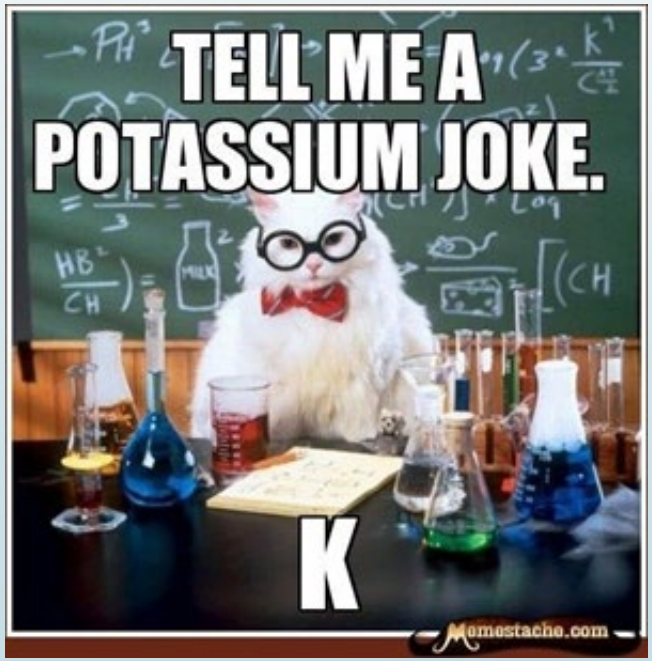
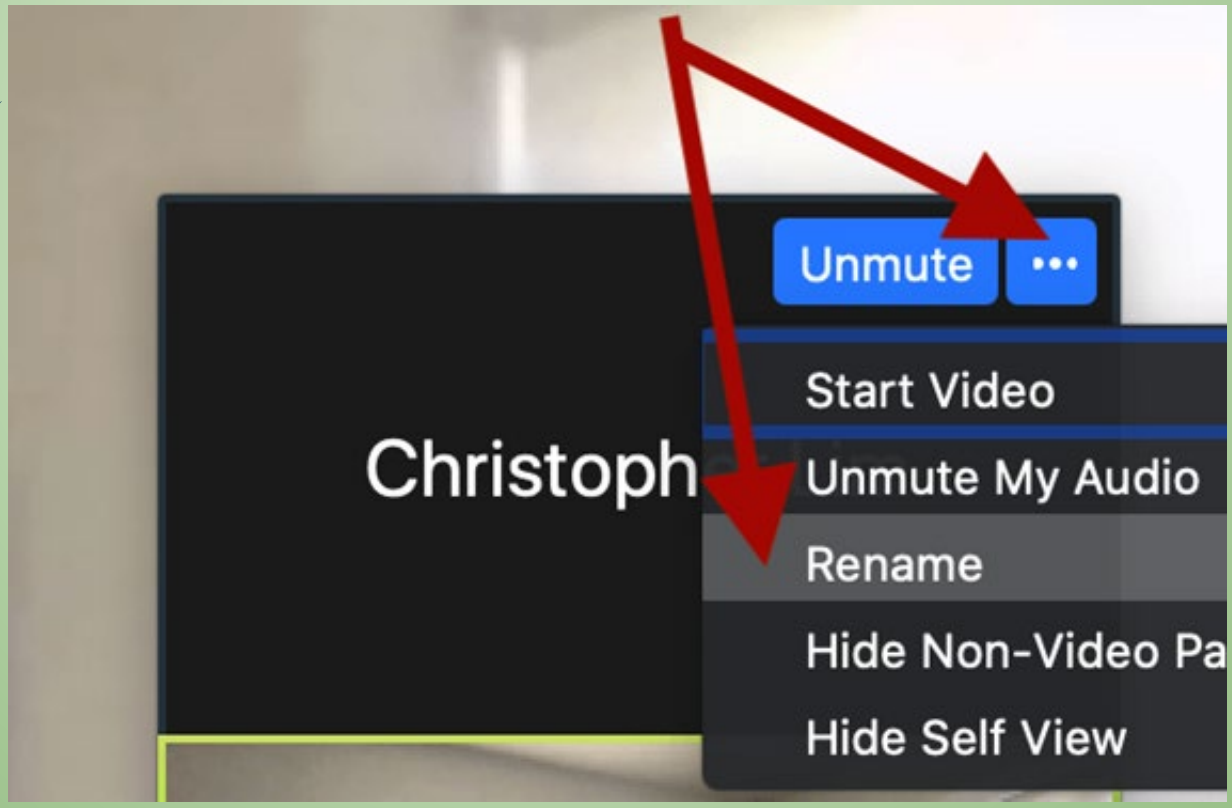
Welcome!
Introduction to the Science Standards for Alaska for 9-12 Grade



I was reading a book on Helium. I couldn't put it down.

Introduce Yourself

Rename your Zoom settings to include your district and subjects you teach.



Vicki Lowe
Kenai Peninsula Borough School District
vixinak@gmail.com

Andrea Pokrzywinski
Lower Kuskokwim School District
andreaupnorth@gmail.com

Gary Cooper
Alaska Science Teachers Association

9-12 Introduction to Science Standards for Alaska Webinar Team

Alaska Department of Education & Early Development

February 12, 2021

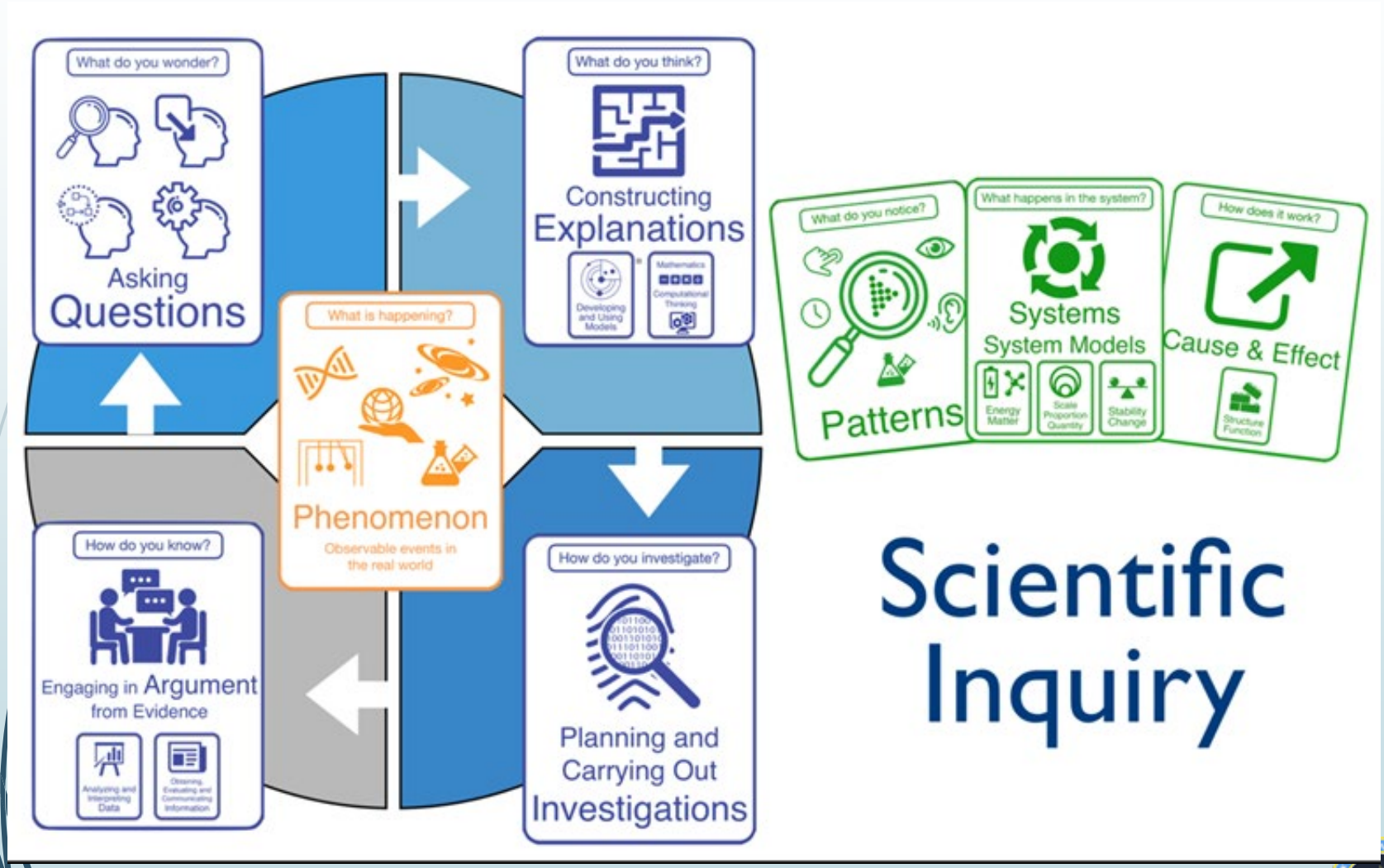
What is in the bubbles? How did it get there?

Open this link and share your thoughts. What do you wonder?

In what lesson, unit or class would you use this phenomena as anchor to teach from?

https://padlet.com/vickilowe/phenomena


NEXT GENERATION
SCIENCE
STANDARDS
For States, By States
Using Phenomena in NGSS-Designed Instruction
An Interview with Brian Reiser


What do you wonder?
Asking Questions
What do you think?
Constructing Explanations
Developing and Using Models
Mathematics
Computational Thinking
What is happening?
Phenomenon
Observable events in the real world
How do you know?
Engaging in Argument from Evidence
Analyzing and Interpreting Data
Obtaining, Evaluating and Communicating Information
How do you investigate?
Planning and Carrying Out Investigations
What do you notice?
Patterns
What happens in the system?
Systems
System Models
Energy Matter
Scale Proportion Quantity
Stability Change
How does it work?
Cause & Effect
Structure Function
Scientific Inquiry

[redacted]

What are your burning questions about the Alaska Science Standards?

Post your questions in the chat

Presentation Objectives

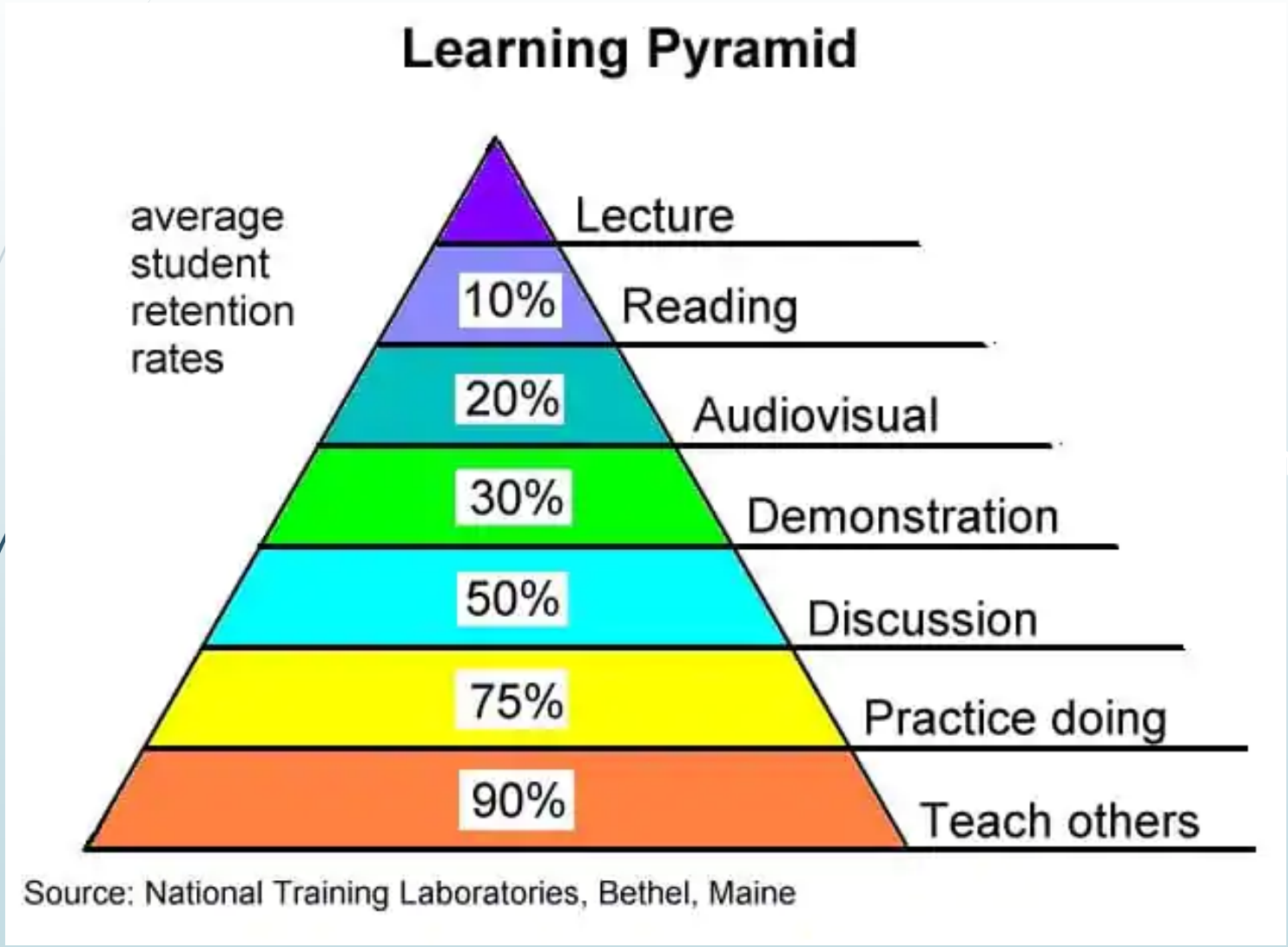
1. Review the 3 Dimensional foundations that support each performance expectation

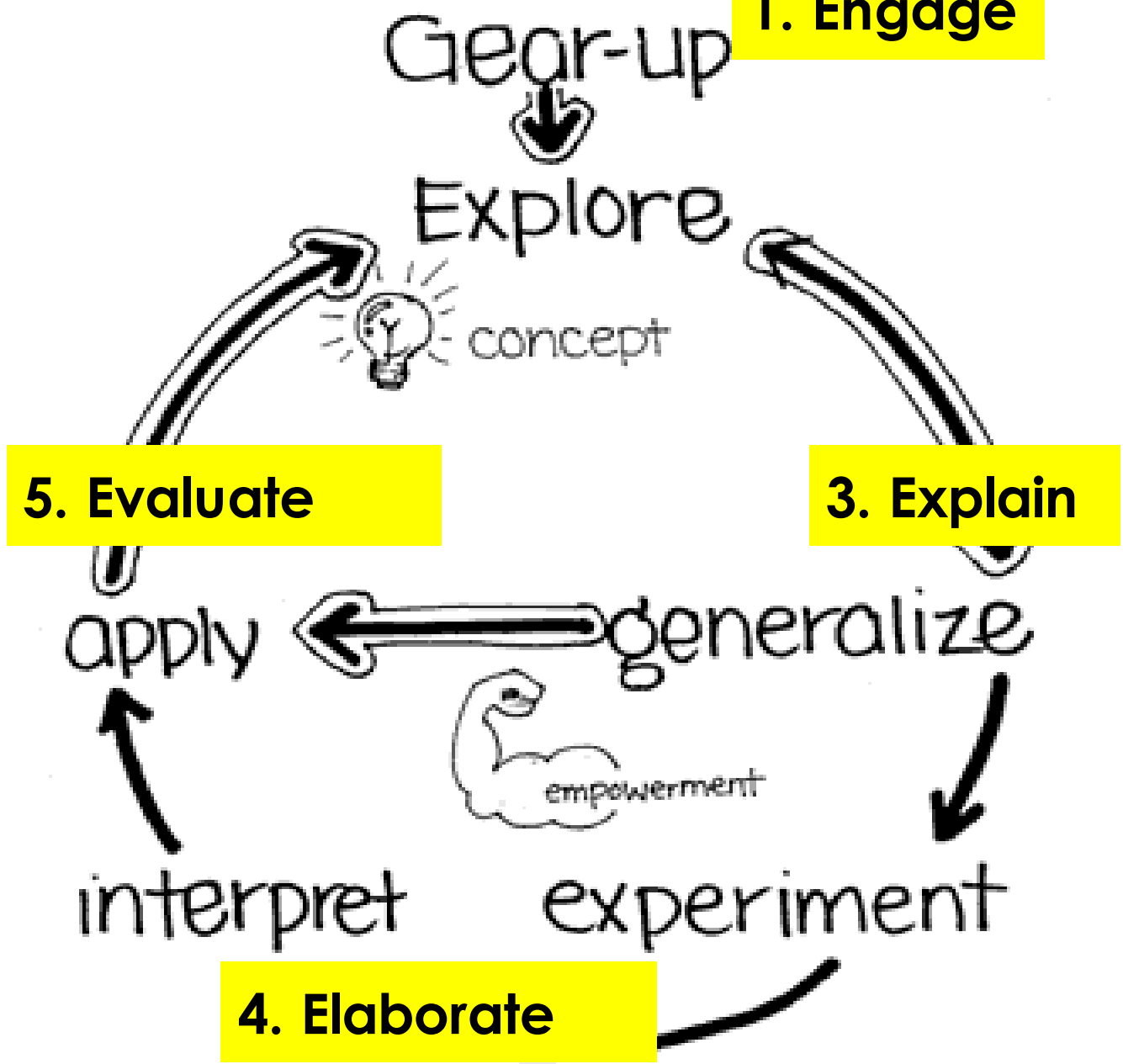
2. Describe the anatomy of a science standard for Alaska

3. Share tools and models to assist in implementation of the Science Standards for Alaska

Science Standards in the Past

Why a revision?





1. Engage

3. Explain

4. Elaborate

5. Evaluate

Addressing Common Misconceptions

- Scientific ideas are absolute and unchanging.
- The process of science is purely analytic and does not involve creativity.
- Science is complete.
- Science is a solitary pursuit.
- Science is boring.

UC Museum of Paleontology, *Misconceptions About Science.* Retrieved from http://undsci.berkeley.edu/teaching/misconceptions.php

More misconceptions about science

- Because scientific ideas are tentative and subject to change, they can't be trusted.
- Scientific ideas are judged democratically based on popularity.
- Scientists are judged on the basis of how many correct hypotheses they propose (i.e., good scientists are the ones who are "right" most often).
- Science is a collection of facts.

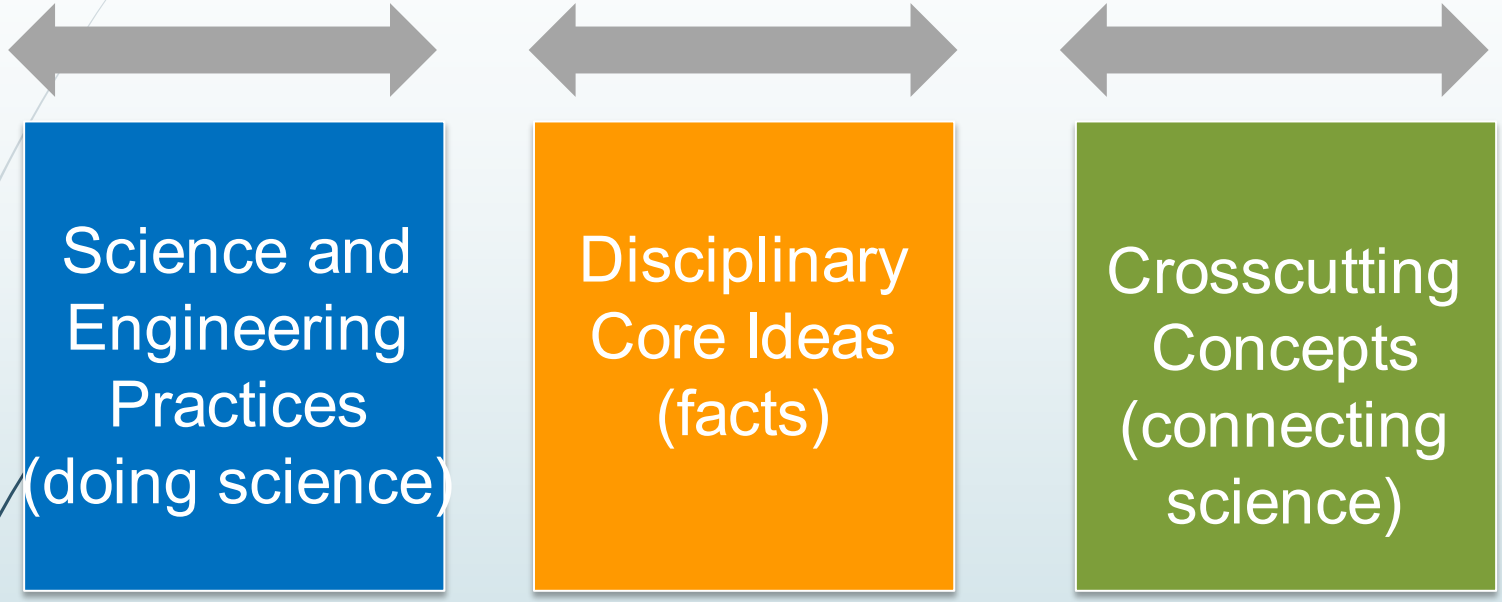
UC Museum of Paleontology, *Misconceptions About Science*. Retrieved from http://undsci.berkeley.edu/teaching/misconceptions.php

Quick Poll

How familiar are you with the Science Standards for Alaska?

The 3 dimensions are cross cutting concepts, disciplinary core ideas and_____.

3 Dimensions Science Standards for Alaska



*

This symbol actually means something!

Science & Engineering Practices (doing science)

Disciplinary Core Ideas (facts)

Crosscutting Concepts (connecting science)

Student Performance Expectation (PE)

PE

Standard

HS-PS3-2

Students who demonstrate understanding can: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).

Clarification Statement: Examples of phenomena at the macroscopic scale could include the conver
energy stored due to position of an object above the earth, and the energy store
could include diagrams, drawings, descriptions, and computer simulations.

Assessment boundaries will be found here

Clarification Statement

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.	**PS3.A: Definitions of Energy** • Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. • At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. • These relationships are better understood at the microscopic scale, at which all of the different manifestations of ene combi the mo associa	**Energy and Matter** • Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.

SEP

DCI

CCC

241

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
	(relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.	

Science and Engineering Practices

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Framework pp.41-82

Crosscutting Concepts

- Patterns
- Cause and effect
- Scale, proportion, and quantity
- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

Framework pp.83-102

Disciplinary Core Ideas

Physical Science

- PS1: Matter and Its Interactions
- PS2: Motion and Stability: Forces and Interactions
- PS3: Energy
- PS4: Waves and Their Applications in Technologies for Information Transfer

Life Science

- LS1: From Molecules to Organisms: Structure and Processes
- LS2: Ecosystems: Interactions, Energy, and Dynamics
- LS3: Heredity: Inheritance and Variation of Traits
- LS4: Biological Evolution: Unity and Diversity

Disciplinary Core Ideas (cont.)

Earth and Space Science

- ESS1: Earth's Place in the Universe
- ESS2: Earth's Systems
- ESS3: Earth and Human Activity

Engineering, Technology, and Applications of Science

- ETS1: Engineering Design
- ETS2: Links Among Engineering, Technology, Science, and Society

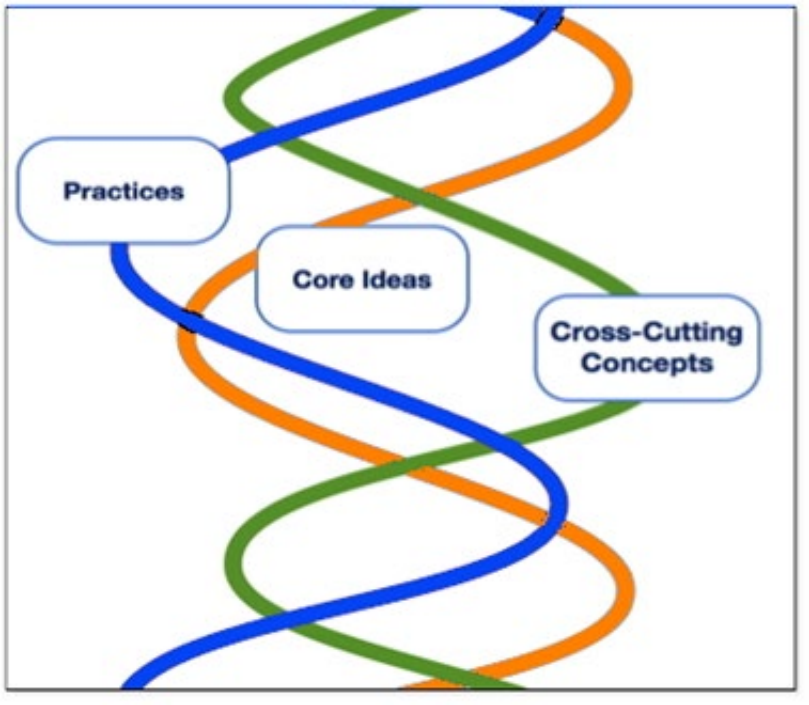
The old way:
List the phases of the king salmon life cycle

new and impro

Create a simulation illustrating how salmon development is impacted by increasing water temperature.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using mathematics, information and computer technology, and computational thinking	From Molecules to Organisms: Structure and Processes	Cause and effect

Three Dimensions Intertwined



- Performance Expectations
- The Framework requires contextual application of the three dimensions by students.
- Focus is on how and why as well as what

Time for a Quick Poll

How I'm feeling about all of this?

An Analogy between 3-Dimensional Learning and Cooking

Kitchen Tools & Techniques (Practices)

Basic Ingredients (Core Ideas)

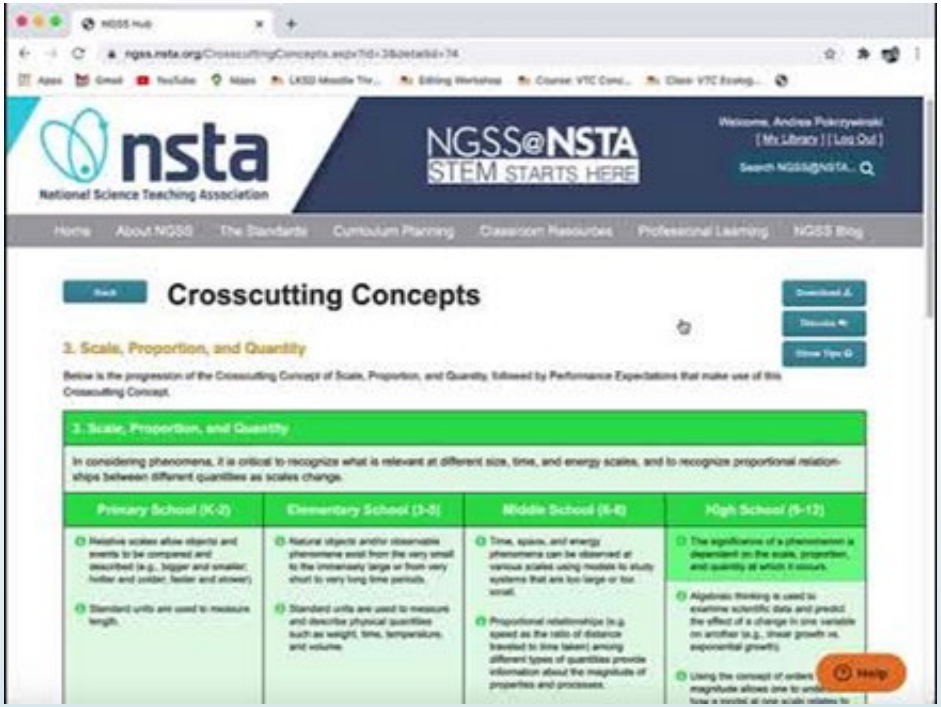
Vegetables, Herbs, Spices, & Seasonings (Crosscutting Concepts)

Preparing a Meal

(Three dimensional Learning)

Where to find the SSA's

https://education.alaska.gov/akstandards/science/science-standards-for-alaska.pdf?v=

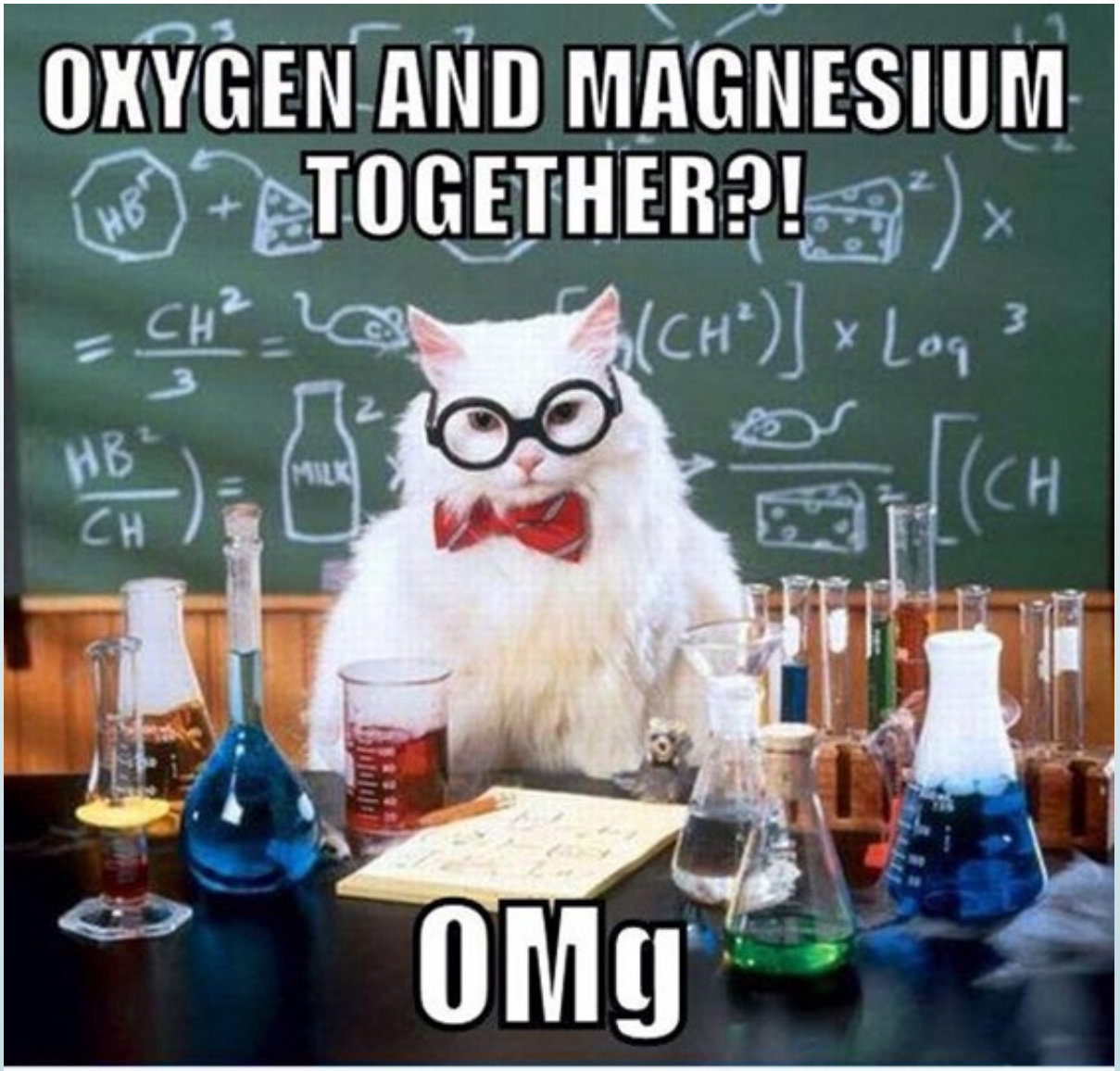


https://ngss.nsta.org/

Break Out Activity-Explore SSA

Explore the NGSS NSTA HUB for 5 minutes - https://ngss.nsta.org/AccessStandardsByTopic.aspx

In your breakout group, share what you found. Chat about reflections, share thoughts and questions.

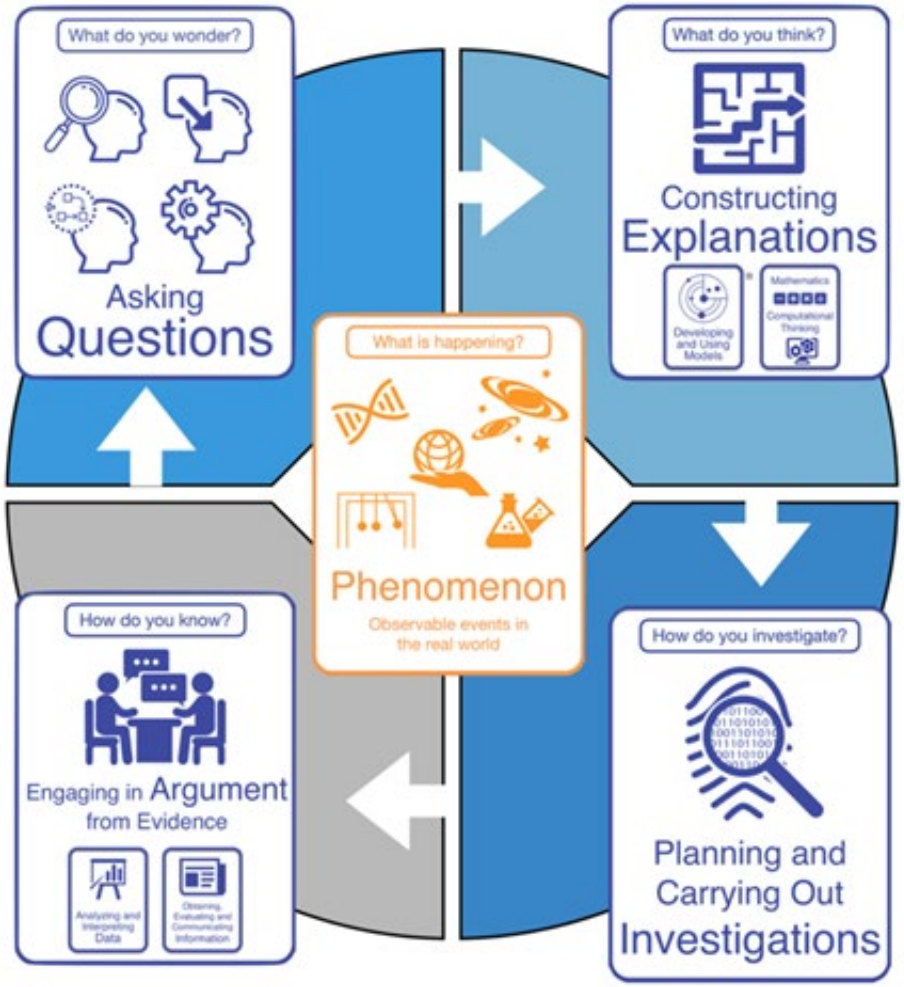

OXYGEN AND MAGNESIUM TOGETHER?!
OMg
FUNNY PICTURES ON KULFOTO.COM

HS-ESS2-2 Students who demonstrate understanding can: Analyze geoscience data to evaluate claims that one change to Earth's surface creates feedbacks that cause changes to other Earth systems.

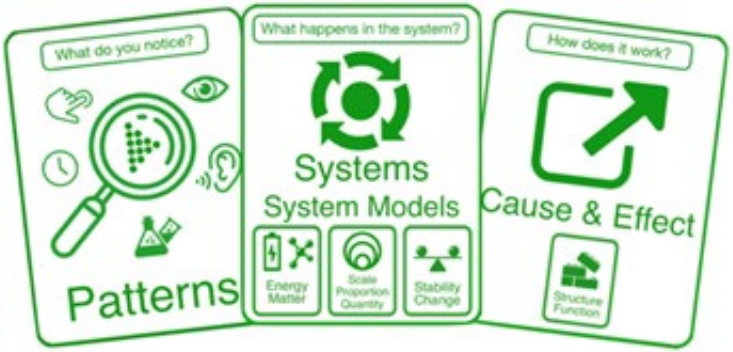
Clarification Statement: Examples should include climate feedbacks, such as how an increase in greenhouse gases causes a rise in global temperature that melts glacial and sea ice, which reduces the amount of sunlight reflected from Earth's surface, increasing surface temperatures and further reducing the amount of ice. Examples could also be taken from other system interactions, such as feedbacks due to the effects of permafrost thawing; how the loss of ground vegetation causes an increase in water runoff and soil erosion; how dammed rivers increase groundwater recharge and decrease sediment transport, and how the loss of wetlands causes a decrease in local humidity that further reduces wetland extent.

https://thewonderofscience.com/teaching

Science Engineering Practices

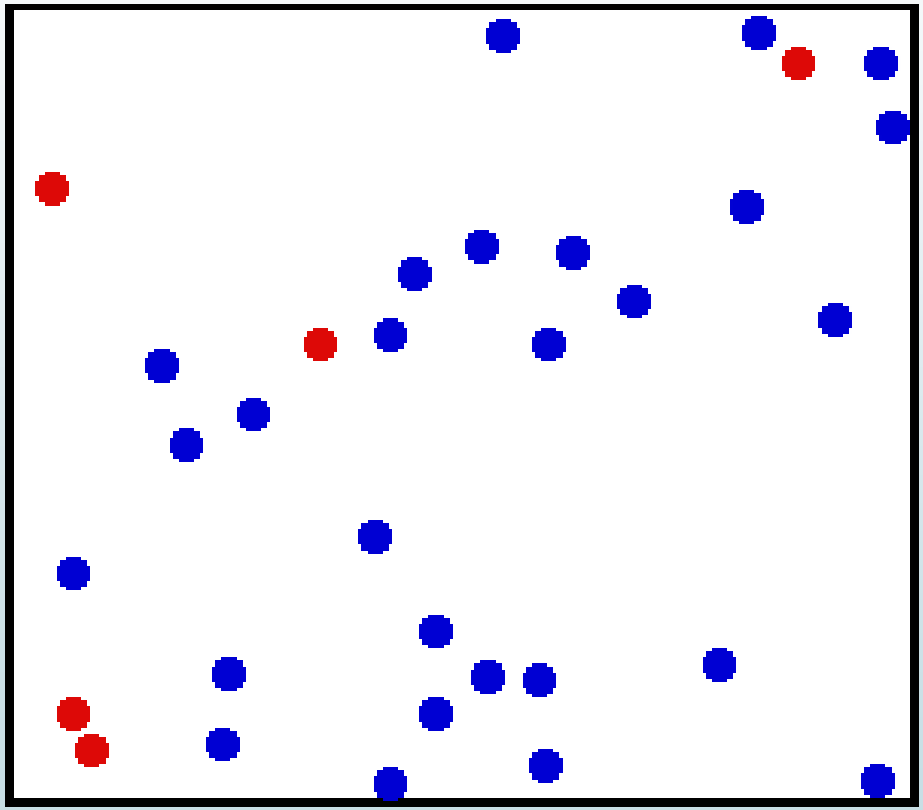


Cross Cutting Concepts



Scientific Inquiry

Unit 1 Kinetic Molecular Theory and Climate Change



By the End of this Activity You Should Be Able to

Science and Engineering Practice

Content Objective

- I can make a model to predict what happens to a substance when the kinetic energy of the particles changes.

Disc.Core Idea

Cross Cutting Concept

Language Objective

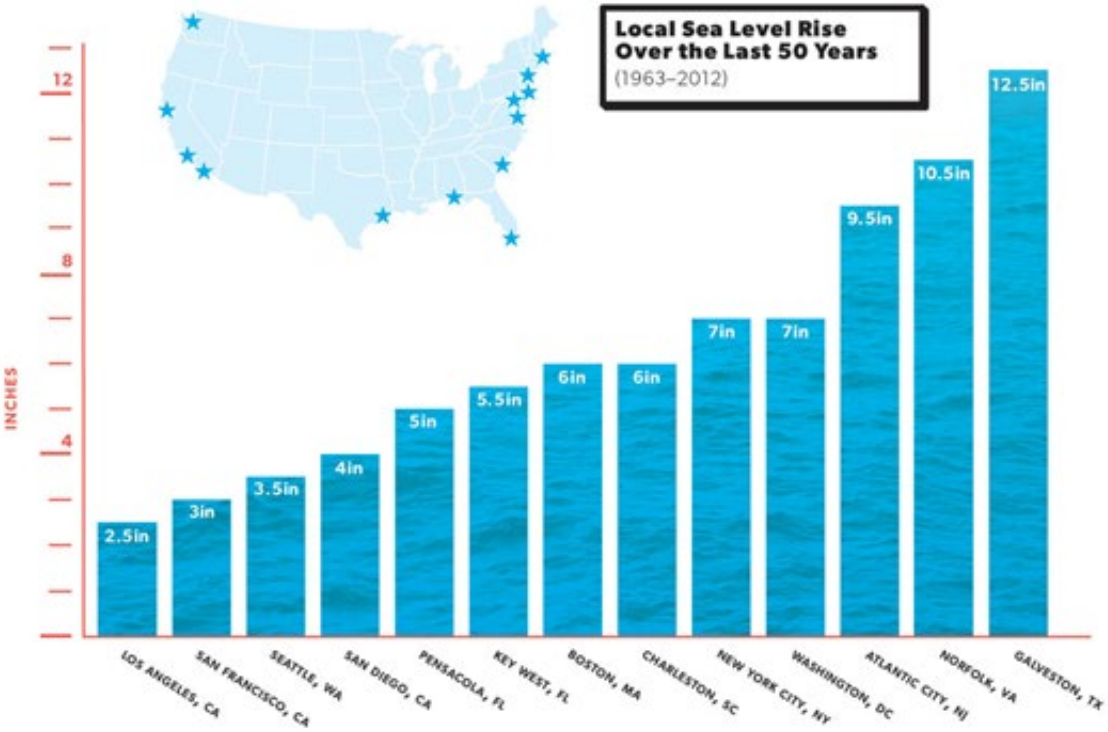
- I can use my model to make a claim and support it with evidence and reasoning.

Language Arts and Nature of Science Connections

SCIENCE CONNECTIONS →

SEA LEVEL RISE & GLOBAL WARMING

Sea levels in the U.S. are rising fastest along the East Coast and Gulf of Mexico.



Global average sea level has increased 8 inches since 1880. The local rate varies depending on both global and local factors, including currents, ocean floor topography, variation in ocean density, and land uplift or susbsidence due to geological processes or human activities.

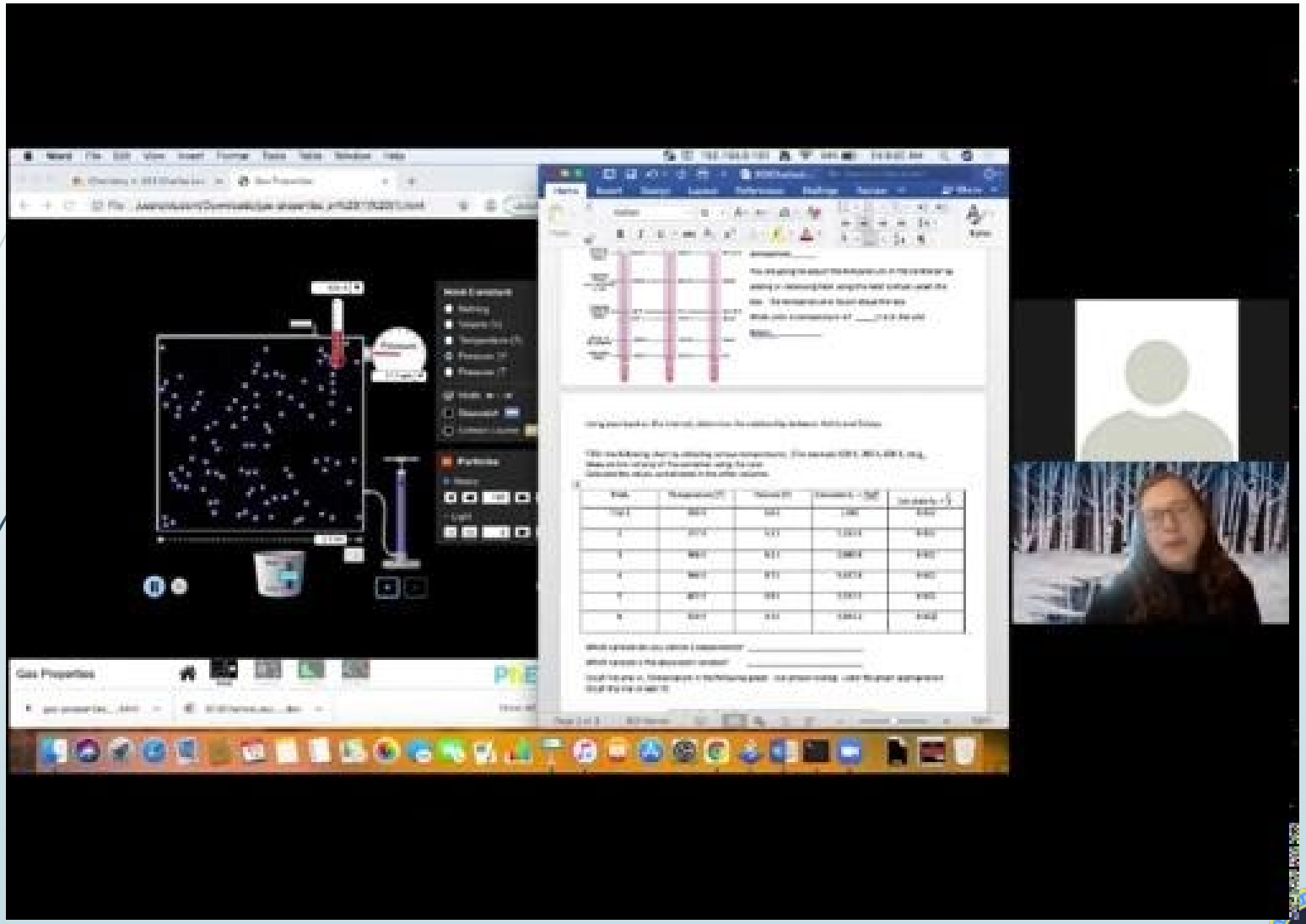
What is causing sea level to rise faster on the East vs. West Coast?

In your breakout group or small discussion group come up with an answer to this question.

Use this model to build a prediction to explain this phenomenon.https://phet.colorado.edu/en/simulation/gas-properties

Sentence Frames:

- I believe that _____ because…
- The evidence suggests that…
- In watching/reading/listening to _____, it lead me to think that…


Gas Properties

Unit-1 Kinetic Molecular Theory and Climate Change

https://docs.google.com/document/d/1OzevRazXw5C_gcQ46mVfK0TX8Jbn_8lhC2DmjHwPsiE/edit

Unit 1 Patterns Chemistry Distance Learning

Unit 1: KMT and Climate Change- approximately 12-15 class periods (90 minutes each)			
Unit Resources: • Unit 1 Folder • Unit 1 Interactive Notebook	• Unit 1 Tracker • Vocabulary • Sample Unit Timeline	• Canvas Course (search for Patterns Chemistry in Canvas Commons) • Unit 1 Paper Packet (UPDATED!)Unit 1 Paper Packet - Patterns Chemistry Distance Learning	Rubrics
ALT1 KMT and Climate Change: Use models to illustrate how pressure, temperature, and volume affect the motions of particles and how this relates to climate change.			
Anchoring Phenomenon: Differences in atmospheric gas temperatures, snowpack, and seawater are causing changes to local and global weather patterns. **Unit Essential Question:** How, and to what extent, is climate change causing change to Earth's systems?			

Implementing New Science Standard

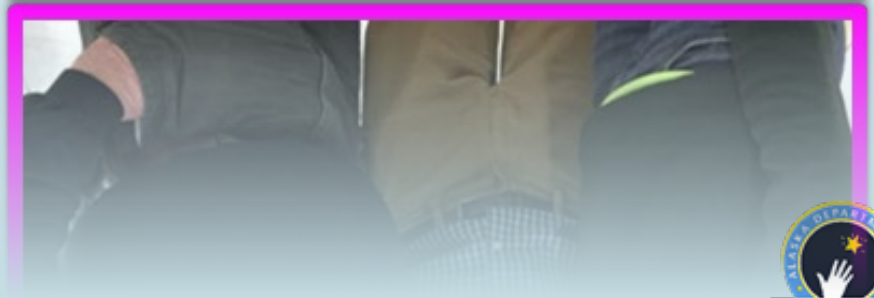
- Share tools and models to assist in implementation of the Science Standards for Alaska

Is it the destination or the journey?

THE WONDER OF SCIENCE

https://thewonderofscience.com/

bozemanscience.com



THE WONDER OF SCIENCE

vJump Right Into It

Organizers, planners, Assistance

vExpanding List

My Go To Spot

EDUCATION & EARLY DEVELOPMENT

Videos

Scientific & Engineering Practices

SEP

- Asking Questions & Defining Problems
- Developing & Using Models
- Planning & Carrying Out Investigations
- Analyzing & Interpreting Data
- Mathematics & Computational Thinking
- Construct Explanations & Design Solutions
- Engaging in Argument from Evidence
- Obtain, Evaluate, Communicate Information

Cross Cutting Concepts

CCC

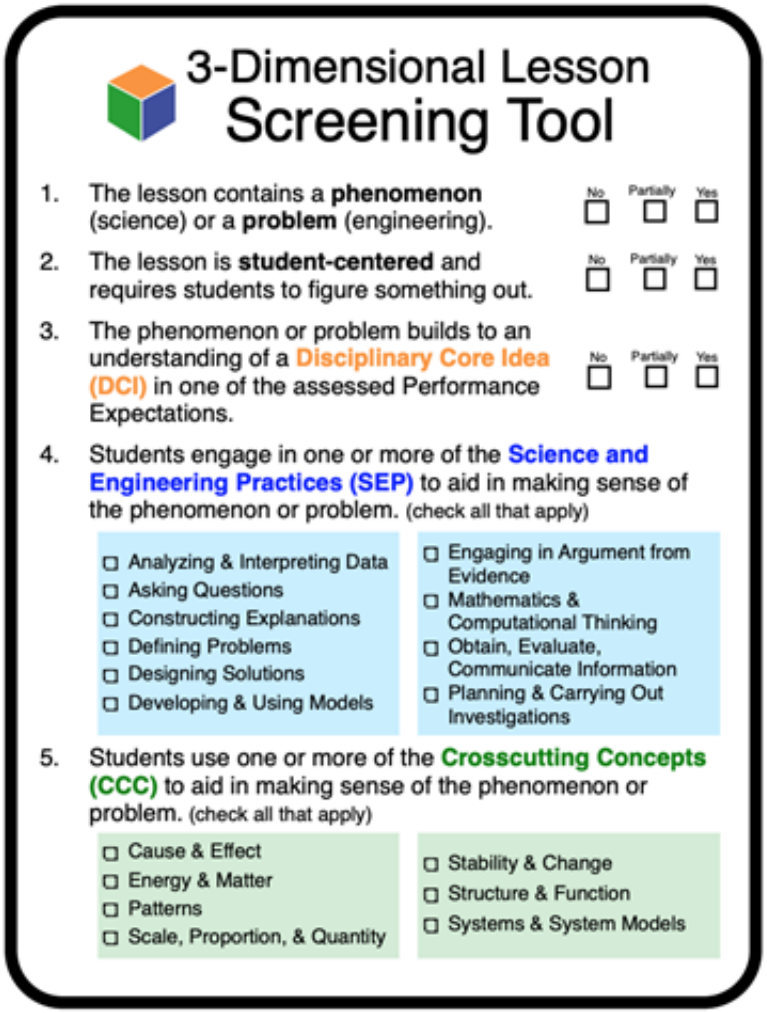
- Patterns
- Cause & Effect: Mechanism & Explanation
- Scale, Proportion, & Quantity
- Systems & System Models
- Energy & Matter: Flow, Cycle, Conservation
- Structure & Function
- Stability & Change

DCI

THE WONDER OF SCIENCE

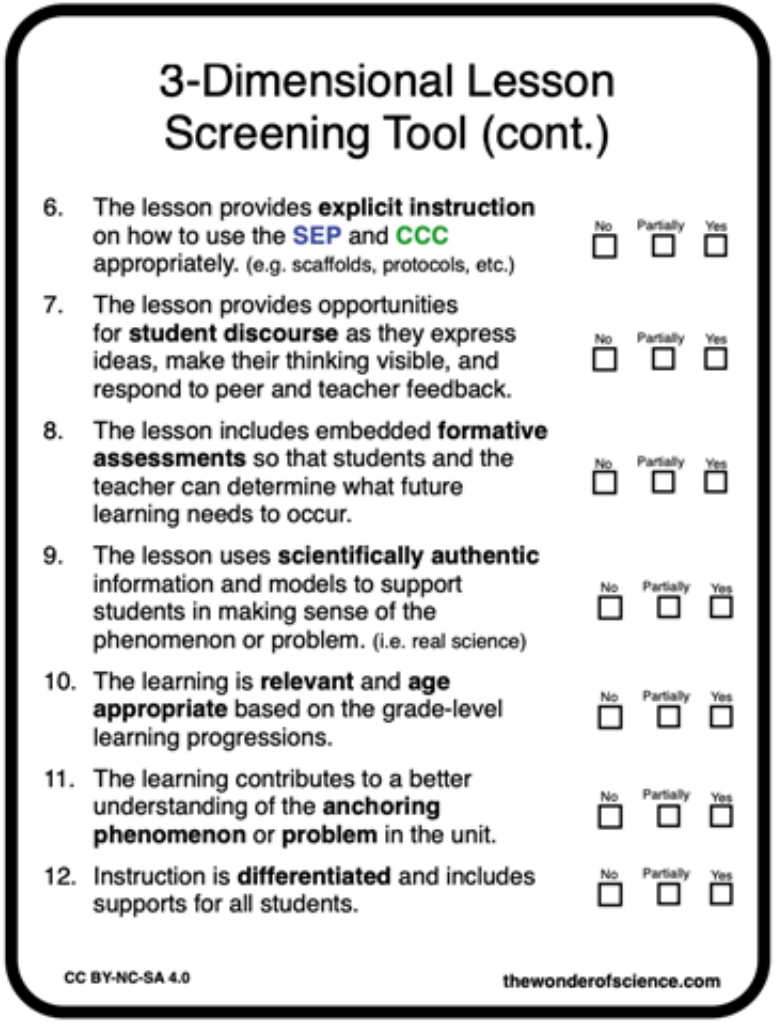
PHENOMENA

A phenomenon is an observable event. In the science classroom a carefully chosen phenomenon can drive student inquiry.



3-Dimensional Lesson Screening Tool

1. The lesson contains a **phenomenon** (science) or a **problem** (engineering). No ☐ Partially ☐ Yes ☐
2. The lesson is **student-centered** and requires students to figure something out. No ☐ Partially ☐ Yes ☐
3. The phenomenon or problem builds to an understanding of a **Disciplinary Core Idea (DCI)** in one of the assessed Performance Expectations. No ☐ Partially ☐ Yes ☐
4. Students engage in one or more of the **Science and Engineering Practices (SEP)** to aid in making sense of the phenomenon or problem. (check all that apply)
   - ☐ Analyzing & Interpreting Data
   - ☐ Asking Questions
   - ☐ Constructing Explanations
   - ☐ Defining Problems
   - ☐ Designing Solutions
   - ☐ Developing & Using Models
   - ☐ Engaging in Argument from Evidence
   - ☐ Mathematics & Computational Thinking
   - ☐ Obtain, Evaluate, Communicate Information
   - ☐ Planning & Carrying Out Investigations
5. Students use one or more of the **Crosscutting Concepts (CCC)** to aid in making sense of the phenomenon or problem. (check all that apply)
   - ☐ Cause & Effect
   - ☐ Energy & Matter
   - ☐ Patterns
   - ☐ Scale, Proportion, & Quantity
   - ☐ Stability & Change
   - ☐ Structure & Function
   - ☐ Systems & System Models



3-Dimensional Lesson Screening Tool (cont.)

6. The lesson provides **explicit instruction** on how to use the **SEP** and **CCC** appropriately. (e.g. scaffolds, protocols, etc.) No ☐ Partially ☐ Yes ☐
7. The lesson provides opportunities for **student discourse** as they express ideas, make their thinking visible, and respond to peer and teacher feedback. No ☐ Partially ☐ Yes ☐
8. The lesson includes embedded **formative assessments** so that students and the teacher can determine what future learning needs to occur. No ☐ Partially ☐ Yes ☐
9. The lesson uses **scientifically authentic** information and models to support students in making sense of the phenomenon or problem. (i.e. real science) No ☐ Partially ☐ Yes ☐
10. The learning is **relevant** and **age appropriate** based on the grade-level learning progressions. No ☐ Partially ☐ Yes ☐
11. The learning contributes to a better understanding of the **anchoring phenomenon** or **problem** in the unit. No ☐ Partially ☐ Yes ☐
12. Instruction is **differentiated** and includes supports for all students. No ☐ Partially ☐ Yes ☐

thewonderofscience.com

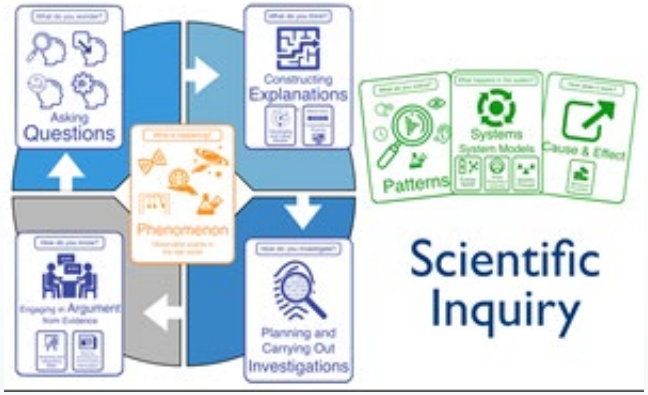
Argumentation Template

The Guiding Question:	
Our **Claim**:	
Our **Evidence**:	Our **Reasoning**:

Break Out Activity-Explore the Wonder of Science

Spend 5 minutes exploring
https://thewonderofscience.com/teaching

In your breakout group, share what you found that will be useful to you. Chat about reflections, share thoughts and questions.


Asking Questions
Constructing Explanations
Phenomenon
Engaging in Argument from Evidence
Planning and Carrying Out Investigations
Patterns
Systems
System Models
Cause & Effect
Scientific Inquiry

Questions?

Alaska Science Teacher Networking

AK Listserv- http://list.state.ak.us/mailman/listinfo/ak.scienceteachers?fbclid=IwAR1Lx1YLNKx6B9RsSDeW4Y_MPGO2PkQNC83eXI8yJY58s3zpOIFKOD__z6c

Alaska Science Teachers Facebook https://www.facebook.com/groups/1799164320730354

Alaska Science Teachers Association- https://asta.wildapricot.org/sys/website

Model Open Source Learning Models Links

Inquiry Hub Biology -
https://www.colorado.edu/program/inquiryhub/curricula/inquiryhub-biology

Inquiry Hub Chemistry -
https://docs.google.com/document/d/1gSVXTDxPRsY7PTR1zQxCY5aU02E8VwHlRaH-0WQ9fAs/edit **(Under construction**

Patterns Science-
https://sites.google.com/beaverton.k12.or.us/patterns/home

Model Open Source Learning Models Links

New Visions Science
Living Environment - Transitional
https://curriculum.newvisions.org/science/course/living-environment/

Earth Science - Transitional
https://curriculum.newvisions.org/science/course/earth-science/

HS Earth Science - NGSS
https://curriculum.newvisions.org/science/course/earth-space-science/

Model Open Source Learning Models Links

Physics- (Under construction)
https://curriculum.newvisions.org/science/course/physics/

HS Biology- NGSS
https://curriculum.newvisions.org/science/course/biology/

Chemistry-
https://curriculum.newvisions.org/science/course/chemistry/

Inquiry Hub Stem - Middle School-
https://www.colorado.edu/program/schoolwide-labs/computational-thinking-classroom-resources-ct-integrated-storyline-units