# Next Generation Science Standards (NGSS)

conceptual shifts of how we teach science in K-12

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# Phenomenon

Feel the two blocks. What do you feel or notice?

What will happen when you place an ice cube on each block?

# Discussion

What did you notice?

What questions do you have?

What can you say about how energy moves?

# Instructional Model - 5Es

| Engage | • Ice melting blocks |
|---|---|
| Explore | • Energy stations<br>• Pair-Share |
| Explain | • Whole class discussion (Science Talk)<br>• Groups draw models to show how energy moves<br>• Read non-Fiction text |
| Elaborate | • Online simulation<br>• Apply this concept to collisions |
| Evaluate | • Explanations of how energy moves using observed evidence<br>• Formative assessments |

# Phenomenon-driven
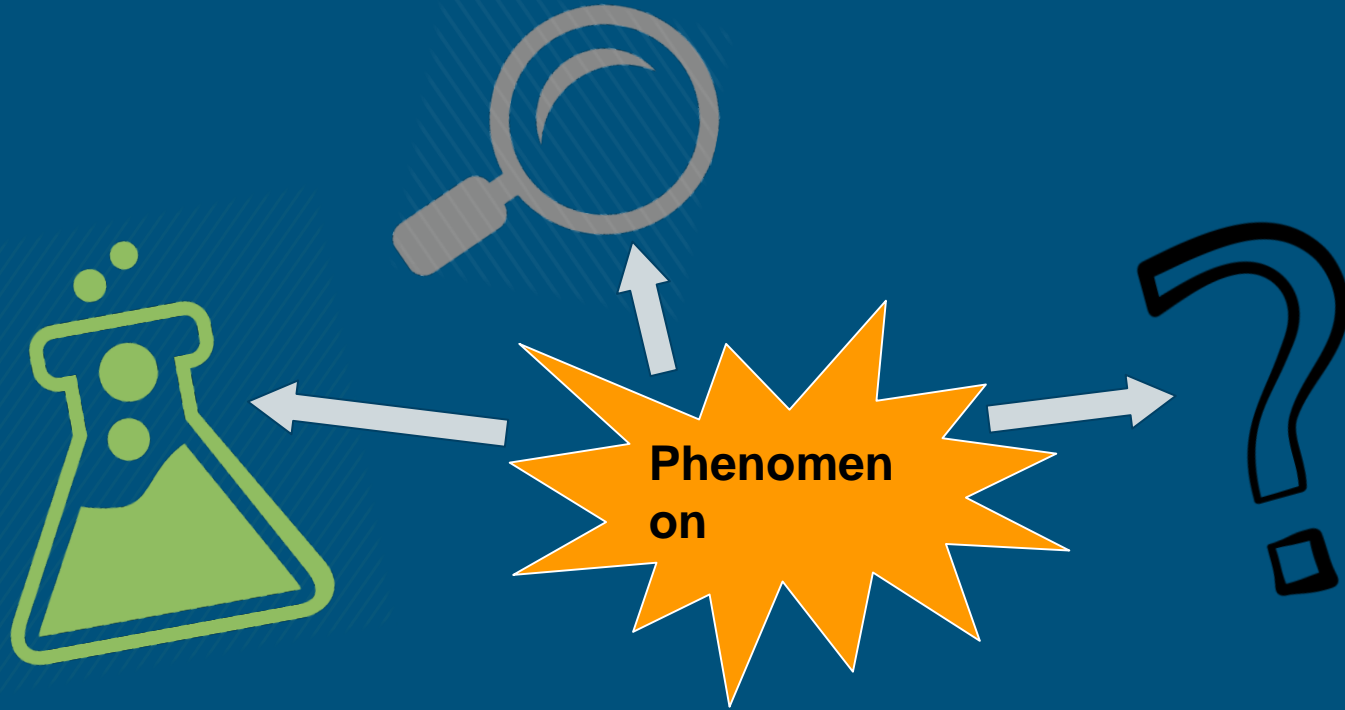
## Science education will involve more:

1. Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned

2. Students conducting investigations, solving problems, and engaging in discussions with teacher guidance

3. Students discussing open-ended questions that focus on the strengths of the evidence used to generate claims

4. Students reading multiple sources and developing summaries of information

5. Student writing of journals, reports, posters, and media presentations that offer explanations and arguments

6. Provision of supports so that all students can engage in sophisticated science and engineering practices

## Science education will involve less:

1. Learning of ideas disconnected from questions about phenomena

2. Teachers providing information to the whole class

3. Teachers posing questions with only one right answer

4. Students reading and answering questions at the end of each chapter

5. Worksheets

6. Oversimplification of activities for students who are perceived to be "less able" to do science and engineering
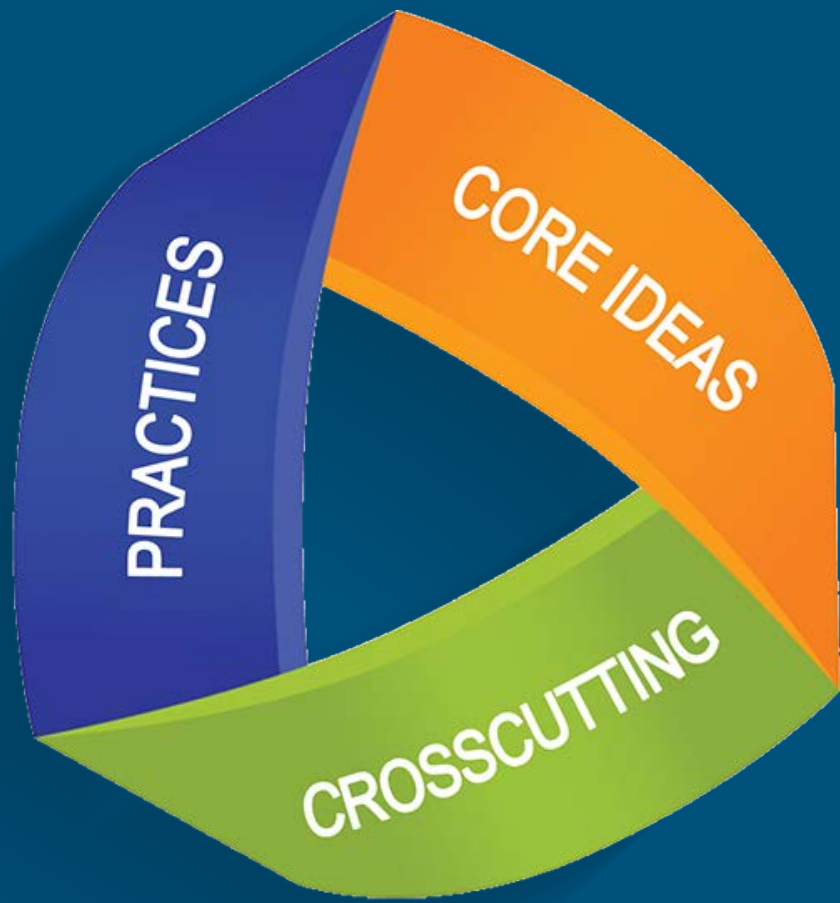
# 3 Dimensional Learning

SCIENCE & ENGINEERING PRACTICES

CROSS CUTTING CONCEPTS

DISCIPLINARY CORE IDEAS
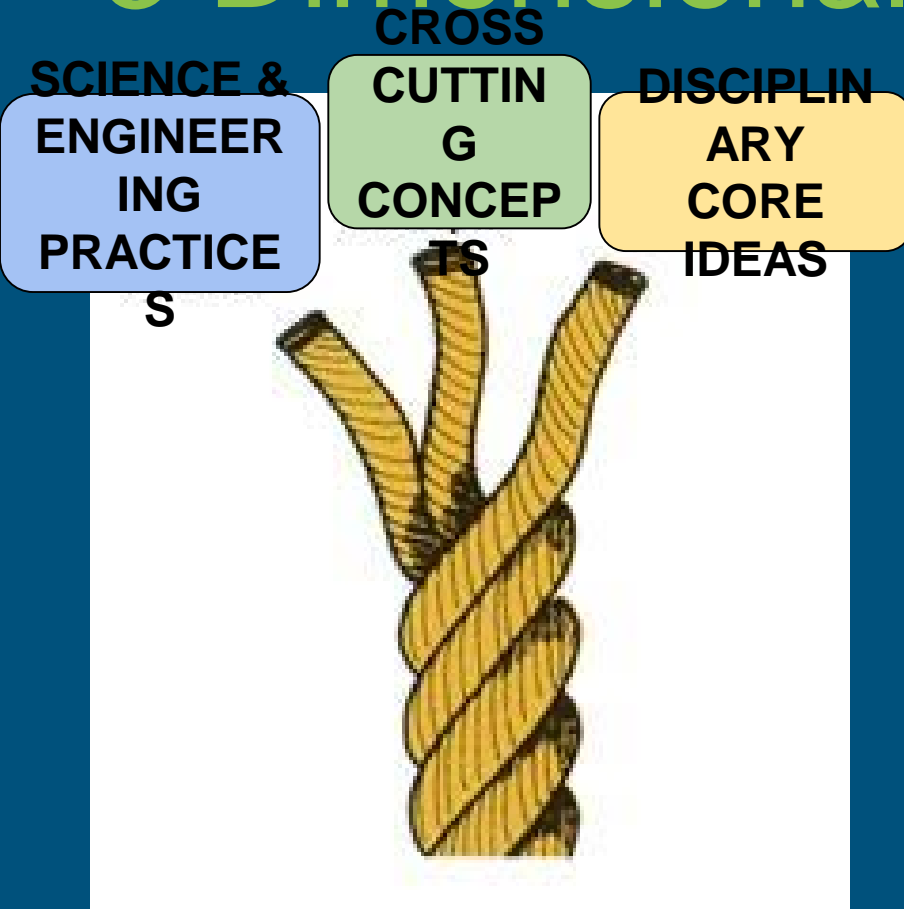
SCIENCE & ENGINEERING PRACTICES (SEPs)
Skills scientists and engineers use to investigate phenomena

CROSS CUTTING CONCEPTS (CCCs)
A set of lenses used to explore and analyze phenomena

DISCIPLINARY CORE IDEAS (DCIs)
Information used to reason about & explain phenomena

# Science & Engineering Practices

1. Asking questions and defining problems
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 and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

# Cross-Cutting Concepts

1. Patterns
2. Cause and Effect
3. Scale, portion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

How scientists and engineers THINK.

# Disciplinary Core Ideas

**What scientists and engineers KNOW.**

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

| Earth & Space Science | Engineering & Technology |
|---|---|
| **ESS1:** Earth's Place in the Universe<br><br>**ESS2:** Earth's Systems<br><br>**ESS3:** Earth and Human Activity | **ETS1:** Engineering Design<br><br>**ETS2:** Links Among Engineering, Technology, Science, and Society |

# Comparison

## Current CA Science Standards (Gr. 2)

**Know**
- Students know objects fall to the ground unless something holds them up.

**Do**
- Students will write or draw descriptions of a sequence of steps, events, and observations.

## NGSS Performance Expectation (Gr. 2)

**Know & Do**

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.