before your flashlight drops. (Note that frame-by-frame players usually let you move forward or backward via arrow keys. The frame you're now at is time 0s and distance 0m.) You can manually move frame-by-frame if you need to.

Now, step by step, record the distance in meters dropped and the corresponding time of the flashlight's fall. Watch the screen closely. Notice that the flashlight doesn't fall much during the first few steps.

If your flashlight leaves a streak of light, only record the location at the bottom of the streak (the streak is a 1/30th of a second record of the light's fall).

Step	Time In Seconds	Distance in Meters	Step	Time in Seconds	Distance in Meters
0	0	0	6		
1			7		
2			8		
3			9		
4			10		
5			11		

Analyzing your data:

How will you use these numbers?

We will calculate velocity and acceleration due to gravity from the data gathered.

Velocity is the speed of an object in a given direction.

• The formula for velocity is:  $v = d/t$  or velocity = distance/time

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Unit 2 - Lesson 3

Acceleration is how fast the rate or speed of something changes. In other words, change in velocity over time. The standard unit of measurement for acceleration is meters per second squared.

Acceleration Formula

$$a = \frac{v_f - v_i}{t}$$

Let's look at the sample data table to learn how to calculate these:

• Acceleration =  $(V_{\text{final}} - V_{\text{initial}}) / \text{the time to make this change}$

• Here's an example using our data (see the table above):

$V_{\text{initial}}$  is the flashlight's velocity just before it's dropped, or 0 m/s

$V_{\text{final}}$  is the velocity of the light at the end of the drop.

In our case, at time 0.297 to 0.33 s (time = 0.033 s), the distance traveled is from 0.4 m to 0.51 m (distance = 0.11 m)

• To determine acceleration, you first need to know the velocity.

• Velocity is the speed of an object in a given direction.

$V = \text{distance} / \text{time}$

So,  $V_{\text{final}} = 0.11 \text{ m} / 0.033 \text{ s} = 3.33 \text{ m/s}$

The time it takes to make that change is 0.33 s

Acceleration =  $(3.33 \text{ m/s} - 0 \text{ m/s}) / 0.33 \text{ s} = 10 \text{ m/s}^2$

\*\*\*\*\*Use your own data to calculate the acceleration of the flashlight you drop.

What is your answer? Show your calculations:

# Assessment

In the form of quizzes, exams, and informal assessment.

## 4.1 Calculating Sonar Depth

Due No due date   Points 4   Questions 4   Time Limit None

### Instructions

#### 4.1 Assignment: Quiz Calculating Sonar Depth

Sound moves at a faster speed in water (1500 meters/sec) than in air (about 340 meters/sec) because the mechanical properties of water differ from air. Temperature also affects the speed of sound (e.g. sound travels faster in warm water than in cold water) and is very influential in some parts of the ocean. (10)

So, depth can be calculated from the speed of sound waves in water, about 1500 meters/second, and the time required for the energy pulse to reach the floor and return using this equation:

depth =  $\frac{1}{2}$  x (two-way travel time) x (speed of sound in water)

If a wave took 6 seconds, the problem would be set up this way.

$(.5 \times 6 \text{ seconds}) \times 1500 \text{ m} = 3 \times 1500 \text{ m} = 4500 \text{ meters}$

(multiply by .5 because of two-way travel time down and back)

#### Question:

What would the depth be for the following data points?

Put your answers into canvas.

Calculate the depth for each data point.

1. 3.2 seconds
2. 5.5 seconds
3. 7.2 seconds
4. 6.4 seconds



# Videos

Short videos relating to the topic being discussed are periodically included in lessons. These videos are 5 minutes or less and include questions to answer as they watch.

## Sample topics:

- Elders sharing about medicinal plants.
- The science of igloos.
- Investigating phenomena.
- What is a Fjord?
- Mariana Trench
- and more

### 1.4 Assignment - Video Quiz - Sargiq/Stinkweed is Medicinal

Traditional ways of knowledge and problem-solving have helped the Iñupiaq in many ways.

- Knowing how to build a shelter.
- Understanding migration patterns of animals.
- Predicting what weather to expect as the seasons pass.

These and many other skills were important in the daily life of the Iñupiaq ancestors.

One thing necessary for survival was medicine.

- They had to figure out what plants could or could not be used to treat an illness.

Watch this video to learn more about the medicinal uses of Sargiq/Stinkweed, as described by one of

our elders, and why they are so important.

STINKWEED  
SARGIQ / SARGIGRUAQ

The video and quiz are embedded in the Canvas course below.

Assignment-Video Quiz - Sargiq/Stinkweed is Medicinal



# Pilot Sites FY25

- 5 sites
  - Deering – did not complete the pilot
  - Kiana – completed pilot
  - KMHS – did not complete the pilot due to teacher turnover (3 different teachers).
  - Noatak – completed pilot
  - Shungnak – completed pilot
- All sites met periodically during Monday collaborative time.
- All teachers met in person for one week of training and professional development, along with the bilingual teacher from their site.
- Four of the teachers will not be teaching next year.
- Feedback received from two sites is on the next slide.



# Teacher Feedback:

**How was the presentation order in the read and learn?**

- The lesson order was ok.
- It worked for me.
- The teachers made adjustments when we met as a group.

**Were the cultural activities appropriate for this grade level?**

- Yes, cultural activities are age-appropriate.

**Could you see community members sharing information if we incorporated this into additional units?**

- Absolutely
- Yes

**Did the depth of knowledge in the units covered meet the rigor you expect?**

- If yes, how? I believe so. They were, for the most part, thought-provoking and can easily be adjusted in the classroom to be more or less rigorous based on our students' needs!
- If not, how can it be improved? No responses.

**Was the reading level appropriate?**

- Yes, it was appropriate.
- I modified it for some of our lower students.

**Did you put the read-and-learn from Canvas onto your board and use it like a PowerPoint presentation?**

- Yes, it made it convenient.

**Did having the assignments preloaded into Canvas make preparation and grading easier?**

- Yes

**Quality of videos?**

- They were good. The students wished there were more of them.

**Video Quizzes?** Were they an effective way to determine if a video had been watched?

- They were!

**What did your students have to say about the lessons?**

- Good
- Most students loved that they could pick out people and places around here and that it was relatable.

# Can a student do the course independently?

- Yes, but the course is designed to encourage dialogue between the teacher and students.
- If a teacher fails to teach the lessons, the students do not understand all parts of it.
- The assignments are intended to
  - Cover concepts from the lessons
  - To interact with each other or their community

# Science Rotation

FY25	PHYSICAL SCIENCE
FY26	BIOLOGY
FY27	PHYSICAL SCIENCE
FY28	BIOLOGY
FY29	PHYSICAL SCIENCE

Chemistry, Environmental Science, and Physics could also be put on the schedule as a site needs them.

# Science Course Rotation, what is it?

- Course are placed on a rotation schedule so that teachers who teach multiple subjects have less preps and can spend more time developing quality lessons.
- This rotation has been in place for several years and should be emphasized by counselors and principals.
- With a consistent course rotation, students who move from school to school are able to take the same core classes.
- Students who fail have two opportunities to take the class in high school and then could take it in summer school for credit recovery.

# Timeline

## **FY 25**

- Pilot the course at 5 sites
- PD with pilot site and bilingual teachers
- Continue to write curriculum, format, enter into CANVAS

## **Summer 2025**

- Work on remaining units and get ready for final versions to enter CANVAS in the fall.

## **Fall 2025**

- Finish, revise, check for accessibility, formatting, etc.
- Place final versions into CANVAS
- Send for printing – each site should have at least five printed copies.
  - One for the teacher.
  - The rest are for those students who have difficulty with online reading.
- BEGIN THE OUTLINE AND TIMELINE FOR BIOLOGY CURRICULUM DEVELOPMENT.

## **Spring 2026**

- March:
  - Present final product to school board.
  - PD science teachers. Bring them to Kotzebue.
  - Final order for all lab materials.

## **Fall 2026**

- Back to school in-service:
  - 1 day to review the plan for teaching.
  - New teacher in-service – 1/2-day training on how to teach the course
- Needs to be an in-person training.
- Send all teachers home with a copy of the curriculum.



# Curriculum Adoption

## Curriculum Adoption Process

The curriculum review and adoption process, guided by Board Policy BP 6141 and 4 AAC 05.080, ensures our educational programs align with district goals, state standards, and the diverse needs of our students. This systematic approach involves continuous evaluation and collaborative input from various stakeholders, ensuring adherence to policies that mandate comprehensive curriculum development, evaluation, and alignment with legal requirements.

To effectively manage this process, we have established a Content Area Review & Program Purchase Cycle. This cycle outlines the schedule for reviewing and updating each content area, ensuring timely procurement of textbooks and materials, and facilitating seamless implementation of the revised curriculum.

## Content Area Review & Program Purchase Cycle

<i>Content Area</i>	<i>Review Schedule</i>	<i>Textbooks &amp; Materials Purchase</i>	<i>Implementation</i>
Inupiaq Physical Science, Biology, and Environmental Science	2020-2025	Spring 2022-25 (Development)	2023-2026
Math	2023-2024	Spring 2024	2024-2025
Social Studies/Health	2025-2026	Spring 2026	2026-2027
Science K-8, HS Physics & Chemistry	2025-2026	Spring 2026	2026-2027
English Language Arts 7-12	2029-2030	Spring 2029	2030-2031
English Language Arts K-6	2029-2030	Spring 2029	2030-2031

Supplemental resources are review and purchased as needed.