Zoom Tips

Everyone in the meeting is muted. Please remain muted unless you are in a breakout session or asked to share out.

Presenters love seeing their audience, so if you're comfortable, turn your camera on so they can see you nodding in understanding and encouragement. If you want to make sure to look your best, face a window or light source.

The chat box is a good place to engage with other participants and ask questions. Selecting this icon will open the chat window.

**Speaker/Gallery View**
Speaker view shows the active speaker. Gallery shows all participants. Make sure to take the time to find that button (at the top right corner of your screen) so you can switch between the views.
Science Standards for Alaska (SSAs)

Bjørn Wolter, Ph.D. & Deb Riddle
Alaska Department of Education & Early Development
January 27, 2021
Our Mission and Vision

**OUR MISSION**

An excellent education for every student every day.

**OUR VISION**

All students will succeed in their education and work, shape worthwhile and satisfying lives for themselves, exemplify the best values of society, and be effective in improving the character and quality of the world about them.

*Alaska Statute 14.03.015*

Photo courtesy of Anchorage School District. Used with permission.
DEED exists to provide **information**, **resources**, and **leadership** to support an excellent education for every student every day.
Alaska’s Education Challenge

- An excellent education for every student every day
- Cultivate Safety and Well-Being
  All schools will be safe and nourish student well-being.
- Increase Student Success
  Success will be identified using multiple measures as part of a rich and varied curriculum.
- Support Responsible and Reflective Learners
  Families, tribes, educators, and communities will provide relevant learning opportunities.
Agenda

- Introductions
- Why new standards?
- The Standards
- How to read the SSAs
- Major shifts
- Learning strategies
- Resources
- Upcoming webinars
Introductions
Why did the state need new standards?
Why New Standards?
Need for New Standards?

STEM Jobs

Interest

Need
Development Process

- Writing Committee
- Review Committee
- Writing Committee
- Public Comment
- State Board
- Adoption
- June 2019
- Writing Committee
- Review Committee
- Writing Committee
- Public Comment
- State Board
- Adoption

Feb. 2018
Dec. 2018

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What standards were considered as examples?
A FRAMEWORK FOR K-12 SCIENCE EDUCATION
Practices, Crosscutting Concepts, and Core Ideas

K-12 Science Standards for Alaska
Misconceptions about science

Because scientific ideas are tentative and subject to change, they can't be trusted.

Scientists are judged on the basis of how many correct hypotheses they propose.

Scientific ideas are judged democratically based on popularity.

Science is a collection of facts.
Moving on from just facts

When instruction focuses on facts…

- Students don’t build the skills needed for real science
- Students don’t relate to science or scientists
- Students don’t understand where science comes from
Old Alaska GLEs for Science

Facts about science

Doing science
Organization of the SSAs

Science and Engineering Practices (doing science)

Disciplinary Core Ideas (facts)

Crosscutting Concepts (connecting science)
Active Learning

- Science is constructivist
  - Experiential
  - Students create own epistemology of the world within the bounds of evidence

- Benefits of active learning in science:
  - Provide opportunity for and promotes higher order thinking
  - Promotes interaction
  - Increases retention
  - Connects theory to application
  - Builds proficiency and self-esteem
Active Learning Pyramid

People remember:

- 10% of what they read
- 20% of what they hear
- 30% of what they see
- 50% of what they see & hear
- 70% of what they say & write
- 90% of what they do

People are able to:

- Define, List, Describe, Explain
- Demonstrate, Apply, Practice
- Analyze, Define, Create, Evaluate

teachonline.asu.edu
1 Perfect
2 Pretty Good
3 Average
4 Some Issues
5 HELP!

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The Standards
Goals of Science Education

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CURIOSITY IS THE ESSENCE OF THE SCIENTIFIC MIND.
How to Read the SSAs
How to Read the Standards

MS-PS4-1

Students who demonstrate understanding:
Qualitatively and quantitatively describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Clarification Statement: Examples can include waves modeled with a jump rope, slinky, water, seismic activity, and sound.

Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.

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

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Disciplinary Core Concepts</th>
<th>Crosscutting Concepts</th>
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<tbody>
<tr>
<td>Using Mathematics and Computational Thinking</td>
<td>PS4.A: Wave Properties</td>
<td>Patterns</td>
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<td>Use mathematical representations to describe and/or support scientific conclusions and design solutions.</td>
<td>A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.</td>
<td>Graphs and charts can be used to identify patterns in data.</td>
</tr>
<tr>
<td>Connections to Nature of Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific Knowledge is Based on Empirical Evidence</td>
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<td></td>
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<tr>
<td>Science knowledge is based upon logical and conceptual connections between evidence and explanations.</td>
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How to Read the Standards....

1. **MS-PS4-1** — Performance Expectation

   **Students who demonstrate understanding:** Qualitatively and quantitatively describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

2. **Clarification Statement:** Examples can include waves modeled with a jump rope, slinky, water, seismic activity, and sound.

3. **Assessment Boundary:** Assessment does not include electromagnetic waves and is limited to standard repeating waves.
How to Read the Standards...

Foundational boxes

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

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- An Excellent Education for Every Student Every Day -
Major Shifts in the SSAs
Five Major Shifts
Three-Dimensional Learning
Disciplinary Core Ideas

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<tr>
<th>Life Science</th>
<th>Physical Science</th>
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<tbody>
<tr>
<td>LS1: From Molecules to Organisms: Structures and Processes</td>
<td>PS1: Matter and Its Interactions</td>
</tr>
<tr>
<td>LS2: Ecosystems: Interactions, Energy, and Dynamics</td>
<td>PS2: Motion and Stability: Forces and Interactions</td>
</tr>
<tr>
<td>LS3: Heredity: Inheritance and Variation of Traits</td>
<td>PS3: Energy</td>
</tr>
<tr>
<td>LS4: Biological Evolution: Unity and Diversity</td>
<td>PS4: Waves and Their Applications in Technologies for Information Transfer</td>
</tr>
</tbody>
</table>

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<th>Earth &amp; Space Science</th>
<th>Engineering &amp; Technology</th>
</tr>
</thead>
<tbody>
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<td>ESS1: Earth's Place in the Universe</td>
<td>ETS1: Engineering Design</td>
</tr>
<tr>
<td>ESS2: Earth's Systems</td>
<td>ETS2: Links Among Engineering, Technology, Science, and Society</td>
</tr>
<tr>
<td>ESS3: Earth and Human Activity</td>
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Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanisms and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change
Science and Engineering Practices (SEPs)

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information.
Engaging in Arguments Using Evidence

What do you know?  How do you know that?

Claim + Evidence + Reasoning = Explanation

Why does your evidence support your claim?
Argumentation
# Argumentation Progression

## Progression of argument

<table>
<thead>
<tr>
<th>Grades K - 2</th>
<th>Grades 3 - 5</th>
<th>Middle School</th>
<th>High School</th>
</tr>
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<td>Make a claim and use evidence</td>
<td>Construct and support scientific arguments drawing on evidence, data, or a model. Consider other ideas.</td>
<td>Construct and present oral and written arguments supported by empirical evidence and reasoning to support or refute an explanation for a phenomenon.</td>
<td>Construct a counter-argument that is based in data and evidence that challenges another proposed argument.</td>
</tr>
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Phenomena
Phenomena Breath

Why can I see my breath when it is cold outside?
Developing and Using Models
Modelling a Phenomenon

Cold environmental air

Condensing water molecules

Warm air and water vapor from lungs
Pedagogical Changes
Cross-curricular Connections
Resources
Science Standards Webpage

https://education.alaska.gov/standards/science
Key Resources

Science Standards for Alaska (SSA) to Alaska ELA/Math Standards Connections

Alaska Science GLEs to Science Standards for Alaska Crosswalk

Teacher Primer for the Science Standards for Alaska
Where to Look for Lesson Plans

- NSTA (National Science Teachers Association)
- Project WET (WATER EDUCATION TODAY)
- Next Generation Science Standards
- Project WILD
- Alaska Department of Fish and Game
Upcoming Webinars
Grade-span Specific Deep Dives
Grade-span Webinars

Lower Elementary (K-2)  Upper Elementary (3-5)


Middle School (6-8)  High School (9-12)

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WE WANT TO HEAR FROM YOU!
Questions?