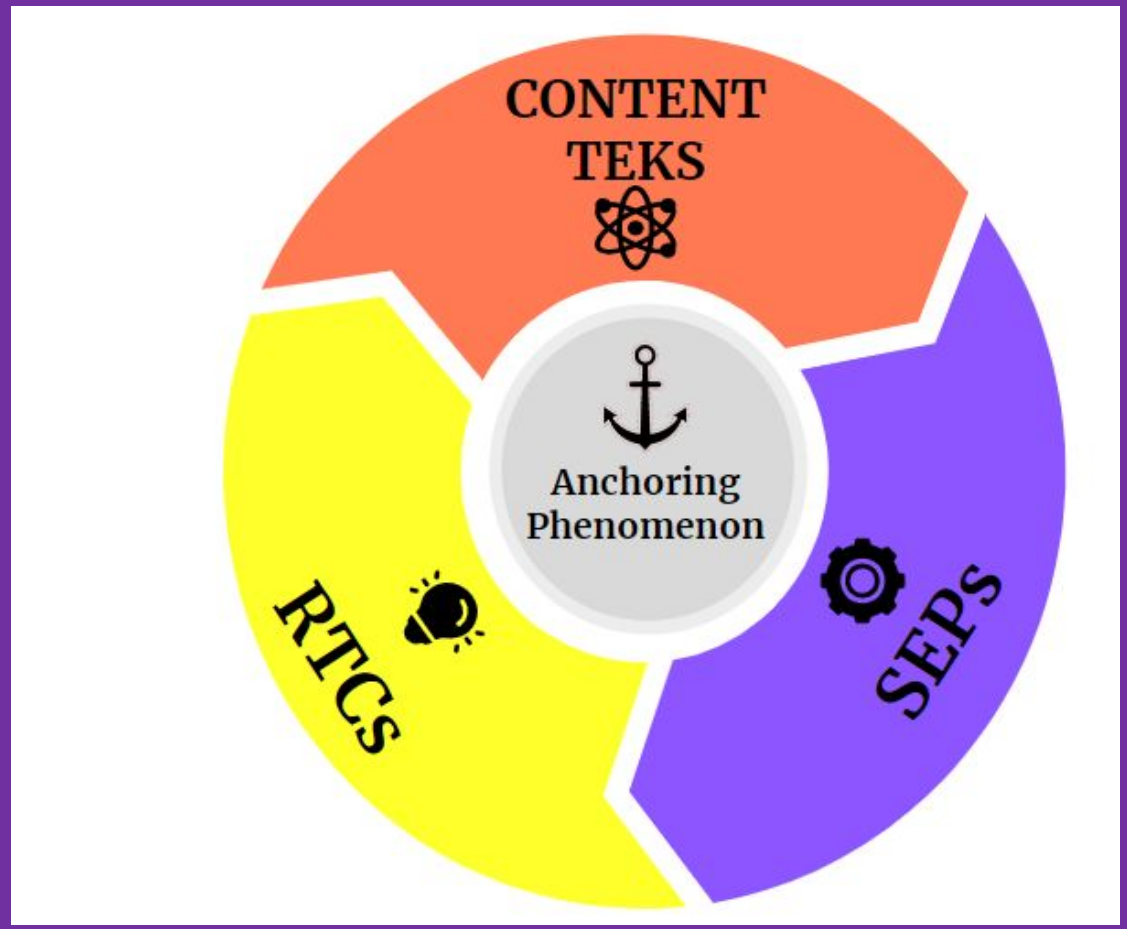
3D Learning

Mrs. Davenport

Learning Objectives:

- Describe the new Science and Engineering Practices (SEPs) and Recurring Themes and Concepts (RTCs).
- Learn the types of phenomenon and how it may look in the classroom.

What does it mean to teach in 3D?



Scientific & Engineering Practices (SEPs)

K-12 Framework defines 8 practices, which Texas organized into 3 main categories (plus added a 4th category)

1. Carrying out investigations & gathering/ organizing data
    - Asking questions (for science) and defining problems (for engineering)
    - Developing and using models
2. Analyzing & interpreting data
    - Using mathematics and computational thinking
3. Developing conclusions & communicating findings
    - designing solutions (for engineering)
4. Understanding contributions of scientists & the importance of scientific research

Recurring Themes & Concepts (RTCs)

Provide a framework for making connections ***horizontally*** across disciplines and ***vertically*** across grade-levels

- Patterns
- Scale, proportion, quantity
- Systems & System Models
- Cause & Effect
- Energy & Matter
- Stability & Change
- Structure & Function

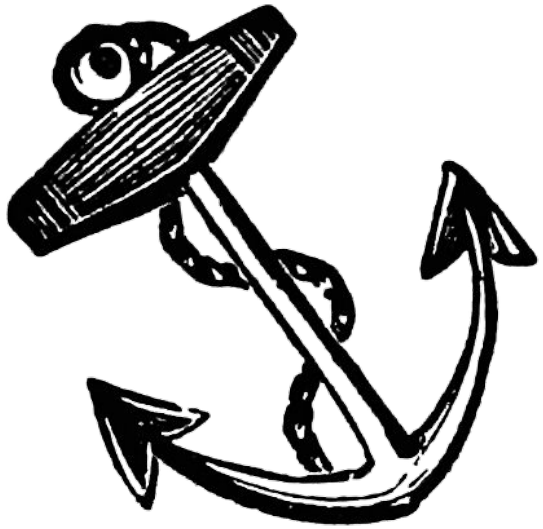
What is a phenomenon?

-Investigating Phenomena

A phenomena is a fact, occurrence, or circumstance observed or observable

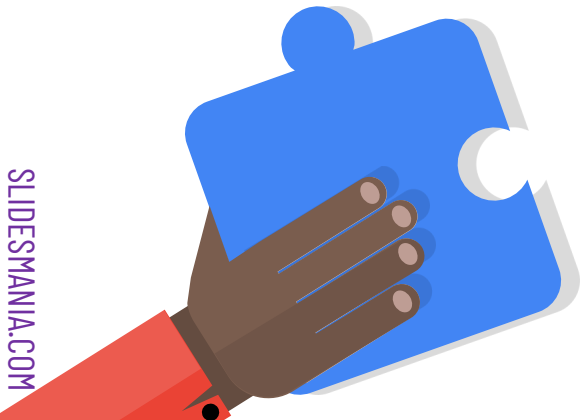
WHAT MAKES A PHENOMENON AN

ANCHOR



INSTEAD OF SIMPLY A

HOOK?



Why would we use a phenomenon to teach science concepts?

Here's Why.....

1. Experiences hold more water with students.
2. Inquiry! Critical thinking skills engaged.
3. Scientific discourse. Getting students to talk about the science.
4. Exposing students to practice and use various models.
5. Leverages student prior knowledge and experience.

Scientific and Engineering Practices

The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, **explain phenomena** , or design solutions using appropriate tools and models.

This is done through **INVESTIGATIONS!**

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Types of Phenomena

Anchoring Phenomena

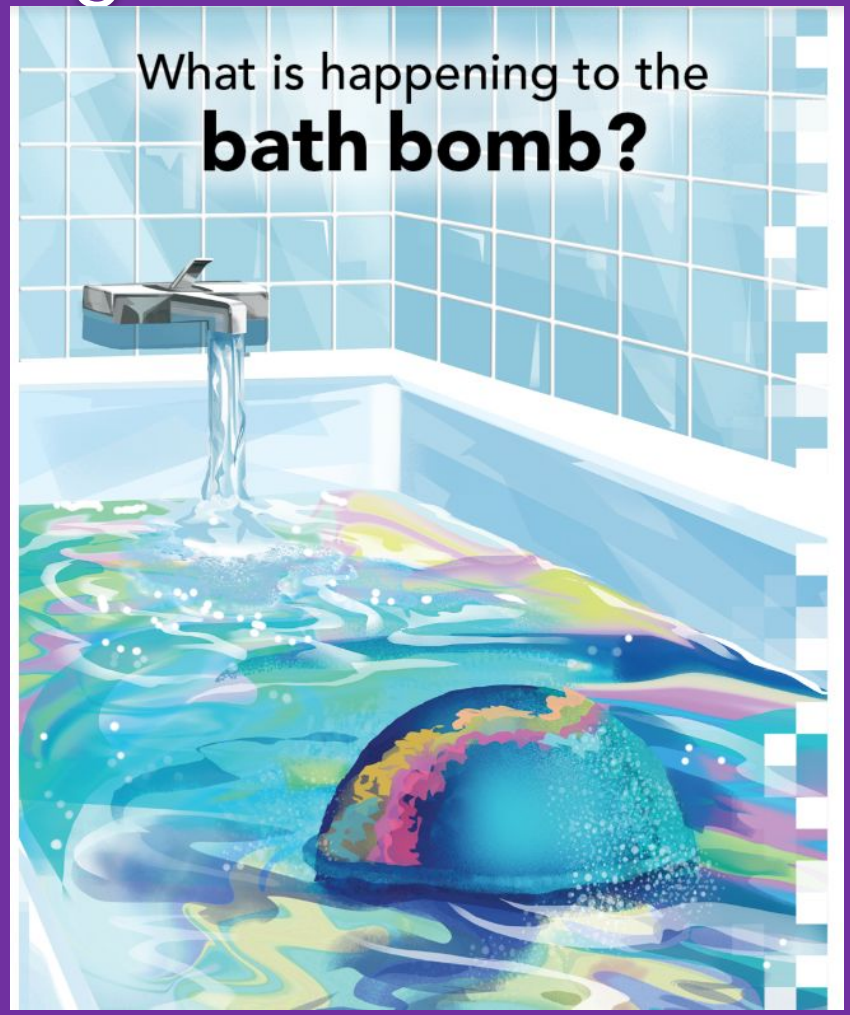
Anchoring phenomena are the focus of an instructional unit and connect student learning across multiple weeks of instruction. They often require significant or in depth understanding of several science ideas as well as multiple lines of evidence and reasoning to adequately explain. Because of their size or scale, students may only be able to explain particular aspects of an anchoring phenomena.

Investigative Phenomena

Investigative phenomena are used in instructional sequences (across several lessons) to provide students personal experience with observable events where an evidence based explanation can be constructed. They often require understanding or use of a fewer number of connected science ideas to explain. By explaining investigative phenomena, students begin to explain aspects of an anchoring phenomena.

Let's Look!: Anchoring Phenomena

With a partner, use CER to answer the following question.



ANCHORING **PHENOMENON**

NAME _____ CLASS _____ DATE _____

What is happening to the bath bomb?

Bath bombs come in an all shapes, sizes, and colors. In addition to other ingredients, most bath bombs contain sodium bicarbonate and citric acid. Drop one into warm water, and it bursts into action. The bath bomb fizzes as it dissolves, producing bubbles of a gas, carbon dioxide (CO_2). When the fizzing stops, all you see is a tub of colored water. Where did the bath bomb go?

SEP Claim-Evidence-Reasoning

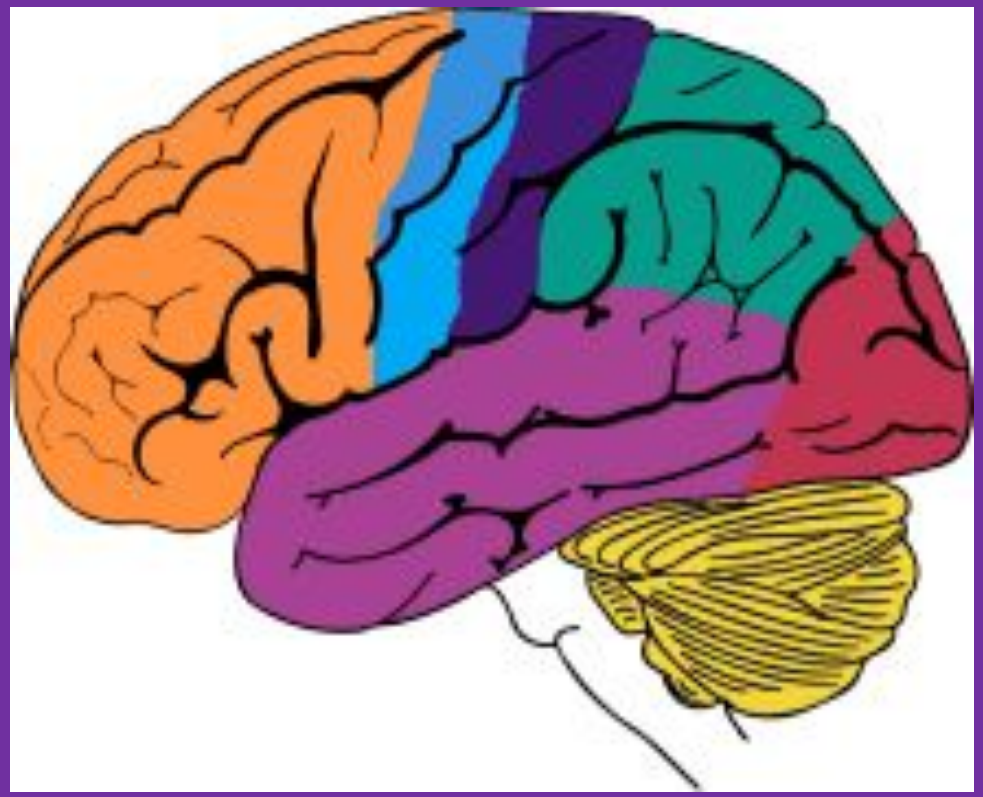
Claim What is happening to the bath bomb?	
Evidence Cite evidence from the video or your own knowledge that supports your claim.	
Reasoning In 1–2 sentences, explain how your evidence supports your claim.	

Let's see this process.....

While watching.....

- What was the teacher doing?
- What were the students doing?
- How did the students encourage students to engage?

Brain Break



Investigative Phenomena: DQB process to start a unit

1. Teacher creates a driving question based on topic(ex:phenomena)
2. Teacher asks each student to write a investigable question connected with the DQ.
3. Ask students to consider if their question is investigable.
4. Teacher asks students to state their questions and use rationale on how it relates to the DQ or to the prior student's question.

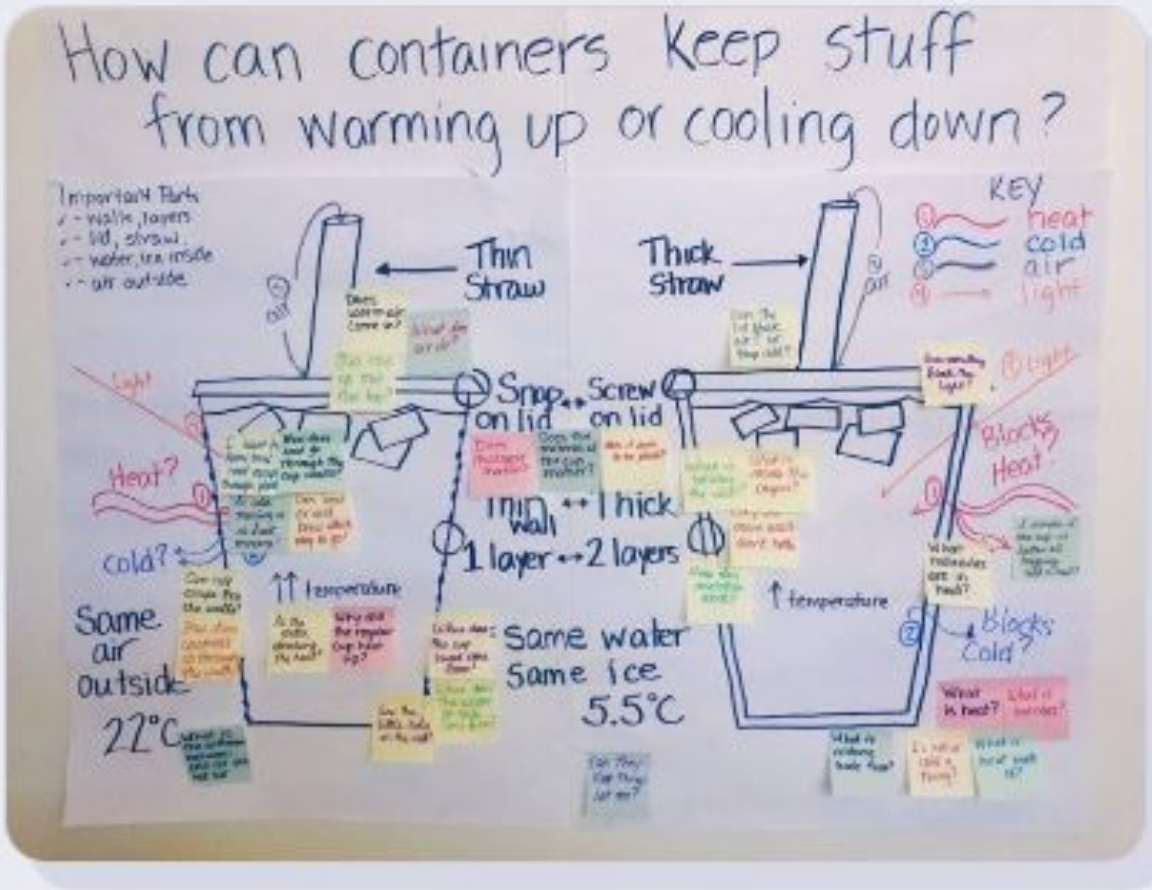
Sentence Stems

Skill	Sample Stems
Ask questions to yourself to make meaning of the most important facts or ideas you read or hear.	What seems to be the most important idea? What is confusing me? What don't I understand? How would I explain this in my own words?
Ask questions to connect content to what you already know.	What comes to mind when I read (or hear) this? What do I already know about this? Does this contradict something I think I already know? In what ways does this add to or extend what I already know?
Ask questions to clarify and better understand the meaning of a topic or text	What did the author mean when she wrote _____ ? What do you mean when you say _____ ? Can you say this in another way? What example can you give? How would you summarize _____?
Ask questions to understand the relationship between two different things.	How is _____ similar to _____? How is _____ different from _____? What do ____ and ____ have in common? What may have contributed to _____? What resulted from _____?
Inquire about the importance or value of something.	What contributes to the significance of _____? How might we go about evaluating _____? What criteria (or standards) could we use to judge _____?
Express curiosity.	I wonder why _____. How might we _____? Have you ever thought about _____?
Challenge a traditional way of thinking about a topic.	What might be an alternative way of thinking? What if _____ ? What's another way of thinking about_____ ?
Test new ideas.	I am thinking _____. How do others react? Imagine _____. How might that play out? What if _____?

Investigative Phenomena; Let's Practice

1. Look at the phenomenon with your partner.
2. Pick a driving question for each phenomena.
3. Share out.

Driving Question Board



This Driving Question Board is built upon the class' consensus model for the phenomenon.

Let's see the DQB in Action!

1. What did you notice?
2. What did you learn?
3. How will you incorporate this into your classroom?

Thank you!
Any questions?