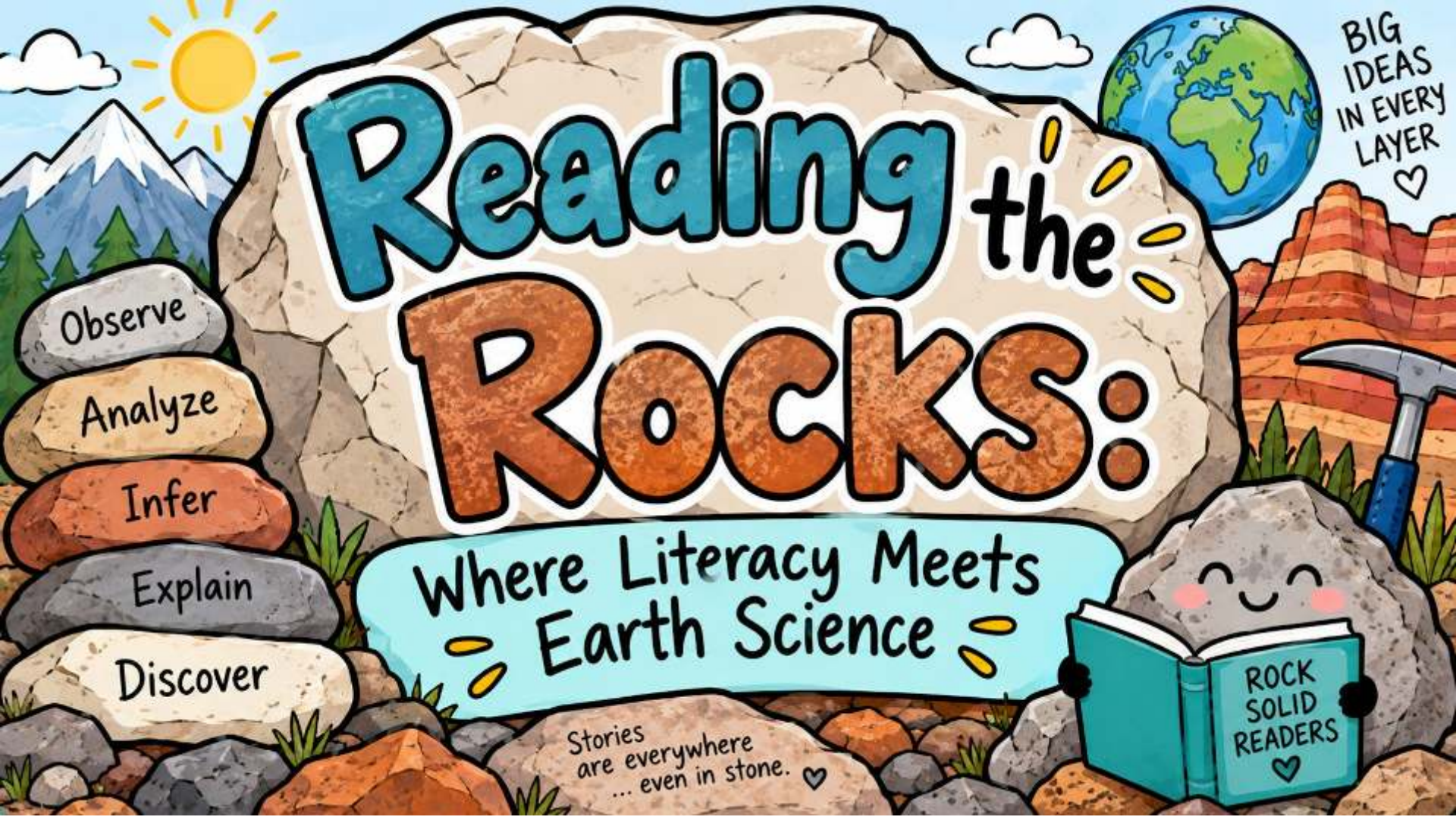




Reading the Rocks:

Observe

Analyze

Infer

Explain

Discover

Where Literacy Meets
Earth Science

Stories
are everywhere
... even in stone. ♥

BIG
IDEAS
IN EVERY
LAYER ♥

ROCK
SOLID
READERS ♥

Earth Processes Resources



From Natalie Dalton's Presentation

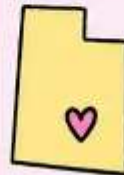


My Teaching Journey

Different Places ♥ Amazing People ♥ A Lifelong Learner

Same
Heart
Same Passion
Brighter
Futures

Beaver County School District



- 15 years teaching 2nd grade
- 1 year teaching 3rd grade

Small District = A Billion Hats!

- District ELL Director
- District Leadership Team



Alpine School District

- Alpine Math Leadership Team
- Alpine Science Leadership Team
- Multiple School Leadership Positions



New experiences.
Bigger impact.
Always learning.

Riverview Elementary

3 years

5th Grade



2 years

5th Grade



1 year

5/6th Split



This Year

6th Grade



Different classrooms.
Different roles.
Same mission...
Brighter futures.

Same Teacher
Bigger Adventures!



Ultimately...

I've learned the very most by just continually seeking knowledge.



GRATEFUL FOR THE PAST ♦ EXCITED FOR WHAT'S NEXT ♦ ALWAYS A LEARNER

Popcorn!



Is it soup, salad,
or a sandwich?



Popcorn-

Is it soup, salad, or a sandwich?

Use CER to explain your thinking!



Soup?



Salad?



Sandwich?

There is no right answer—just strong reasoning!

C = CLAIM

Tell what you think.

- I think popcorn is a _____ because _____.
- In my opinion, popcorn is a _____.
- I believe popcorn fits best in the _____ category.
- My claim is that popcorn is a _____.

E = EVIDENCE

Give reasons or examples to support your claim.

- One reason is _____.
- For example, _____.
- I know this because _____.
- Another piece of evidence is _____.
- The text/definition says _____.
- You can also see that _____.

R = REASONING

Explain how your evidence supports your claim.

- This shows that _____ because _____.
- This evidence supports my claim because _____.
- Therefore, popcorn can be considered a _____.
- This makes sense because _____.
- Overall, this is why I think popcorn is a _____.

Good discussions are made with claims, evidence, and reasoning!



Popcorn:

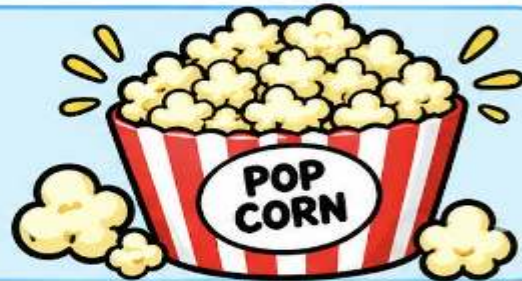
Let's use strong reasoning to find out!

Is it soup, salad, or a sandwich?

We know that a salad is defined as a dish consisting of a mixture of small, separate, and bite-sized pieces of food, often tossed together with an optional dressing or seasoning.



We see that a bowl of popcorn consists of dozens of individual, irregular puffed kernels piled together, which can be tossed with butter, salt, or sweet toppings without melting or blending into a single uniform mass.



Because of this, it means popcorn structurally fits under the category of a salad.



Therefore, popcorn is a salad!

Counter Arguments

Why might someone argue that popcorn is a...

Look at all sides!
Good discussions consider different points of view!

A Soup?



Someone might argue...

- It's served in a bowl, like soup.
- It can be a warm, comfort food, like many soups.
- Some versions (like popcorn with flavored butter or cheese) have liquid added, similar to a broth or sauce.
- It's made up of small pieces, like ingredients in a soup.

“It's a bowl full of warm, seasoned pieces—just like soup!”

A Sandwich?



Someone might argue...

- It can be eaten between two pieces of bread (a popcorn sandwich does exist!).
- It is a filling, just like other sandwich ingredients.
- It's handheld and can be eaten on the go.
- There are creative recipes that turn popcorn into a sandwich, so it can fit the category.

“If you put it between bread, it becomes a sandwich!”

A Salad?



Someone might argue...

- It's a mixture of many small, separate pieces.
- It can be tossed with different ingredients (butter, salt, chocolate, candy, etc.), similar to how salad ingredients are mixed.
- It's often served in a bowl.
- There are “snack mixes” that include popcorn with other ingredients, like a mixed salad.

“It's a mix of small pieces tossed together—just like a salad!”

Thinking about counter arguments makes our reasoning stronger!

SAME THINKING. DIFFERENT TOPICS.

Soup-Salad-Sandwich helps you practice the same kind of thinking you use in science (CER) and in reading and writing.

SOUP - SALAD - SANDWICH

A low-stakes argument.



Is a taco a soup, salad, or sandwich?

CLAIM

A taco is a sandwich.

EVIDENCE

The filling is held inside a tortilla.

REASONING

Sandwiches use a bread or bread-like structure to hold ingredients together. A tortilla works the same way.

Show Form Filling Toolbar



SCIENCE (CER)

Use evidence to explain what the data show.



What does the evidence show about the Hawaiian Islands?

CLAIM

The Hawaiian Islands form a chain.



EVIDENCE

The maps and images show the islands lined up and underwater mountains beneath the ocean.

REASONING

A chain is a pattern of features in a line or sequence. The evidence shows the islands and underwater mountains form a sequence, so they make a chain.

LITERACY

Use evidence to support your interpretation.



What does the evidence show about a character, idea, or theme?

CLAIM

The character is courageous.



EVIDENCE

The character returns to help a friend even though it is dangerous.

REASONING

Courage means doing something despite fear or risk. The character's actions show courage, so the evidence supports this claim.

WHAT DO YOU NOTICE?

All three use the same thinking:

- Make a claim.
- Use evidence from what you see or read.
- Explain how the evidence supports your claim (reasoning).

HOW MIGHT THIS HELP YOU IN SCIENCE AND IN READING AND WRITING?

THE CONTENT CHANGES. THE THINKING DOESN'T.

Reflect on Current Reality



BIG
IDEAS
START
HERE

Quick Write



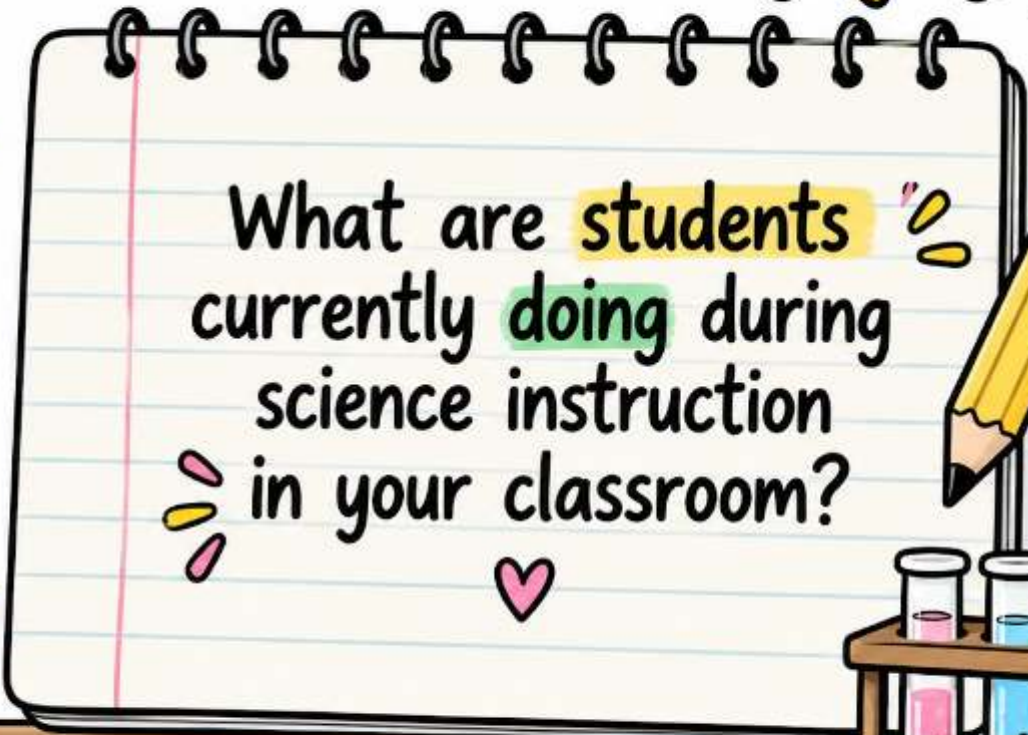
1 Minute

Record your thoughts
on the back of a
student notebook.

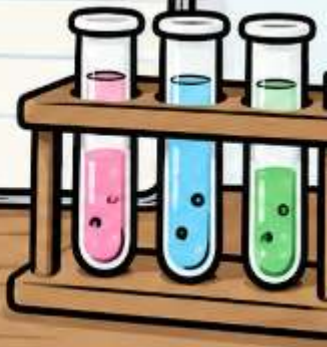
Focus on
student actions!



SCIENCE
MATTERS



What are students
currently doing during
science instruction
in your classroom?



Same Students ♥ New Discoveries ♥ Brighter Futures

Reflect on Current Reality

Great Thinking Happens Together!

Turn and Talk



Find a partner and discuss:

Focus on student actions!

What routines or structures you currently use support student thinking and discussion?

Good Ideas!



Same Students ♥ New Ideas ♥ Brighter Futures





Good thinkers ask great questions!

SOCRATIC SEMINARS

Real Questions. Respectful Talk. Deeper Thinking.

It's not about having the right answer.
It's about thinking together!
♥

WHAT IS A SOCRATIC SEMINAR?

A Socratic Seminar is a structured discussion where students explore a big question by:

- listening carefully
- sharing thoughtful ideas
- using evidence
- building on each other's thinking
- considering different perspectives

A conversation that goes deeper!

WHY DO IT IN 5TH GRADE?

- ✓ Builds critical thinking skills
- ✓ Helps students communicate clearly
- ✓ Teaches active listening and respect
- ✓ Builds confidence in speaking
- ✓ Prepares students for middle school and beyond
- ✓ Makes reading more meaningful
- ✓ Helps students see different perspectives

THE TEACHER'S ROLE

- Choose a meaningful text and big question.
- Teach and model discussion skills.
- Set clear norms and expectations.
- Use sentence stems and visuals.
- Facilitate, don't lead the discussion.
- Keep the conversation focused and respectful.
- Step in only when needed (to redirect, invite new voices, or deepen thinking).

GUIDE

SUPPORT

LISTEN

EMPOWER

TEACH THE DISCUSSION SKILLS

- 1 Listen actively (eyes on speaker).
- 2 Take turns speaking.
- 3 Speak clearly and stay on topic.
- 4 Use evidence from the text.
- 5 Build on others' ideas.
- 6 Ask thoughtful questions.
- 7 Respect different opinions.
- 8 Be open to changing your thinking.

Talk to learn, not to win!

USE SENTENCE STEMS

- I think...
- I agree with ____ because...
- I would like to add...
- Can you say more about that?
- I'm wondering...
- The text says...
- That makes me think...
- I see it differently because...
- A question I have is...



A SIMPLE PROCESS

- 1 **Introduce the text.**
Read and build background knowledge.
- 2 **Generate questions.**
Students write and discuss possible questions.
- 3 **Choose the question.**
Select one that is open-ended and meaningful.
- 4 **Discuss!**
Students have a structured, respectful discussion.
- 5 **Reflect.**
Students think about what they learned, what changed, and what they are still wondering.

KIND WORDS + CURIOUS QUESTIONS = BIG THINKING

Respectful discussions build a stronger, kinder classroom!



Teach It in Small Steps

Building Confident Discussion Skills

Small steps lead to BIG conversations!

1 Introduce

Explain what a Socratic Seminar is and why we do it. Show a short example.

A respectful conversation where we explore a big question together!

2 Teach and Model the Sentence Stems

Introduce just a few key stems. Model how to use them with students.

I think...

Can you say more about that?

I'd like to add to what ____ said.

3 Do a Short, Low-Stakes Practice Round

Use a simple, fun topic (e.g., pancakes or waffles?). Give students a few minutes to try it out.



The goal isn't the "right" answer—it's practicing the skills!

4 Give a Focus for Each Round

Start with one skill at a time. Example:

- Round 1: Everyone shares an idea.
- Round 2: Respond to someone else.
- Round 3: Ask a follow-up question.

Focus Ideas:

- ☒ Share an idea
- ☒ Build on an idea
- ☒ Ask a question
- ☒ Respectfully disagree

Add more skills in future rounds!

5 Reflect

After the discussion, ask:

- What went well?
- What helped the conversation?
- What could we do even better next time?

Think about how we talked, not just what we said!

6 Keep Practicing

Use new topics and add new skills over time. Students will become more confident and independent!



♥ Practice today. Powerful discussions tomorrow. ♥



Discussion Challenges

Use these challenges to build your discussion skills!

Same skills.
Bigger thinking!
♥

1

Share Your Own Idea

Start the conversation by clearly sharing your thinking.



"I think ____
because ____."

2

Build on Someone's Idea

Connect to what someone else said.



"I'd like to add to
what ____ said..."

3

Ask a Genuine Follow-Up Question

Show you are listening by asking for more information or clarification.



"Can you say more
about ____?"

4

Respectfully Disagree

Share a different perspective in a kind and thoughtful way.



"I see it differently
because ____."

5

Refer Back to Something Said Earlier

Make a connection to a previous idea in the discussion.



"Earlier, ____ said ____.
That makes me think..."

6

Revise or Change Your Thinking

Be open to new ideas and show how the discussion influenced your thinking.



"At first I thought ____,
but after hearing ____,
now I'm thinking ____."

Listen.
Think.
Respond.
Grow
♥

Great conversations don't just happen...
we practice them!

Different
ideas make
stronger
thinking!
♥

Great questions help us share ideas, listen to others, and think more deeply!

Socratic Seminar

Simple Topics to Start With

These topics are not about right or wrong answers. They are just for practice and fun!



Is pizza better with lots of toppings or just a few?



Would you rather have a dog or a cat? Why?



Should school start later in the morning?



Should kids have homework? Why or why not?



Is a cone better than a cup?



Are board games better than video games?



Is it better to read the book or watch the movie?



Which season is the best? Why?



Should older students still have recess?



Is it better to work alone or with a group? Why?



Does music help people work better?



Are breakfast foods better than dinner foods?



Would flying or invisibility be the better superpower? Why?



Would you rather explore space or the deep ocean? Why?



Would you rather have \$100 now or \$10 every week for a year? Why?



Would you rather be really good at one thing or pretty good at many things? Why?

SAME SKILLS.
ANY TOPIC.

Real conversations. Bigger thinkers! ♥

PRACTICE TODAY.
USE IT EVERYWHERE!



From Socratic Seminars to Scientific Circles

The same thinking. A new topic. Real-world science.



SOCRATIC SEMINAR

Deep conversations about complex texts.

- ✓ Students read a text closely.
- ✓ Prepare questions and ideas.
- ✓ Listen actively and build on others' ideas.
- ✓ Use evidence from the text.
- ✓ Respectfully disagree and ask for clarification.
- ✓ Explore big ideas and multiple perspectives.
- ✓ The teacher facilitates, not leads.



THE TRANSFER

The same discussion skills that help students analyze ideas in ELA also help them think like scientists!

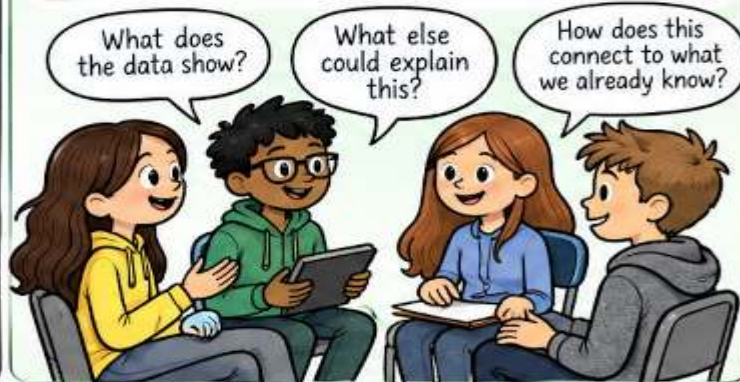
SHARED SKILLS

- ✓ Ask thoughtful questions ("I wonder...")
- ✓ Use evidence to support ideas
- ✓ Listen and build on others' thinking
- ✓ Consider multiple perspectives
- ✓ Explain and justify reasoning
- ✓ Engage in respectful, focused discussions

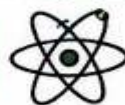
SCIENTIFIC CIRCLES

Collaborative conversations about real-world science.

- ✓ Students explore a scientific question, data, or phenomenon.
- ✓ Prepare questions using observations and evidence.
- ✓ Discuss ideas, claim-evidence-reasoning, and possible explanations.
- ✓ Listen actively and build on others' ideas.
- ✓ Use evidence from data, investigations, or credible sources.
- ✓ Respectfully disagree and ask for clarification.
- ✓ The teacher facilitates, not leads.



Great readers ask big questions. Great scientists do too!



Discussion builds understanding—in every subject.

Student Sensemaking

Curious
Learners
Brighter
Futures



Students learn science deeply
when they are actively:

- making observations
- discussing ideas
- asking questions
- using evidence
- revising thinking
- modeling and explaining
- figuring things out together

Real
'Thinking.
Real Learning.
Real Impact.



Science
makes sense
when we think
together!

SAME QUESTIONS ♥ NEW DISCOVERIES ♥ BRIGHTER FUTURES



What is the
current reality
of Literacy to help with
sense making in science
in your classroom?

Let's be real. Let's learn together. ♥



Same
Big Questions.
Brighter
Learning. ♥



As We Go Through the Lesson...

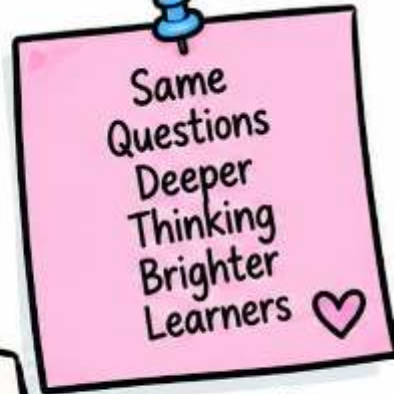
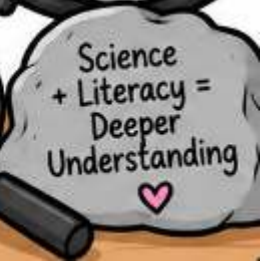


1

Think about how literacy is helping with sensemaking of science.

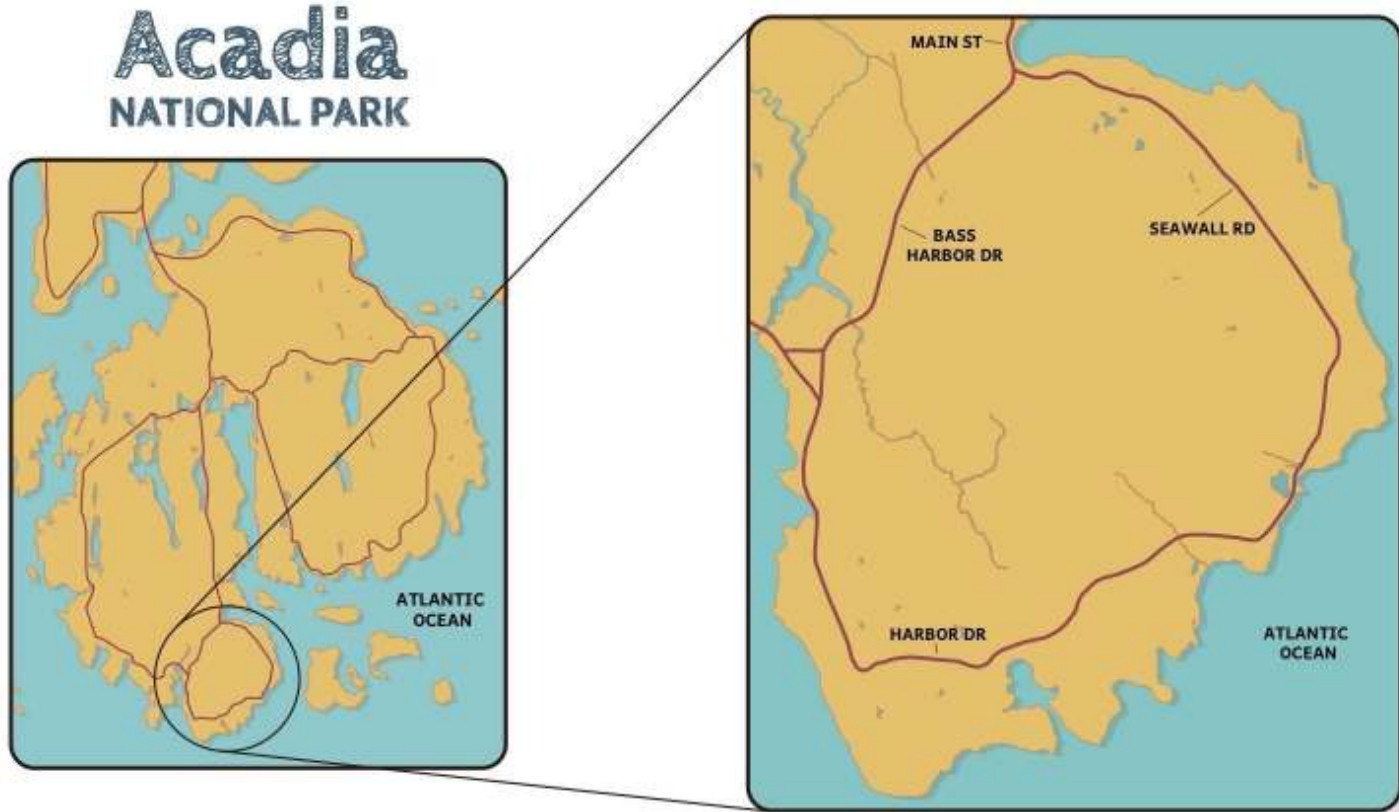
2

Pay attention to what students are doing.



Obtain information from maps

C



Explore a new phenomenon



Bar Harbor Story

Explore a new phenomenon



Friends of Acadia

Explore a new phenomenon



Bar Harbor Story

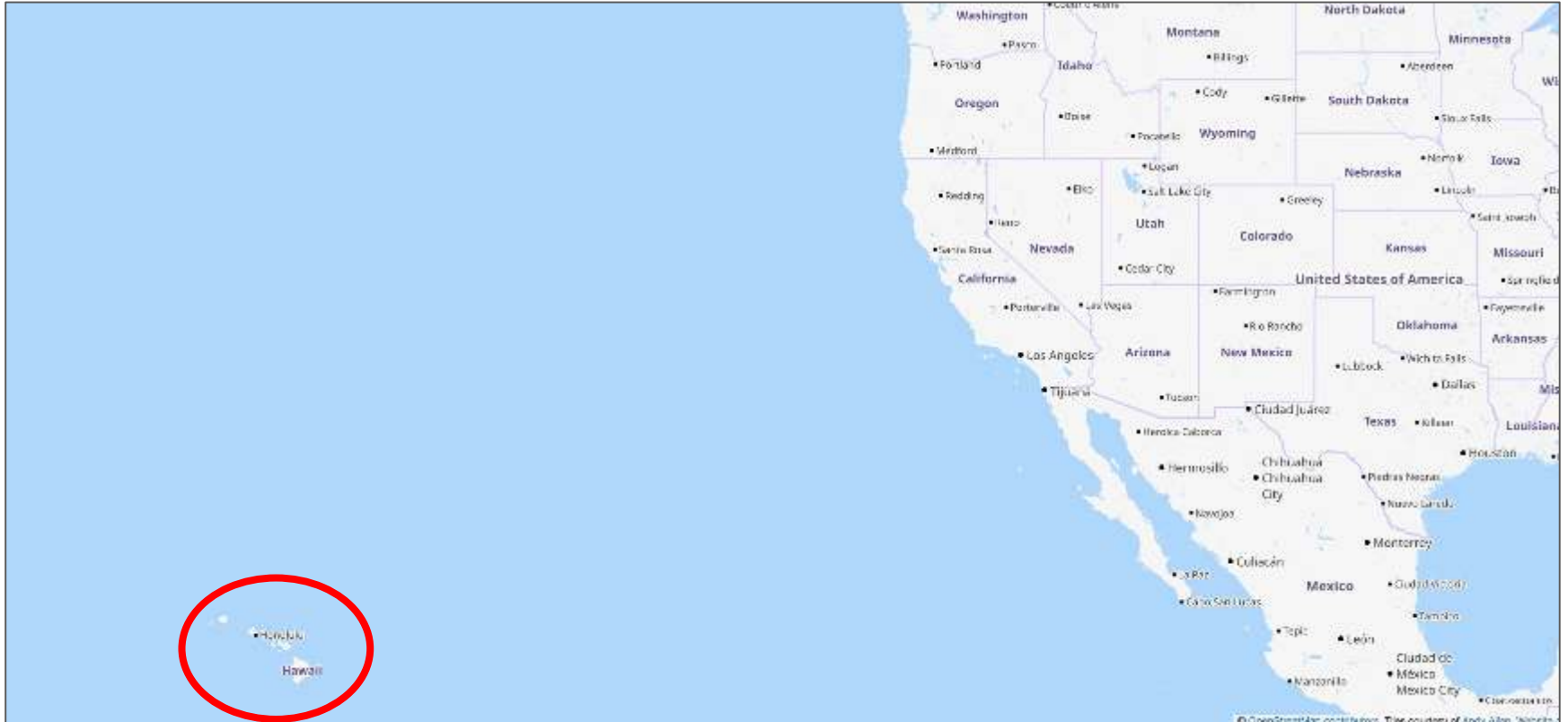




Hawaii Volcanoes National Park

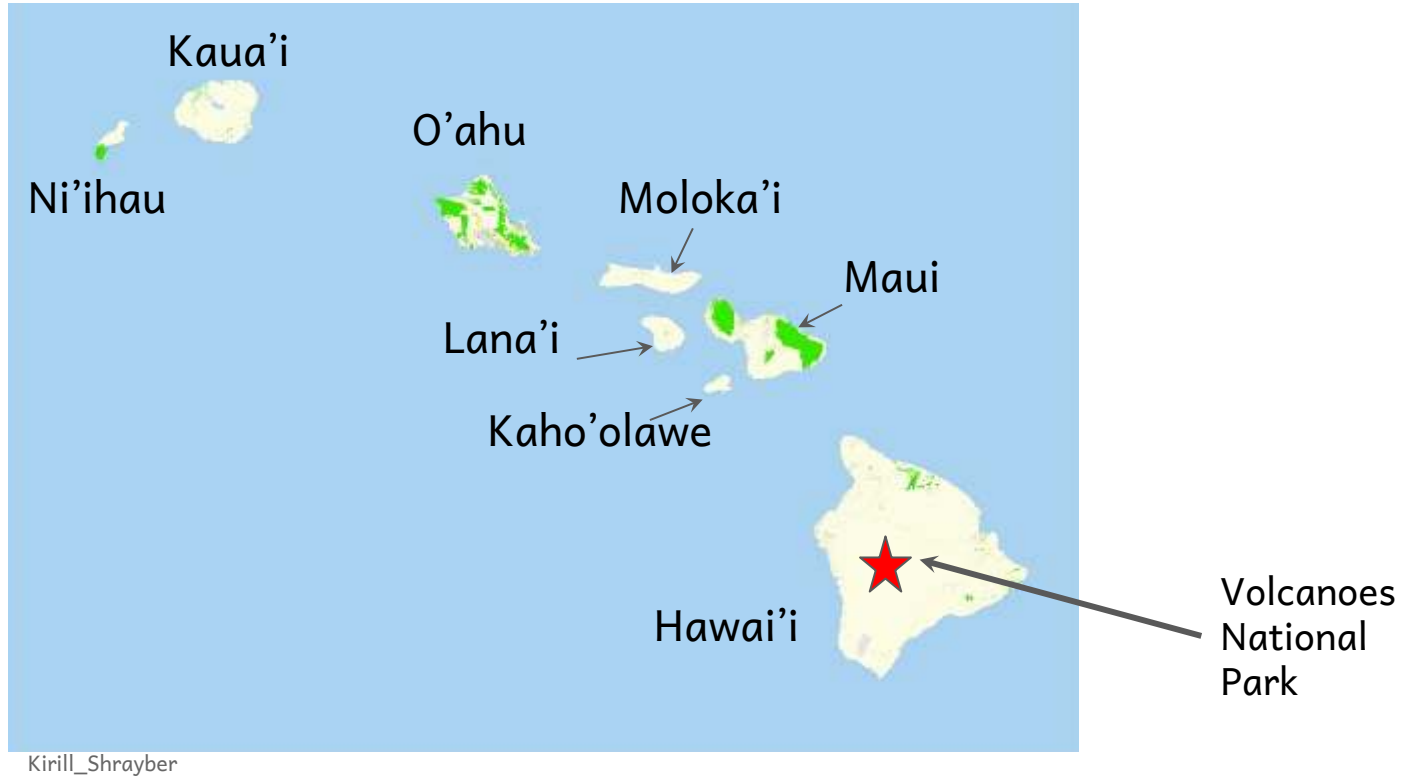


Notice and wonder



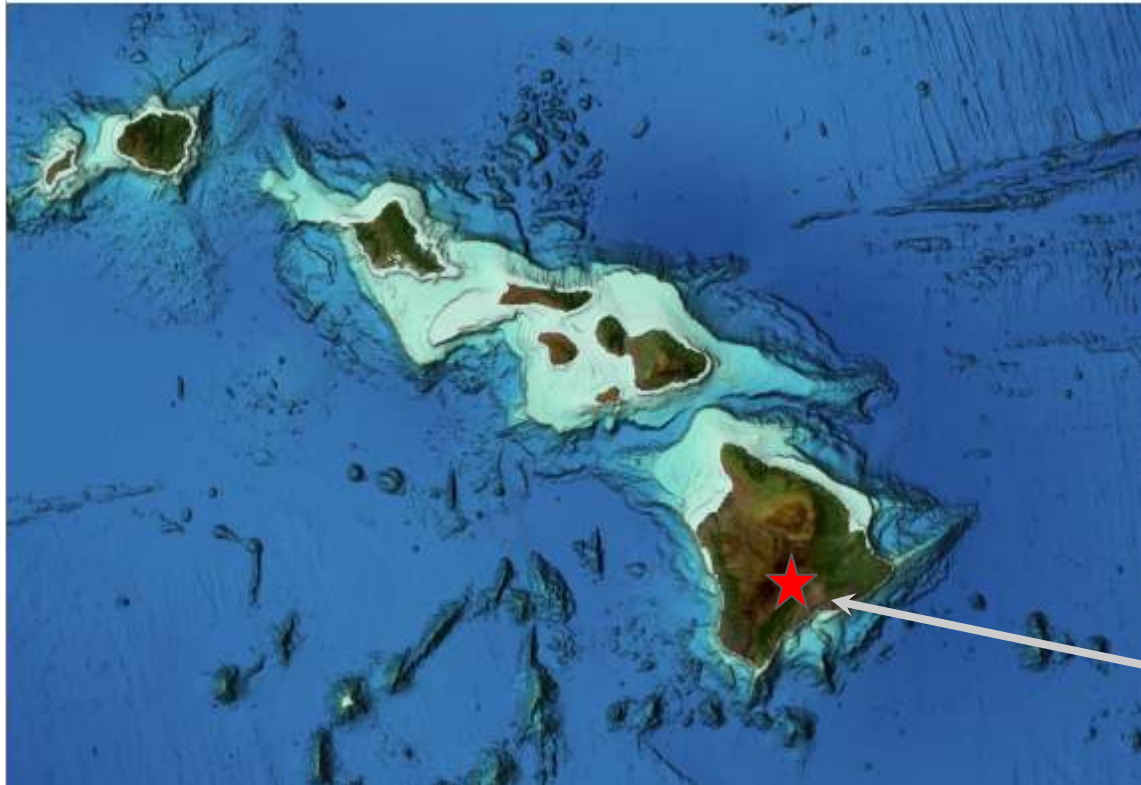
Notice and wonder

D



Notice and wonder

E



Volcanoes
National
Park

Notice and wonder

F



Michael & Kevin in Kona CC BY 2.0

Notice and wonder

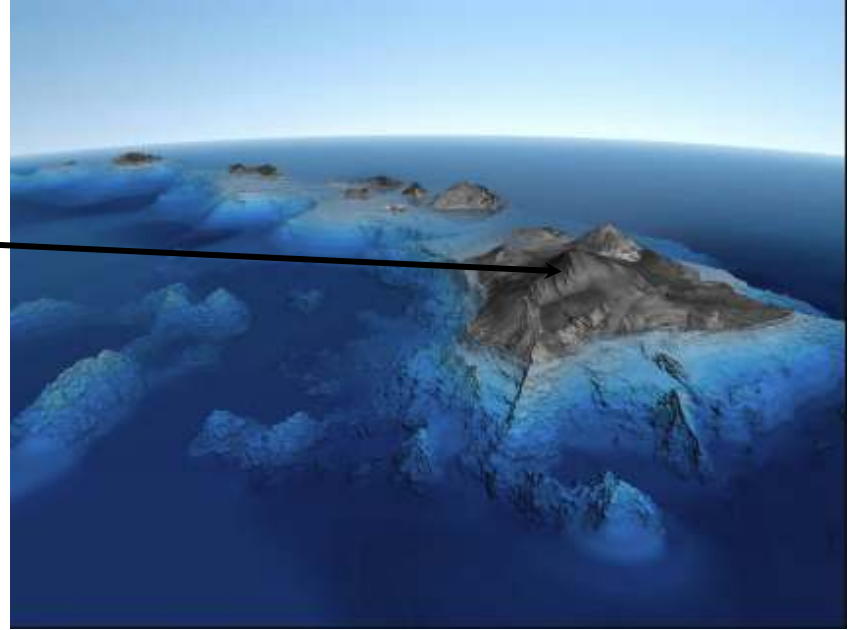


Kirill_Shrayber



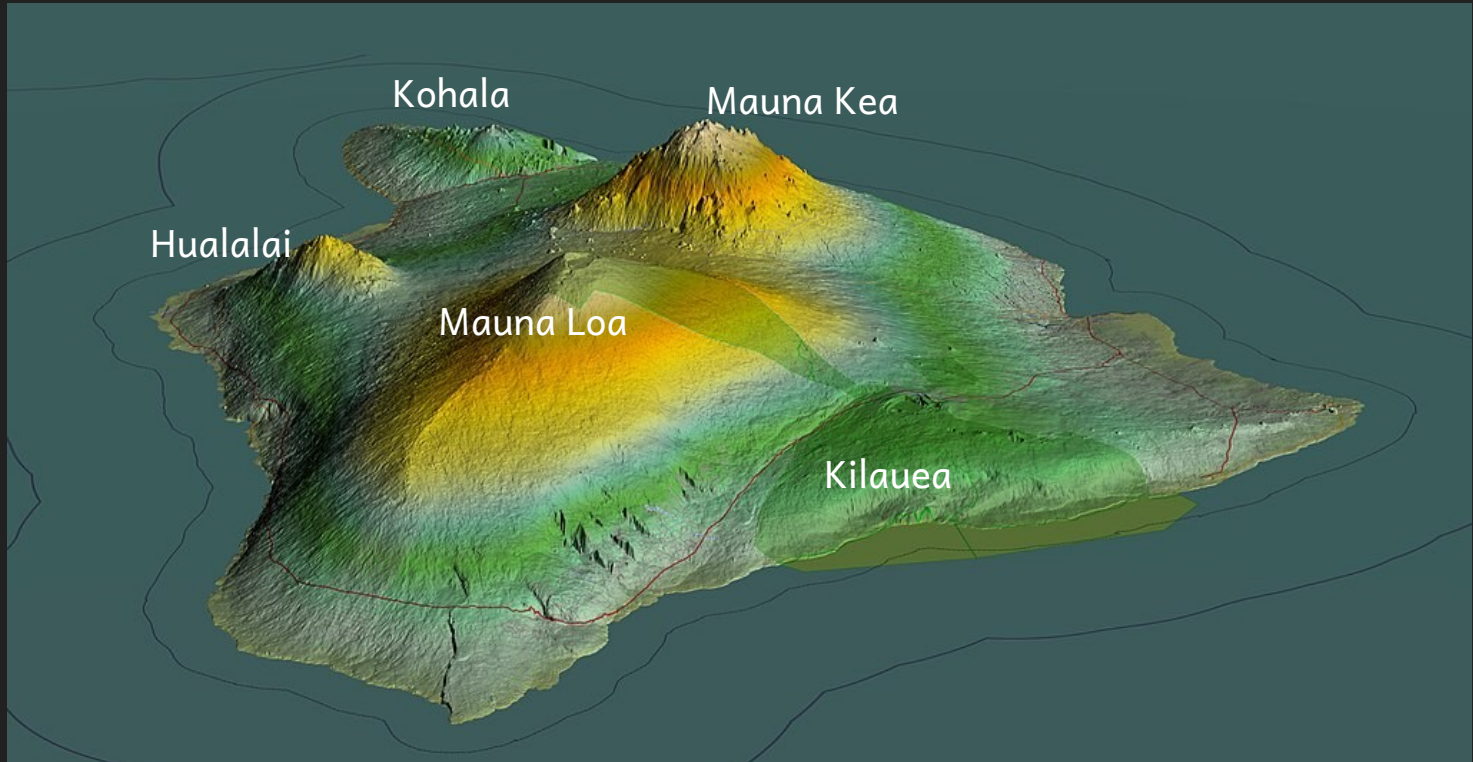
GEBCO

Volcanoes
National
Park



Michael & Kevin in Kona CC BY 2.0

Notice and wonder

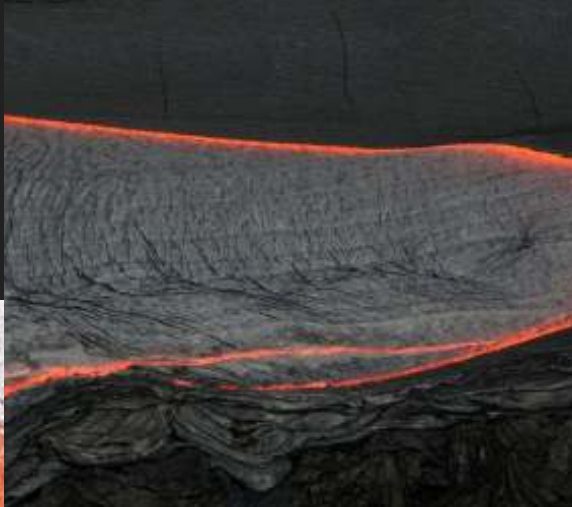


USGS CC BY-SA 3.0

Volcanoes on the island of Hawai'i

Notice and wonder

I



Arj7582



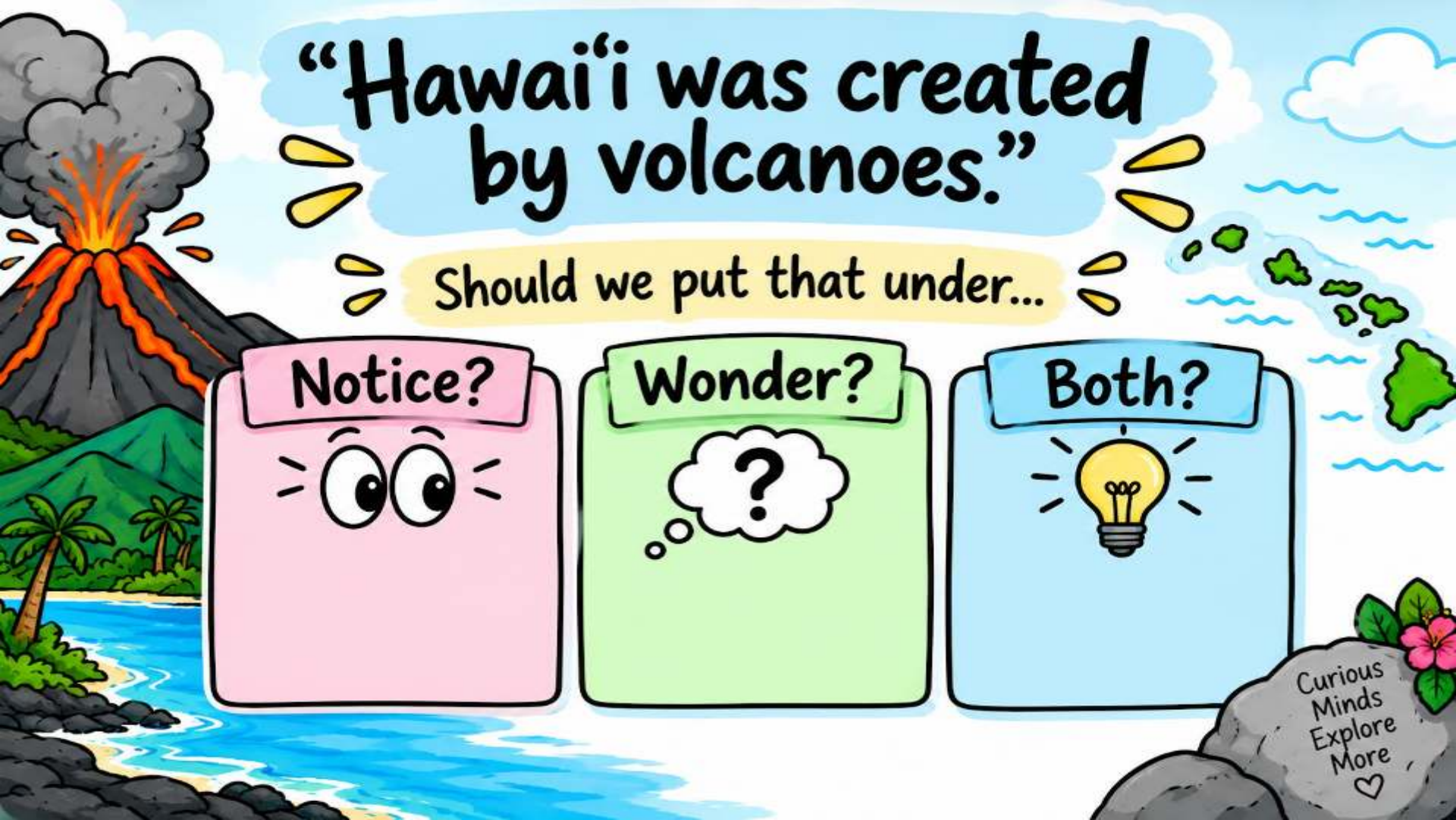
National Park Service

Notice

- Volcano even though not on Ring of Fire
- Far away from U.S.
- 8 islands
- Land is separated
- can't drive from island to island
- two islands not connected - light blue
- rocks under ocean - different colors
- maybe from volcanic eruption
- looks like islands connected under neath ~~water~~
- star is Volcano National Park
- 2-d map doesn't show much detail - other maps show more
- texture
- color - depth
- see one island to the next
- Middle of map islands - volcanoes, beaches on the edge (web)
- 3d map - looks like one big connected island
- volcanoes on island of Hawaii
- left - erupting lava
- right - volcanic eruption, lava starting to come up

Wonder

- Why is there a volcano in the middle of the ocean?
- How many islands are there?
- How far away is Hawaii from mainland U.S.?
- Why is Hawaii so far away?
- Which island has the most volcanoes?
- What are the labels? Are they cities?
- How many active/inactive volcanoes are in Hawaii?
- What are the green spots on the map? Are they mountains, volcanoes, sediments?
- Why is the island of Hawaii bigger?
- How deep is the light blue area on the map vs. the dark blue? Can I walk out on it?
- Are the rocks under the ocean caused by volcanic eruptions?
- Are the rocks under the water, shallow area, caused from lava cooling under water?
- Does the red line on the map show where water meets the shore?
- Did the ~~water~~ lava fall into the water and create land?
- How long does it take to create an island?
- How many volcanic eruptions took place?



“Hawai‘i was created by volcanoes.”

Should we put that under...

Notice?



Wonder?



Both?



Curious
Minds
Explore
More
♡

Look
Closer
Think
Deeper!

UPGRADE the OBSERVATION

Same place. More evidence. Better language. Deeper scientific thinking.

Hawai'i



C

Hawai'i in the Pacific



1. NOTICE IT

What do you see?

D

The Hawaiian Islands



2. NAME IT

Be more specific.
What feature(s) do you notice?

E

A Closer Look



3. LOCATE IT

Where are they?
What is their location?

F

Under the Ocean



4. FIND A PATTERN

What patterns do you notice?
What does this show you?

G

Putting It Together



5. CONNECT THE EVIDENCE

How do the images work together?
What can you conclude?

6.

ASK A BETTER QUESTION

What does this make you wonder?
What new question do you have?



Better observations lead to better questions. Better questions lead to new discoveries!



Curious
minds discover
more!

UPGRADE the OBSERVATION

Same place. More evidence. Better language. Deeper scientific thinking.

Hawai'i

A closer look helps us notice more. Let's upgrade our observations!



C Hawai'i in the Pacific



1. NOTICE IT

What do you see?

Hawai'i is in the middle of the Pacific Ocean, far from the mainland.



Wonder:

- Why is it so far from other land?
- How did it get there?

D The Hawaiian Islands



2. NAME IT

Be more specific.
What feature(s) do you notice?

Hawai'i is a group of islands. There are several islands, including Hawai'i, Maui, O'ahu, Kaua'i, Moloka'i, Lana'i, Kaho'olawe, and Ni'ihau.



Wonder:

- Why are there multiple islands?
- Why are the islands different sizes and shapes?

E A Closer Look



3. LOCATE IT

Where are they?
What is their location?

The islands are part of a chain that stretches across the ocean. The islands are surrounded by a much larger underwater area with mountains and other features on the ocean floor.



Wonder:

- How far does the chain go?
- Are there more mountains under the water?

F Under the Ocean



4. FIND A PATTERN

What patterns do you notice?
What does this show you?

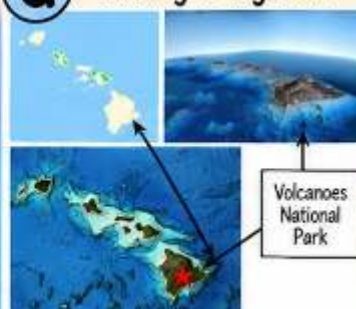
The islands are the tops of much larger underwater mountains. The mountains form a chain that continues below the ocean surface.



Wonder:

- Why do the mountains form a chain?
- What causes underwater mountains to form?

G Putting It Together



5. CONNECT THE EVIDENCE

How do the images work together?
What can you conclude?

All of the images show that Hawai'i is part of a long chain of mountains that extends across the ocean floor. The islands we see above the water are just the tops of these mountains.



Wonder:

- What caused this chain to form?
- Why is Hawai'i not near a continent?

6



ASK A BETTER QUESTION

What does this make you wonder?
What new question do you have?

Why do the Hawaiian Islands form a chain of mountains in the middle of the Pacific Ocean?
What could be causing these underwater mountains to form?



Curious minds explore more!

➔ Better observations lead to better questions. Better questions lead to new discoveries! ➔

UPGRADE the OBSERVATION

Better language leads to better science.

Same Data.
Deeper
Thinking.

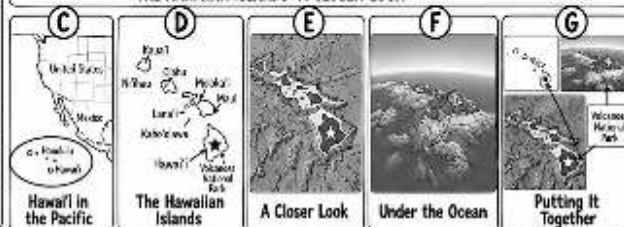
OUR GOAL

Use precise language to describe patterns and features of the Hawaiian Islands using multiple sources of evidence.

Utah SEED 5.1.1

"Analyze and interpret data to describe patterns of earth's features, including the locations of earthquakes, volcanoes, and mountain chains."

THE HAWAIIAN ISLANDS: A CLOSER LOOK



STEP-BY-STEP: UPGRADE YOUR OBSERVATION

Start simple. Add more detail each time. Use the data to be precise.

1	2	3	4	5	6
Start with what you notice. Just describe what you see.	Be more specific. Name the features.	Add location. Where are they located?	Use a pattern word. How are they arranged?	Add evidence from the data. Use specific details from the images.	Explain the relationship. What does this mean?
Hawaii is in the Pacific Ocean, far from the mainland.	Hawaii is a group of islands including Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Kahoolawe, and Nihoa.	The Hawaiian Islands are located in the middle of the Pacific Ocean, many hundreds of miles from any continent.	The islands appear to form a chain that stretches from the northwest to the southeast.	The images show that the Hawaiian Islands are the visible tops of much larger underwater mountains that continue below the ocean surface.	The evidence suggests that the Hawaiian Islands are part of a long chain of mountains that stretch across the ocean floor. This makes me wonder how they formed.
This is a good start, but it's pretty general.	Use precise nouns instead of general words like "island."	Tell where you see the features on the map.	Try words like chain, line, pattern, sequence, or aligned.	Point to specific features you see (e.g., underwater mountains, shapes, directions).	Compare, explain, and use words like "because," "suggests," "indicates," or "leads me to wonder."

YOUR TURN!

- Look at the images at the top.
- Write your own upgraded observation about the Hawaiian Islands.
- Try to include a pattern word and evidence from at least two images.

CHALLENGE:

Can you write a final sentence that a scientist would agree is precise, accurate, and based on the data?

USEFUL WORDS

- island / islands
- ocean / Pacific Ocean
- located / location
- chain / line / sequence
- underwater
- mountain / mountains
- volcano / volcanoes
- surface / below / ocean floor
- pattern / extends / continues
- rather than / hundreds of miles
- similar to / different from
- evidence / suggests / indicates
- formed / from / caused
- because / leads to / might

REFLECTION

- Which version of your sentence best shows the pattern? Why?
- How did changing your language help you think more scientifically?
- What words were most helpful?
- What might you still wonder?

More precise language helps us see more in the data.

SCIENTISTS USE LITERACY TO MAKE SENSE OF OUR WORLD.

UPGRADE the OBSERVATION

Better language leads to better science.

Same Data.
Deeper
Thinking.

OUR GOAL

Use precise language to describe patterns in earthquakes, volcanoes, and mountain chains.

Utah SEED 5.1.1

"Analyze and interpret data to describe patterns of earth's features, including the locations of earthquakes, volcanoes, and mountain chains."

EARTHQUAKES & VOLCANOES AROUND THE WORLD



Look closely at the map. What do you notice?

Let's upgrade our observation!

STEP-BY-STEP: UPGRADE YOUR OBSERVATION

Start simple. Add more detail each time. Use the data to be precise.

1	2	3	4	5	6
Start with what you notice. Just describe what you see.	Be more specific. Name the features.	Add location. Where do they occur?	Use a pattern word. How are they distributed?	Add evidence from the data. Use specific details from the map.	Explain the relationship. What does this mean?
"There are lots of earthquakes."	"There are lots of earthquakes and volcanoes."	"Earthquakes and volcanoes are near the oceans."	"Earthquakes and volcanoes are concentrated near the edges of continents."	"They are concentrated in narrow bands along the western edges of North and South America and around the Pacific Ocean."	"Earthquakes and volcanoes are often concentrated in the same narrow bands, especially around the edges of the Pacific Ocean."
This is a good start, but it's pretty general.	Use precise nouns instead of general words like "things."	Tell where you see the features on the map.	Try words like clustered, concentrated, band, or scattered.	Point to specific places you see on the map.	Compare, explain, and try to say what the data suggests (e.g., use "because" or "leads to").

TRY IT YOURSELF!

- Look at the map above.
- Write your own upgraded observation about earthquakes and volcanoes.
- Challenge: How do the same with mountain chains (use a mountain map if provided).

USEFUL WORDS

- north / south / west / east
- continent / ocean
- edge / boundary
- near / along / between
- clustered / concentrated
- scattered / band / chain
- pattern / distribution
- more than / fewer than
- unlike / similar to
- while / compared to
- leads to / occurs most often

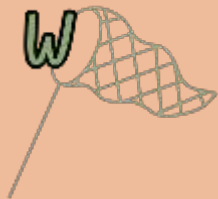
REFLECTION

- Which version of your sentence best shows the pattern? Why?
- How did changing your language help you think more scientifically?
- What words were most helpful?
- What might you still wonder?

More precise language helps us see more in the data.

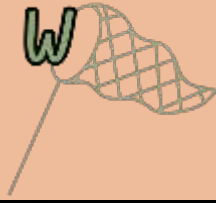
SCIENTISTS USE LITERACY TO MAKE SENSE OF OUR WORLD.

Word Catchers



Word	What it means to me	Consensus definition
volcano		

Word Catchers



K

Word	What it means to me	Consensus definition
lava		

WORD CATCHER

CATCH WORDS.
BUILD MEANING.
GROW UNDERSTANDING!



Word:

Good readers and scientists catch important words!



Related Words

Words that are connected to this word...

-
-
-
-
-
-

What This Word Means to Me

In my own words...

Consensus Definition

Our class's agreed-upon definition...

WORDS HELP US MAKE SENSE OF SCIENCE!



Lift the Curtain:

SEMANTICS

What does it mean here?



MORPHOLOGY

How is it related to other words?



DECODING

Can students actually read it?



Recall our question about new land



Recall that we are curious if lava can form new land.

Turn and talk:

Do you think the Hawai'ian islands have always been there?



Kirill_Shrayber



GEBCO

Be ready to share your thinking with the class.

Notice and wonder



Scientists are able to figure out how old rocks are.

Location	Age, in years, of oldest rocks	
Volcanoes National Park, HI	700,000	Seven hundred thousand
Thunder Hole, Acadia National Park, ME	500,000,000	Five hundred million
Voyageurs National Park, MN	3,000,000,000	Three billion

Notice and wonder



Scientists are able to figure out how old rocks are.

Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Decimal Point
1,000,000,000	100,000,000	10,000,000	1,000,000	100,000	10,000	1,000	100	10	1	
										.

Be ready to share your thinking
with the class.

Develop an initial model



How could an island like Hawai'i form?

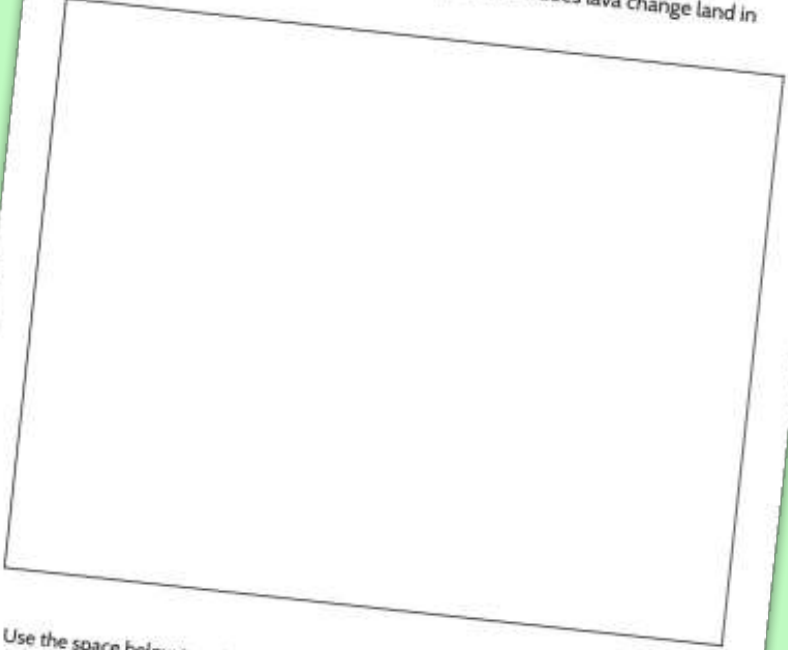
Use words, symbols, and/or drawings to explain your thinking.



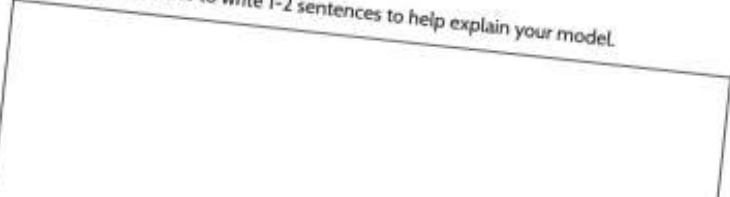
Michael & Kevin

Lesson 8: Initial Model

Use words, symbols, and/or drawings to explain how does lava change land in Hawai'i?



Use the space below to write 1-2 sentences to help explain your model.



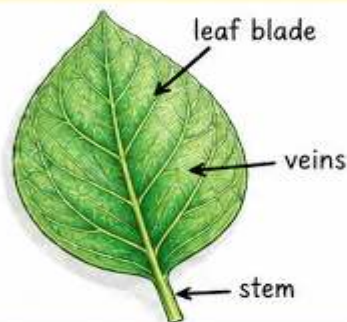
The ABCD of Scientific Illustrations

Teach students to draw like scientists!

Drawings help us think, show what we know, and communicate science!

A ACCURATE

Drawings should be realistic and show what you actually see or know. Use correct science vocabulary.



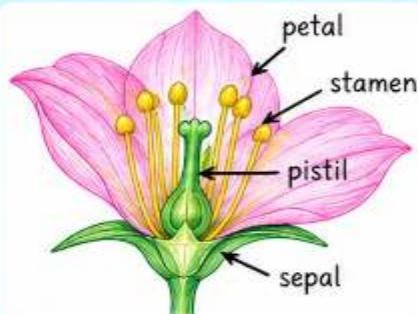
B BIG

No teeny tiny drawings. Take up space! Make your drawing large enough to show important features.



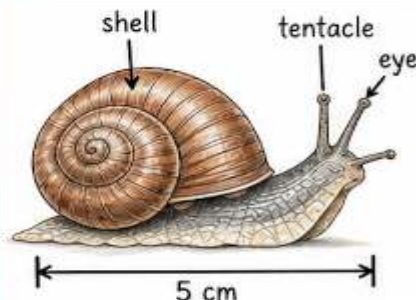
C COLORFUL

Use the actual colors you see. Color helps show important details and makes your drawing more realistic.



D DETAILED

Include labels and measurements. Show important features and add notes if helpful. Use arrows and clear, neat labels.



How to Teach It
A simple routine for success!

1

Introduce the ABCD.

Explain each letter and show examples (good and not so good).

2

Model it.

Think aloud while you draw a quick example together.

3

Practice together.

Give students a simple object or picture and draw as a class.

4

Guided practice.

Students draw their own, and you conference or circulate.

5

Reflect.

Use a checklist or rubric and have students self-assess.

6

Apply often.

Use scientific illustrations in labs, observations, and classwork regularly!

When students draw like scientists, they notice more, think deeper, and communicate their ideas more clearly!

Develop a model



Partner A: take 1 minute to share.

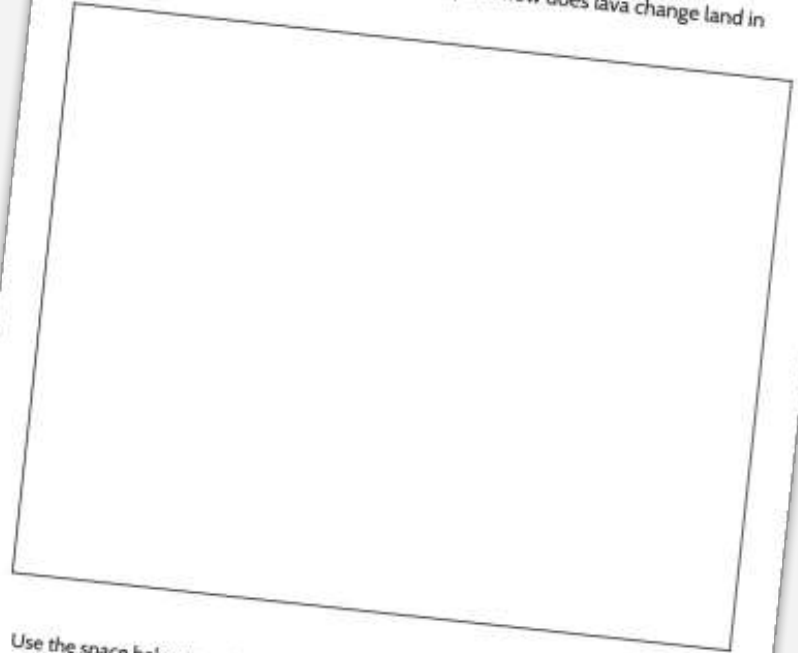
Partner B: **Look, listen**, and take 1 minute to **respond** with feedback.

Repeat with partner B sharing their model.

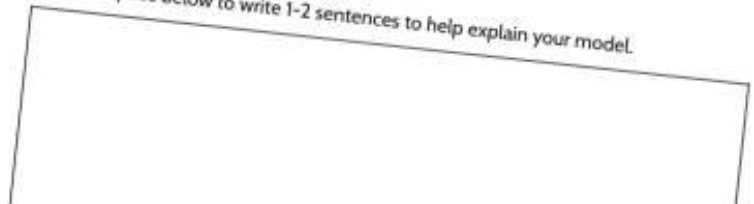
Put a checkmark on your model where you and your partner agree or have something similar.

Lesson 8: Initial Model

Use words, symbols, and/or drawings to explain how does lava change land in Hawai'i?



Use the space below to write 1-2 sentences to help explain your model.



Prompts to use	Ideas to look and listen for	Possible follow-up responses
Can someone share a similarity that you had with your partner?	<i>We said the lava comes out of the volcano. They drew the volcano like I did (holds up model), like this shape.</i>	I see several people gesturing that they did, too. How could we show that on our model? Do others agree/disagree with this idea?
Using your hands and words, how did the volcano get to be that shape?	<i>The lava! It comes out and then makes the sides of the volcano (gestures process with hands). Gestures I don't know.</i>	Can you say more? Can someone restate what (student) is saying? How can we show that in our model?
Does the lava form the island all at once?	<i>I drew it like (booooo!), and it all goes everywhere (gestures big motion with arms). No, it probably happens slowly, like over a really long time. I am not sure. I have never seen lava, but I think it just burns everything.</i>	What did others draw? Can you come up and draw your idea? It seems like we are pretty unsure. Can we put a question mark for this part?

Anything we want to have happen in our

classroom,

needs to be

reinforced

constantly.





Partner Talk Reminders



Look • Listen • Respond

Better thinking happens together! ♥

LOOK



- ✓ Face your partner
- ✓ Make eye contact
- ✓ Show you are engaged (nod, smile)
- ✓ Look at their model or notes

LISTEN



- ✓ Let your partner finish
- ✓ Be quiet while they are sharing
- ✓ Show you are listening (nod, "uh-huh")
- ✓ Think about what they are saying

RESPOND



- ✓ Be kind and respectful
- ✓ Add to their thinking
- ✓ Ask a question
- ✓ Give feedback
- ✓ Use a sentence stem
- ✓ Disagree respectfully

Helpful Sentence Stems

My model shows _____
because _____.

One thing I'm uncertain
about is _____.

One similarity between
our models is _____.

One difference is _____.

Different ideas help us learn more! ♥

LIFT THE CURTAIN

"Students frequently know more than they can independently put 'into polished writing.'"



"Drawing, labeling, gesturing and talking aren't avoiding literacy. They're building the language students will eventually need to write."

Look beyond the finished product! ♥

Different paths. Same deep thinking! ♥



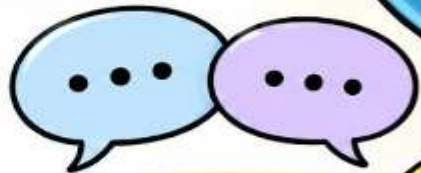
Drawing



Labeling



Gesturing



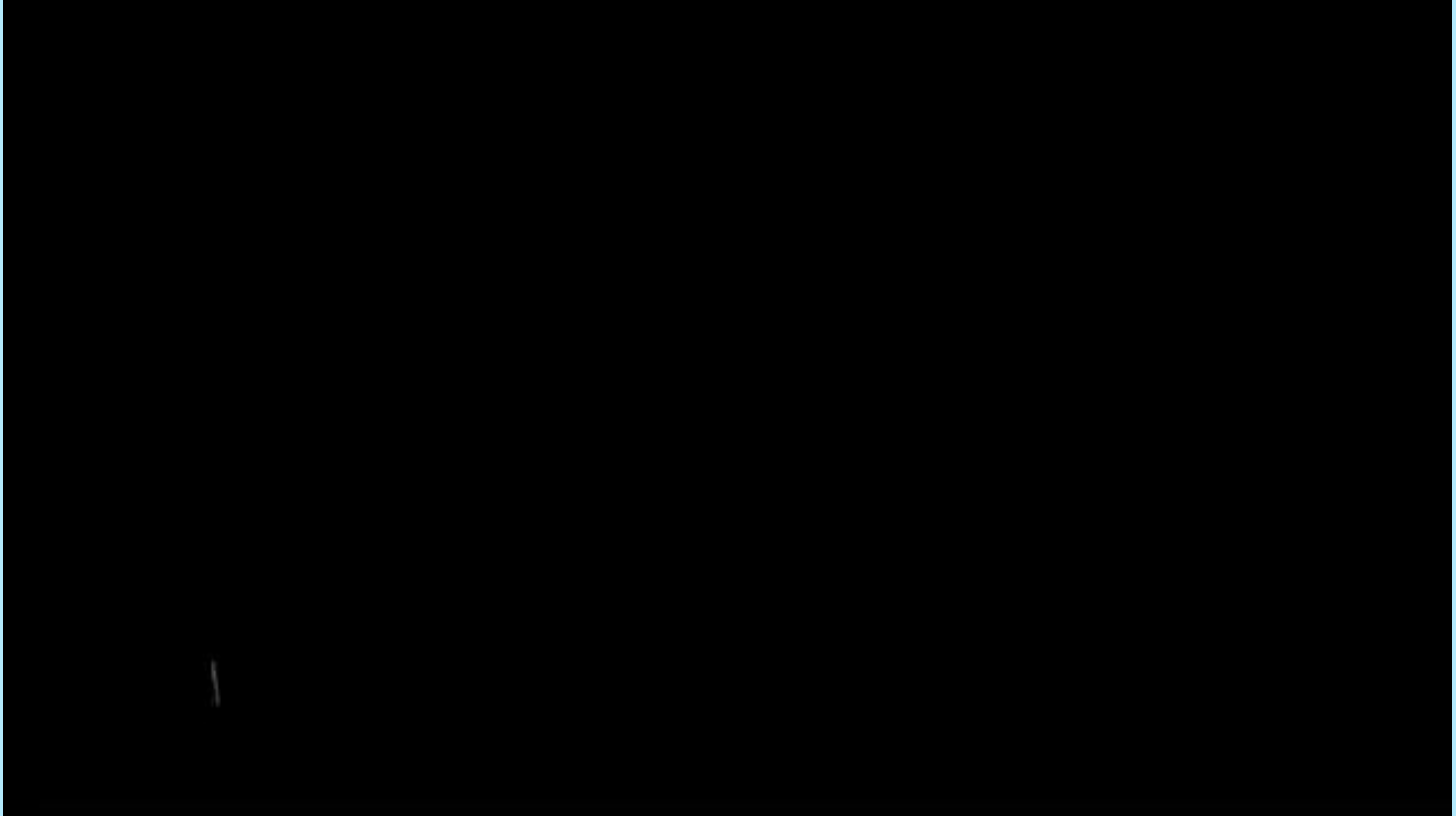
Talking



ALL OF THESE HELP BUILD IDEAS, UNDERSTANDING, AND LANGUAGE.



Make observations



Lava from Hawai'i Volcanoes National Park

Make observations



How is wax like lava?

How is not like lava?



Jesse! S? CC BY 2.0

Safety precautions



The wax will be hot and is not to be touched at any time.

The candle warmer is hot and is not to be touched at any time.

Models: Helpful, But Not Perfect

Models help us think, explain, and make sense of the world... but they **also have constraints!**

How Models Are Useful

- ✓ Help us visualize things we can't see directly.
- ✓ Make complex ideas simpler to understand.
- ✓ Allow us to test ideas and make predictions.
- ✓ Help us communicate and explain our thinking to others.
- ✓ Can be revised as we learn more.



A globe is a model of Earth.



An atom model helps us imagine something very small.



A weather model helps predict future conditions.



A graph is a model that helps us share data clearly.



Models can change when we get new evidence.

But Models Still Have Constraints

- ✗ Models are simplified versions of reality.
- ✗ They don't show every detail.
- ✗ They can leave out important factors.
- ✗ They may not be to scale.
- ✗ They can sometimes be misleading if we forget their limitations.
- ✗ They need to be revised when we get new evidence.



A map shows some details, but not everything.



A skeleton model shows the bones, but not muscles, skin, or color.



A water cycle model shows the main steps, but leaves out many smaller processes.



A solar system model shows relative size, but not the actual distances.



A model can help us understand, but it's not the same as the real thing.



Weather models are updated as new data comes in.



Models are **powerful tools**,
but we must always think about what they do – and what **they don't** – show.

Make predictions



Do you think it worked like this when Hawai'i was formed?

What would we expect to see if we were standing on the island and could look at the land below our feet?



WHICH WORD WINS?

Which word **BEST** describes what the hot wax did after it was poured?



moved

traveled

spread

flowed

piled

Tell partners:

- Choose ONE.
- Be ready to defend it using something you observed.



There's not necessarily one word that must "win." Think about **which part of the phenomenon** you're describing.

Round 2:

What happened as it cooled?

Which word **BEST** describes what happened to the wax as it cooled?

stopped

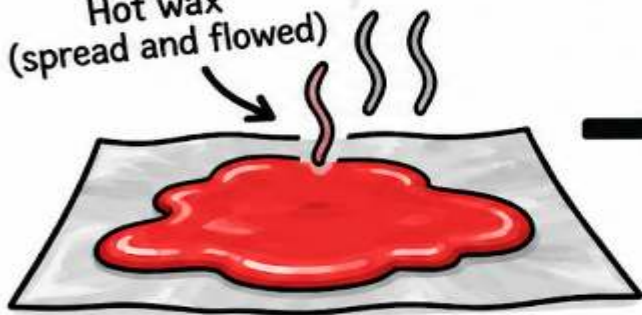
dried

froze

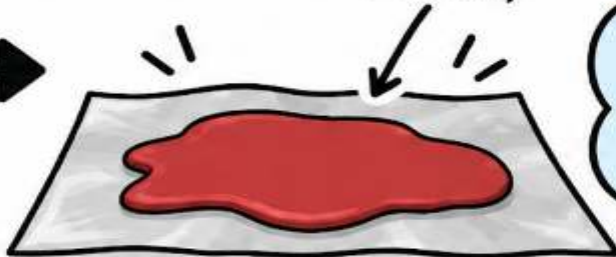
hardened

changed

Hot wax
(spread and flowed)



Cool wax
(now solid)



Think about:

- What does **dry** mean?
- Did water leave the wax?
- What does freeze usually communicate?



Tell partners:

- Choose **ONE** word.
- Be ready to defend it using something you observed.

Round 3:

Repeated Pours

Which word **BEST** describes what happened over repeated pours?



Each pour cooled and stayed on top of the layer before it.

grew

stacked

collected

built up

piled



Tell your partner:

- Choose **ONE** word.
- Be ready to defend your choice using something you observed.

From Our Model to Real Lava

Can our winning words from the wax model also describe the real lava at Kīlauea?

Our Wax Model



Wax flowed.



Wax hardened
as it cooled.



Wax built up in
repeated layers.

Real Lava at Kīlauea



Yes!
Lava flowed. ✓



Yes!
Lava hardened
as it cooled. ✓



Not exactly.
We cannot say
Hawai'i formed
exactly like our
wax model. ✗



Think About It:

- What is similar between the wax model and the real lava?
- What is different?
- What are the limitations of our model?

Models help us
understand, but they
don't show everything!

Evidence Sort:
Strong or Weak?



Evidence Sort:

Sentence Stems to Explain Your Thinking

Use these stems to help explain why evidence is stronger or weaker!

Strong or Weak

- I think this evidence is strong because _____.
- I think this evidence is weak because _____.
- This evidence helps prove _____.
- This evidence does not tell us much about _____.

Compare Evidence

- _____ is stronger evidence than _____ because _____.
- Both pieces of evidence show _____, but _____ is stronger because _____.
- I ranked _____ above _____ because _____.
- _____ is weaker because it does not directly show _____.

Think Like a Scientist

- This is strong evidence because it directly supports the claim that _____.
- This evidence is relevant to the claim because _____.
- This evidence is more convincing because _____.
- This evidence tells us _____, but it does not tell us _____.
- I would need more information about _____ before I considered this strong evidence.

Look at the claim. How well does the evidence support it?

Be specific.
Use details from the evidence!

Explain your thinking!



Obtain information about the land in Hawai'i



- Read the text with a partner.
- Pause after each paragraph to summarize the main idea.
- Circle or underline main ideas.

LESSON 9 • Handout

NAME _____ DATE _____

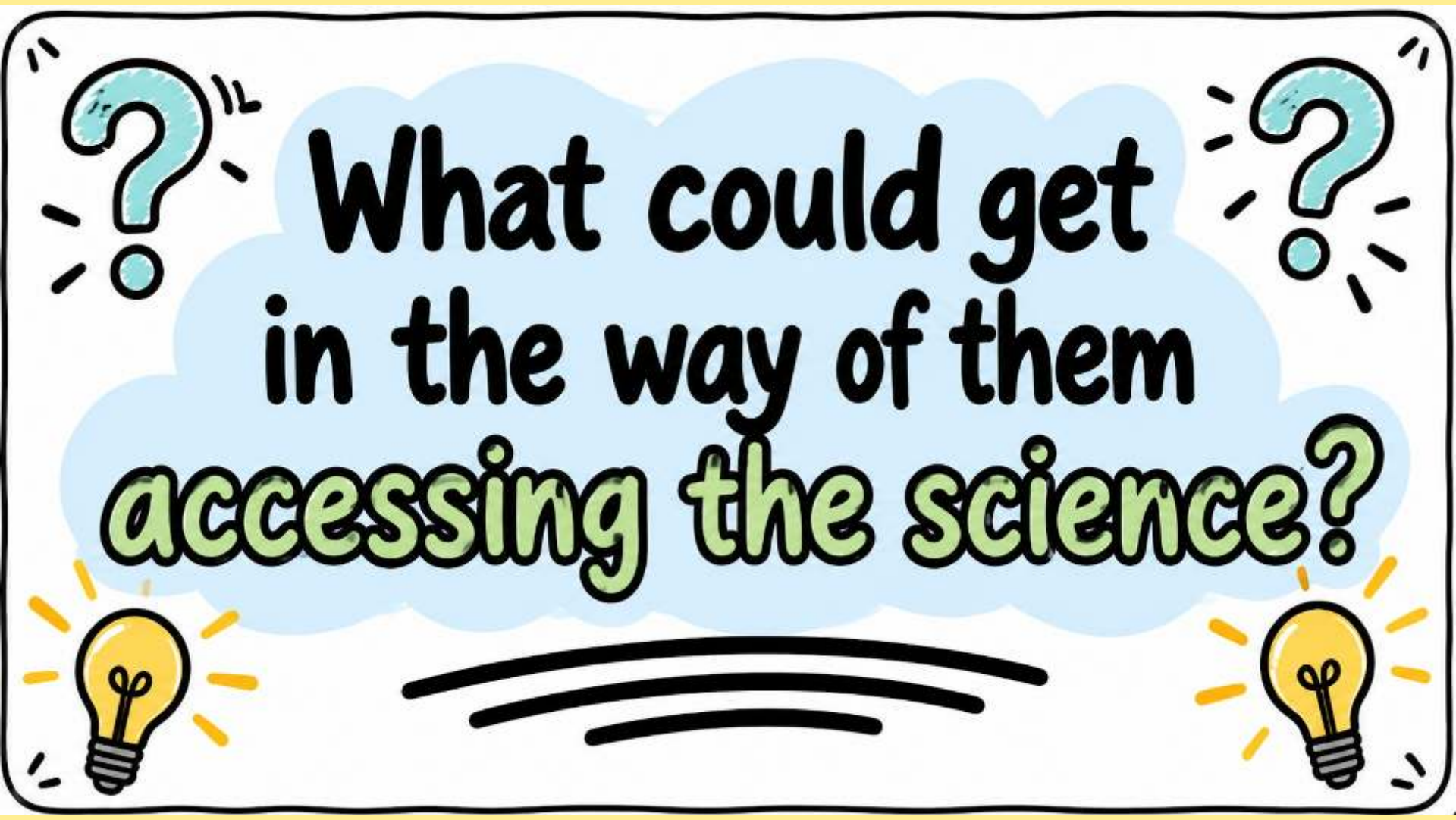
Volcanoes and the Island of Hawaii

Did Volcanoes Form the Island of Hawaii?

Scientists claim that volcanoes formed the island of Hawaii. Over time, scientists have found lots of evidence to support this claim. Some evidence can be seen easily. For example, scientists have observed volcanoes erupting on the island of Hawaii. Also, scientists have figured out that most of the rock on the island is made from lava. The rock used to be lava, but it cooled and hardened over time. This rock is known as volcanic rock.

Unit 5
Unit 4
Unit 3
Unit 2
Unit 1
Hawaiian Lava Flow

Other evidence is not as easy to see as volcanic rock. Scientists needed to find more evidence underground. Scientists dug underground to find evidence of layers of land. They think that these layers are created from volcanic eruptions over time. When scientists dig into the ground, they can see layers of rock that look different from the land above ground. This is because every volcanic eruption is a little bit different. Some erupt more quickly or slowly, so the layers of rock are different.



What could get
in the way of them
accessing the science?

Annotating Guide

Use these symbols as you read to keep track of your thinking!



CONFIRMS MY MODEL



MAKES ME WONDER



COULD CHANGE MY MODEL



Good readers revise their thinking! ♥



READ LIKE A SCIENTIST

Use these strategies to help you read and understand the text.

READ
THINK
DISCOVER
LEARN

1 KNOW YOUR MISSION



- What am I reading to figure out?
- Look at the title, pictures, and questions.
- Say the purpose in your own words.

2 ATTACK A TOUGH WORD



- Don't skip it!
- Look for a word you know inside it.
- Break it into meaningful parts (prefix, root, suffix).
- Read the whole sentence again.

Example:

erupt → erupted → eruption → eruptions
volcano → volcanic

3 CHUNK A TOUGH SENTENCE



- Read it in smaller parts.
- Ask:
 - Who or what is this about?
 - What happened?
 - Why, how, or when?
- Reread the whole sentence to make sure it makes sense.

Small Steps
Lead to Big Understanding!

4

HUNT FOR EVIDENCE



- Look for what scientists observed, measured, found, or tested.
- Underline or highlight the evidence (not the whole paragraph!).
- Ask: What does this tell me?

5

CONNECT THE IDEAS



- Look for words such as:
because when after then
over time each time eventually
- Ask: How are these ideas connected?
- Think about the sequence of events and the cause and effect.

6

STOP & SAY IT



- After a section, pause.
- What did I just learn?
- Say it in your own words (without looking!).
- Does this information CONFIRM, CHALLENGE, or CHANGE my model or thinking?

USE ANNOTATION SYMBOLS

E

= Evidence
(something scientists observed or found)



= Cause, change, or process
(how or why something happened)

?

= I'm confused or wondering
(I have a question)

STUCK? TRY THIS!



1. Reread the sentence.
2. Read the sentences before it.
3. Look at the picture or diagram.
4. Break apart the hard word.
5. Ask: "What makes sense identified?"
6. THEN ask someone for help.

Curious Readers
Make a Brighter Tomorrow!

Language Carrying the Sequence

“**Each time** a volcano erupted, the hot lava flowed out of the volcano. **Then**, the lava spread out on the ocean floor.
After that, the lava cooled and hardened.”

Fluency:

Take a key sentence
and phrase it.

For example:

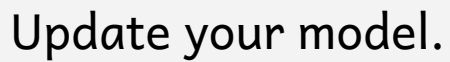
Over many years, / there were many more
volcanic eruptions. //

Every time, / more lava flowed out of the
volcanoes / and cooled. //

Each layer of new rock / piled up on top /
of the old rock. //



U

☒

Which Word Wins?

The scientific meaning depends on precise word choice!

1. Growing an Island

Which word most accurately describes what repeated volcanic eruptions did to the island over a long period of time?

made

formed

created

built



Go back to the text.
Which word best matches what it says?

2. What Counts as Evidence?

Which word best fits here?

proof

clue

evidence

fact



Why does the lesson call the layers of volcanic rock evidence?



Talk About It!

- Which word did you choose? Why?
- What clues in the text helped you decide?
- How are the words similar? How are they different?
- What does evidence actually mean in science?

Good scientists use precise words to communicate their thinking!

Evidence Sort:

Strong or Weak?



How did repeated volcanic eruptions help form Hawai'i?

Claim: _____.

Evidence: _____.

Reasoning:
This evidence matters because

_____.

IT'S MORE THAN JUST FANCY WORDS!

Better language helps us think more clearly and show what we know.

BEFORE



The wax went everywhere and then got hard.

SAME IDEA...
STRONGER
THINKING!

AFTER

Like the lava in the video, the melted wax spread across the surface and cooled. With repeated pours, new hardened layers remained on top of earlier layers, providing evidence that repeated flows can build material over time.



WHAT CHANGED? LOOK AT HOW THE LANGUAGE HELPED US THINK MORE SCIENTIFICALLY!

1 NAME PRECISELY



"melted wax"
"hardened layers"

Helps us make careful and accurate observations.

2 TELL WHERE



"spread across the surface"
"on top of earlier layers"

Helps us show location and spatial thinking.

3 DESCRIBE PATTERN



"With repeated pours, new hardened layers remained..."

Helps us recognize patterns over time.

4 ADD EVIDENCE



"providing evidence that..."

Helps us use evidence, not just opinions.

5 COMPARE



"Like the lava in the video..."

Helps us connect our model to a real phenomenon.

6 CHECK THE CLAIM



"...can build material over time."

Helps us make sure our claim is accurate and supported by the evidence.

THE CONTENT DIDN'T JUST GET FANCIER — OUR THINKING GOT STRONGER!

Better language leads to better science!

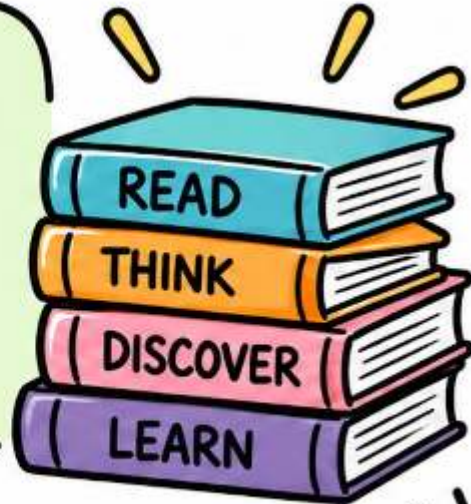
Lesson 8 leaves students with another puzzle. If volcanoes change land, **do volcanoes occur everywhere?**

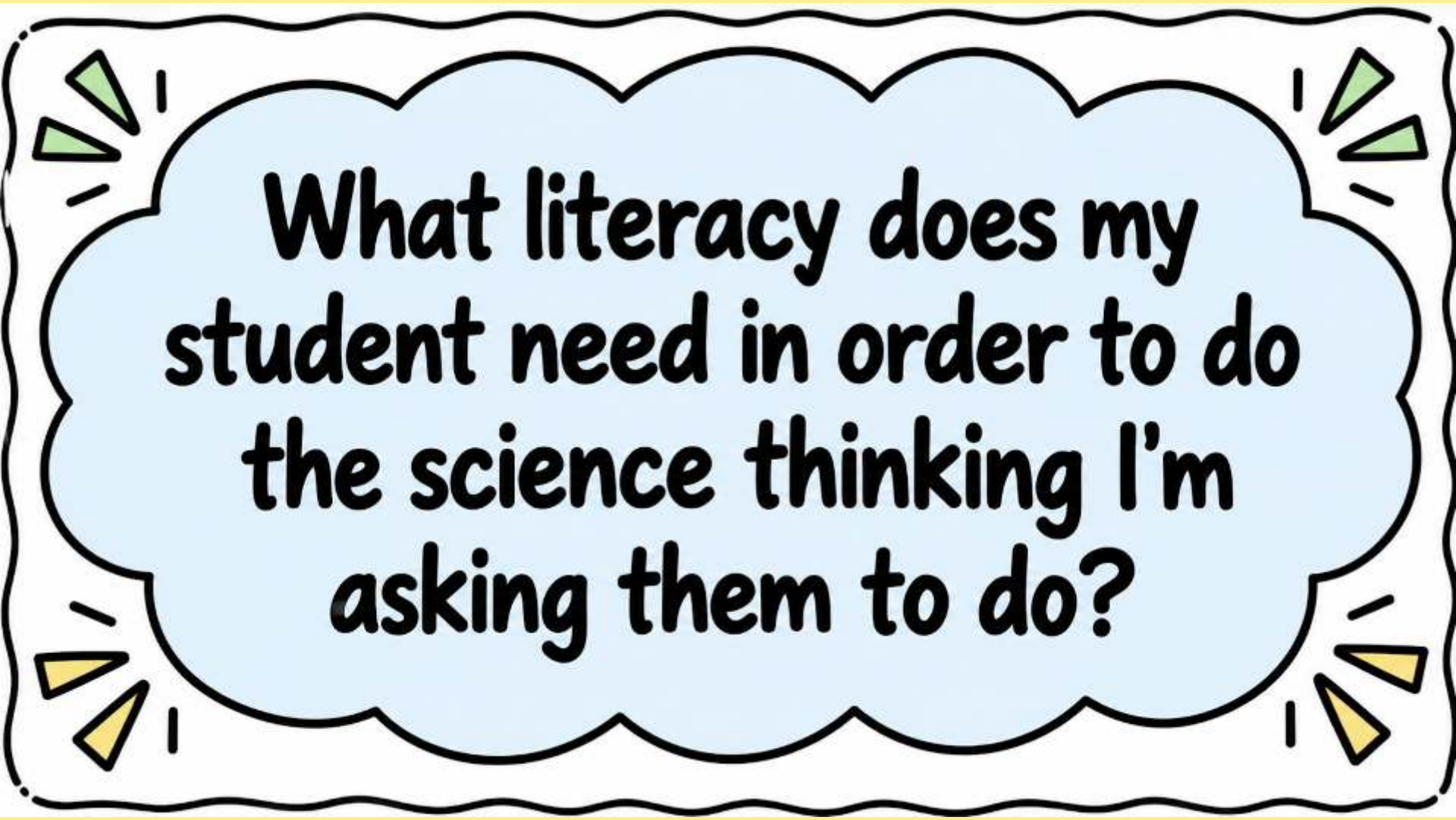




**We didn't stop doing science
so we could teach literacy.**

**The literacy helped us do
increasingly sophisticated
science.**





**What literacy does my
student need in order to do
the science thinking I'm
asking them to do?**