Next Generation Science Standards
K–12 science standards were developed through a collaborative state led effort.

NGSS Focus on a Three Dimensional Learning Model

All K–12 students should master these concepts in order for success in college & career.
COHERENT LEARNING PROGRESSIONS

- Engagement in deeper learning of content.
- Builds on knowledge & skills developed at each grade level.
- Allows for revisiting concepts to deepen understanding.

NGSS allows the learner to apply learning in context.
THREE DIMENSIONAL LEARNING

- Scientific & Engineering Practices
- Crosscutting Concepts
- Core Ideas

Quoted text from Peter A’Hearn
Practices are the behaviors that scientists engage in as they investigate and build models and theories about the natural world and the behaviors that engineers use as they design and build models and systems.
• Asking Questions (for science) & Defining Problems (for engineering)
• Developing & Using Models
• Planning and Carrying Out Investigations
• Analyzing & Interpreting Data Using Mathematics and Computational Thinking
• Constructing Explanations (for science) and Designing Solutions (for engineering)
• Engaging in Argument from Evidence
• Obtaining, Evaluating, and Communicating Information

6th grade model explaining the transition of sound.
Crosscutting concepts are concepts that have application across all disciplines of science. As such, they provide a way of linking the different disciplines of science.

Making connections to the BIG idea.
Crosscutting Concepts

1. Patterns
2. Cause & Effect
3. Scale, Proportion & Quantity
4. Systems & System Models
5. Energy & Matter
6. Structure & Function
7. Stability & Change

Thinking, speaking, and writing like scientists and engineers.

Based on the pattern that I see I conclude...

One way key parts of this system work together is...
Disciplinary core ideas are the big ideas of science that provide scientists and engineers with the concepts and foundations to make sense of phenomena or design solutions to problems.
IN THE CLASSROOM

Shift from

Teacher ‘telling students’

or

Students ‘learning about’

Students making sense of the science
Discourse in the classroom
Accountable Talk
Talk moves
Turn and Talk

Helps students make sense of the science.
A unit’s instruction begins with an observable phenomena that needs explanation.

For example:

- Why are there fossils on the top of Mount Everest?
- Why did peppered moths in England turn from white and black speckles to mostly gray by 1900?
- Why does a slug ‘melt’ when it meets salt?
Why did the moths change from speckled to gray?
Asking questions

Students explain what they think they understand about the question by building models and asking questions.
IN THE CLASSROOM

Student understanding guides the course of investigations.

Each investigation, reading, image or video clip helps to build the bigger picture.

“What does this new information tell us about the phenomenon?”
In this process

- Revisit their initial models
- Make claims justifying with evidence & reasoning
- Dialogue allows the class to build understanding of the science concept.

Students are encouraged to explore related phenomena to broadly apply their new learning.
In 2016, Scottsdale, Arizona, received one-third of its annual rainfall during the summer. Tucson, Arizona, received one-half of its annual rainfall during the same time period.

Figure 1 shows the typical annual rainfall, in inches, for different areas in the state.

**Figure 1. Typical Arizona Rainfall**

<table>
<thead>
<tr>
<th></th>
<th>Most Rainfall</th>
<th>Second Most Rainfall</th>
<th>Least Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southeast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwest</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part A**

Use Figure 1 to rank the Central, Southeast and Southwest Arizona regions by the typical annual rainfall.

**Part B**

Use Figure 2 to identify the time of the year during which each city receives the most rain. Select the boxes to choose the best answer for each city.
A layer of clay separates two layers of sedimentary rock in Montana. Fossils of different mammal teeth are found in both of the sedimentary rock layers.

Figure 1 shows the locations of the sedimentary rock layers and the clay layer in between.

Figure 3 shows three geologic columns. These geologic columns represent the time periods from which some of the teeth in Table 1 have been recovered. The age at the bottom of each column represents the oldest known age for the teeth in that column.

**Figure 3. Locations of Fossil Mammal Teeth**

- **Column 1**
- **Column 2**
- **Column 3**
### 2019 NGSS Assessment Results

<table>
<thead>
<tr>
<th>Grade</th>
<th>At /Above Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 8</td>
<td>80.7%</td>
</tr>
<tr>
<td>Grade 5</td>
<td>79.2%</td>
</tr>
</tbody>
</table>
NGSS Standards

- Value performance over memorization
- Designed with a multilayered approach
- Engineering and design practices are woven throughout
- Possess direct CCSS links (Reading & Math)
- Assessments are multifaceted & dynamic