

Barbara Spiecker



ATOMIC HANDS

[www.atomichands.com](http://www.atomichands.com)

# STEM UNLOCKED

**The Architecture of Visual Mapping**

IDHHC Interpreter Conference

*April 25 - 26, 2026*



**Atomic Hands**  
**Executive Director**

**BARBARA**  
**SPIECKER**



# THIS SPACE IS...

## SAFE

- Everyone belongs here
- **No judgement**
- Ask questions or share thoughts/comments ANY time throughout the training  
**(WE LOVE THEM!)**

## DEAF-FRIENDLY

- Please use **ASL at all times**
- Raise your hand when you want to say something and we will copy sign for everyone

## COLLABORATIVE

- This is an opportunity for all of us to **play, practice, and grow** together
- Please be mindful of various learning and engagement styles
- Equal participation during group work

**beyond knowledge and signs...**

**What makes STEM hard  
to interpret?**

**What do you do when STEM  
language gets dense?**

**Where do you lose clarity  
most often:**

*syntax, anchoring,  
relationships, pacing, etc?*

# WHY SHOULD THIS WORKSHOP MATTER TO YOU?

STEM interpreting ≠ “term swapping”

Deaf people deserve meaning,  
not just vocabulary

STEM success often hinges on  
visual clarity + conceptual structure

**GOAL TODAY:** build visual pathways  
that make complex ideas feel obvious

# DECODING SYNTAX PATTERNS

**Interpreters do this more often than they realize:**

- Follow English word order
- Omit prepositions, possessive case, etc.
- Makes it unclear who the actor is and what they are doing to whom
- Do not break up chunks of information spatially

# DECODING SYNTAX PATTERNS

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- Do not break up chunks of information spatially

**As a result...**

- Increases cognitive load for deaf people
- Can lead to misunderstandings

# DECODE BEFORE YOU ENCODE

*Figure Out the Concept's Ingredients and Shape*

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**What Is The  
Purpose?**

explain

compare

solve

...

# DECODE BEFORE YOU ENCODE

*Figure Out the Concept's Ingredients and Shape*

## What Is The Purpose?

explain  
compare  
solve

...

## What Is The Structure?

definition  
model  
procedure

...

# DECODE BEFORE YOU ENCODE

*Figure Out the Concept's Ingredients and Shape*

## What Is The Purpose?

explain  
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## What Is The Structure?

definition  
model  
procedure

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## What Are The Key Entities?

objects  
variables  
parts

...

# DECODE BEFORE YOU ENCODE

*Figure Out the Concept's Ingredients and Shape*

**What Is The Purpose?**

explain  
compare  
solve

...

**What Is The Structure?**

definition  
model  
procedure

...

**What Are The Key Entities?**

objects  
variables  
parts

...

**What Are The Relationships?**

cause/effect  
proportionality  
sequence

...

# DECODE BEFORE YOU ENCODE

## Warm-Up

Ocean acidification happens as  $\text{CO}_2$  increases and ocean pH decreases.

# DECODE BEFORE YOU ENCODE

## Warm-Up

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- What is the purpose?
- What is the structure?
- What are the key entities?
- What are the relationships?

# DECODE BEFORE YOU ENCODE

## Warm-Up

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- What is the purpose?

# DECODE BEFORE YOU ENCODE

## Warm-Up

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- What is the purpose?
  - Explain a relationship about ocean acidification

# DECODE BEFORE YOU ENCODE

## Warm-Up

Ocean acidification happens as  $\text{CO}_2$  increases and ocean pH decreases.

- What is the structure?

# DECODE BEFORE YOU ENCODE

## Warm-Up

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- What is the structure?
  - Cause and effect

# DECODE BEFORE YOU ENCODE

## Warm-Up

Ocean acidification happens as  $\text{CO}_2$  increases and ocean pH decreases.

- What are the key entities?

# DECODE BEFORE YOU ENCODE

## Warm-Up

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- What are the key entities?
  - CO<sub>2</sub> and ocean pH

# DECODE BEFORE YOU ENCODE

## Warm-Up

Ocean acidification happens as  $\text{CO}_2$  increases and ocean pH decreases.

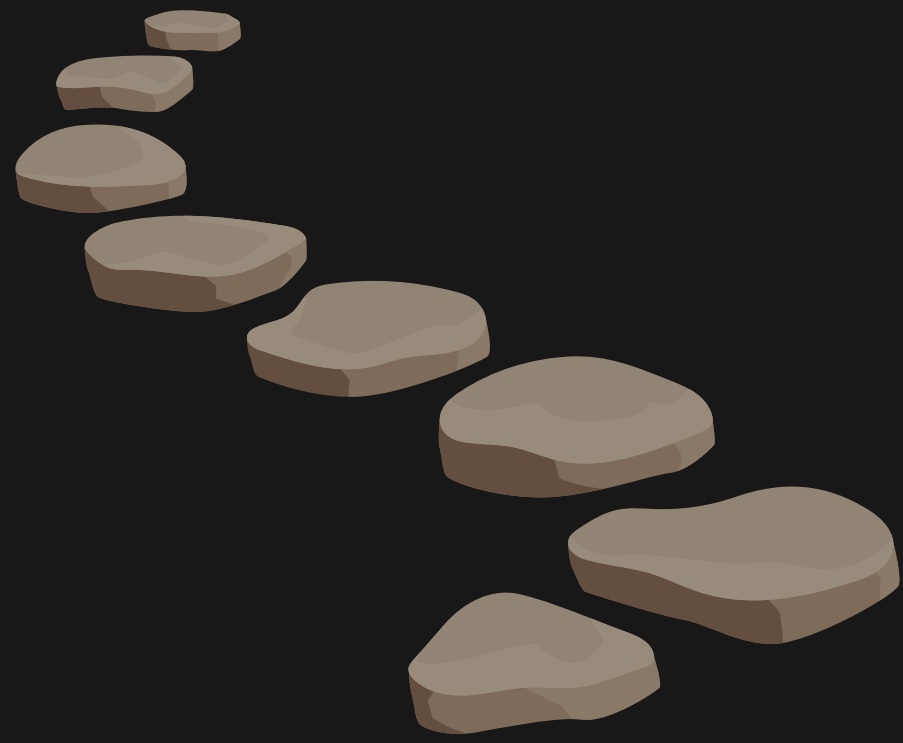
- What are the relationships?

# DECODE BEFORE YOU ENCODE

## Warm-Up

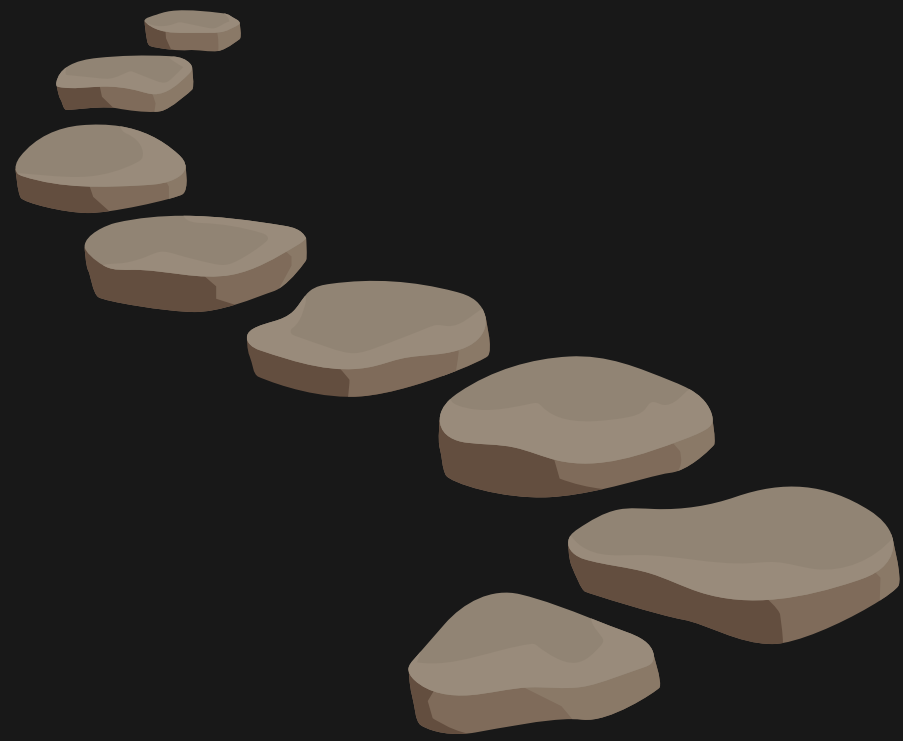
**Ocean acidification happens as  $\text{CO}_2$  increases and ocean pH decreases.**

- What are the relationships?
  - Inverse relationship
  - When  $\text{CO}_2$  increases, pH decreases (ocean becomes more acidic).



# CORE IDEA: Visual Pathway

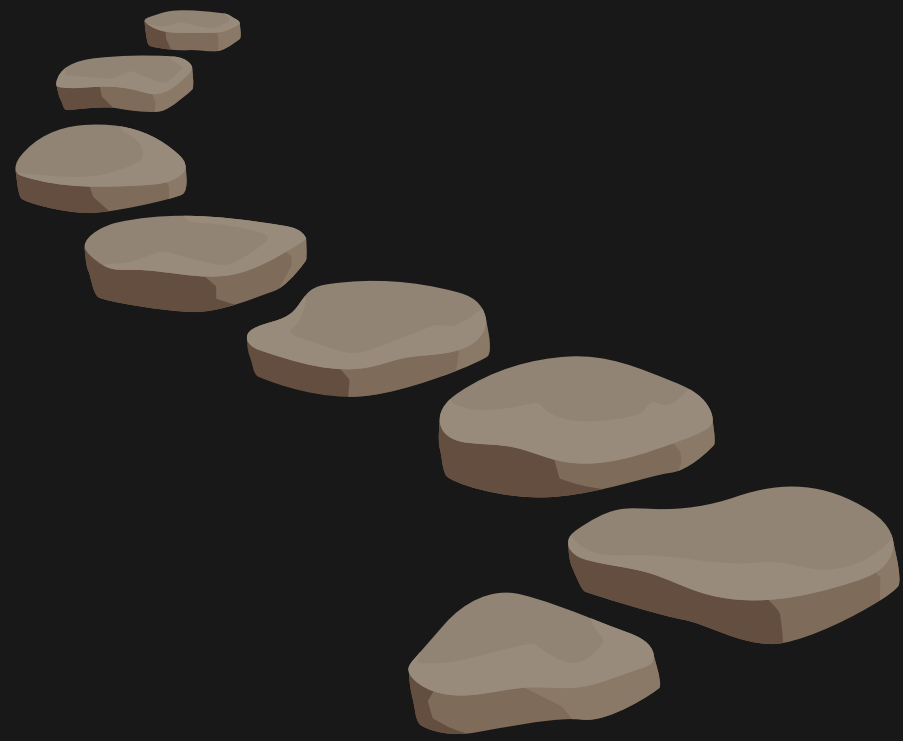
Visual Pathway = a planned route for understanding



# CORE IDEA: Visual Pathway

**Visual Pathway** = a planned route for understanding

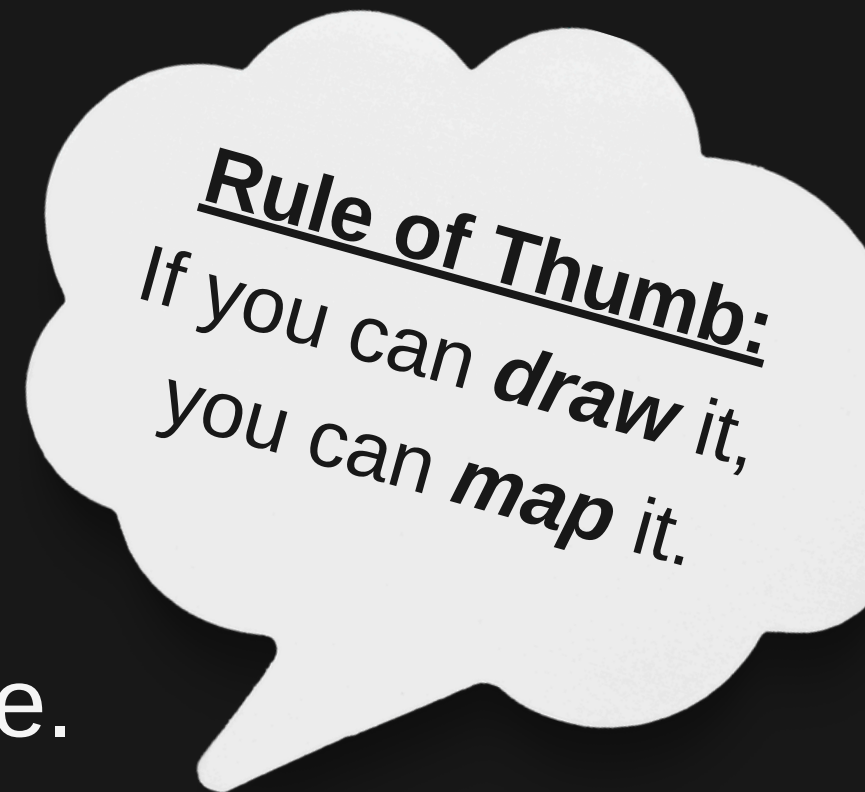
- State the topic or core idea.
- Determine the key entities and where they live in space.
- Identify which entities must stay fixed (anchors) so the map doesn't drift.
- Choose a visual template to show the relationships.

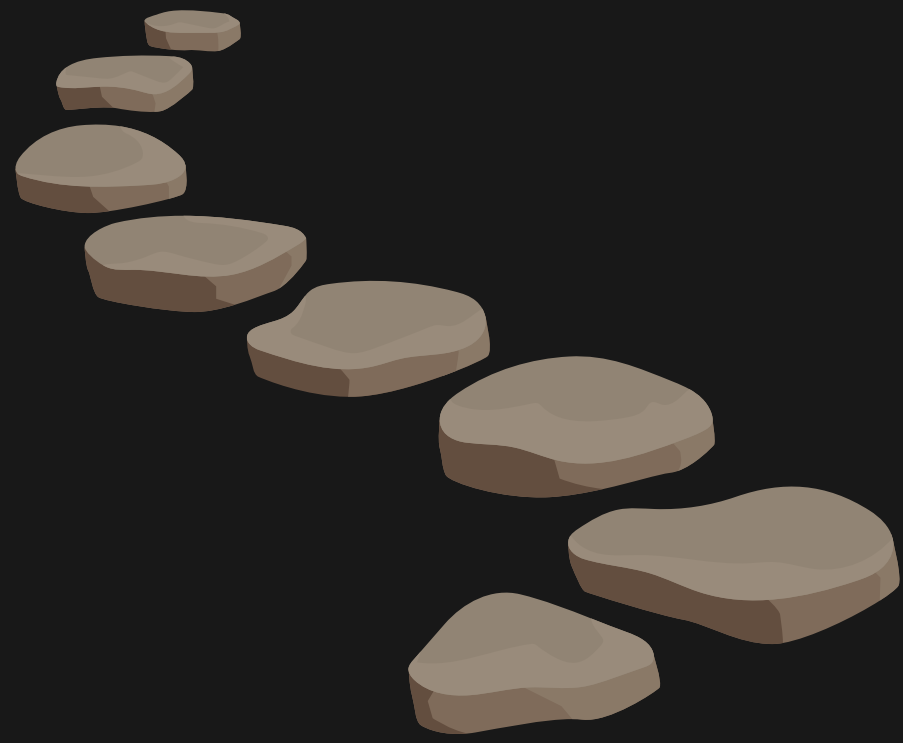


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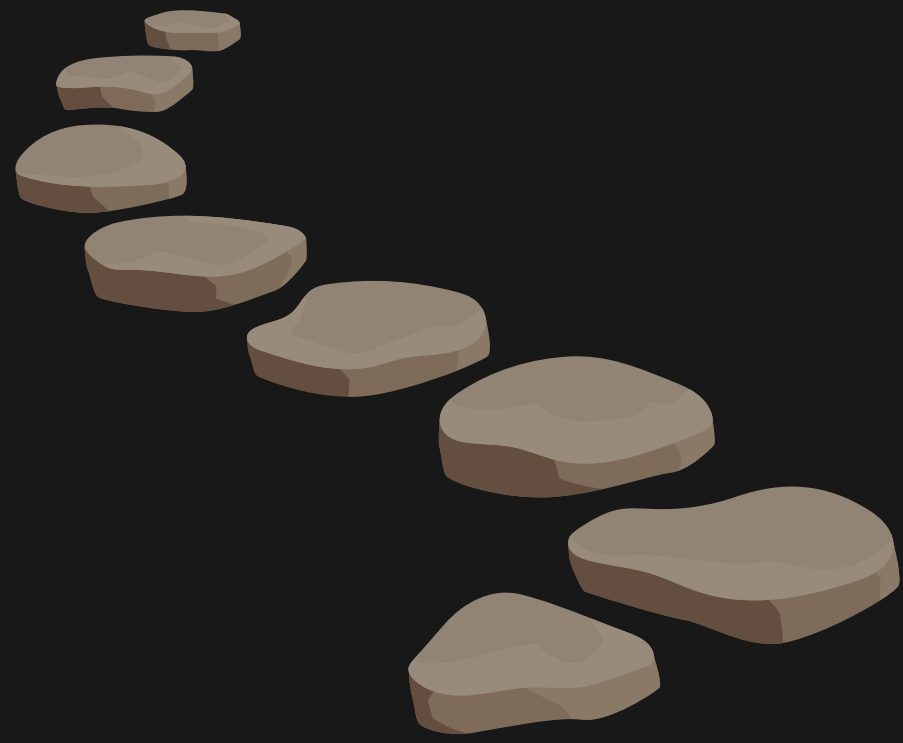
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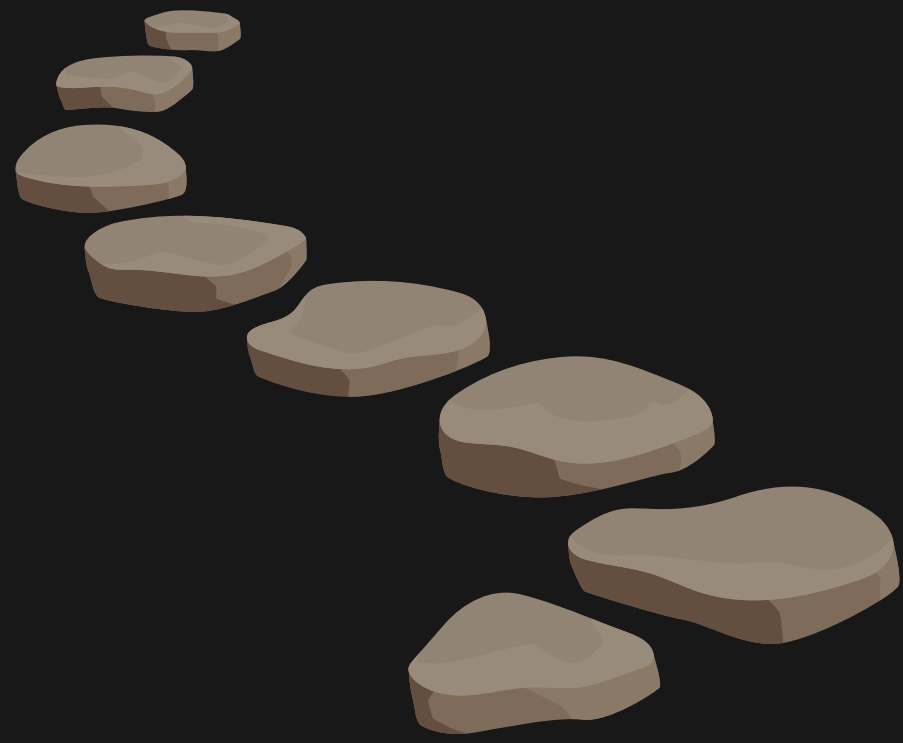
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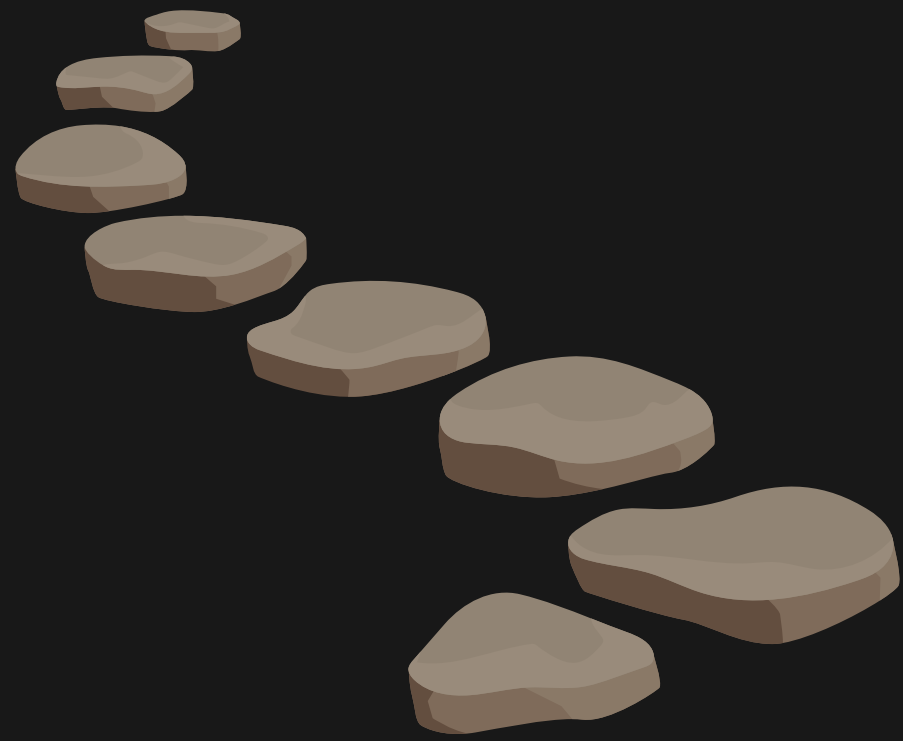
- **Determine the key entities and where they live in space.**



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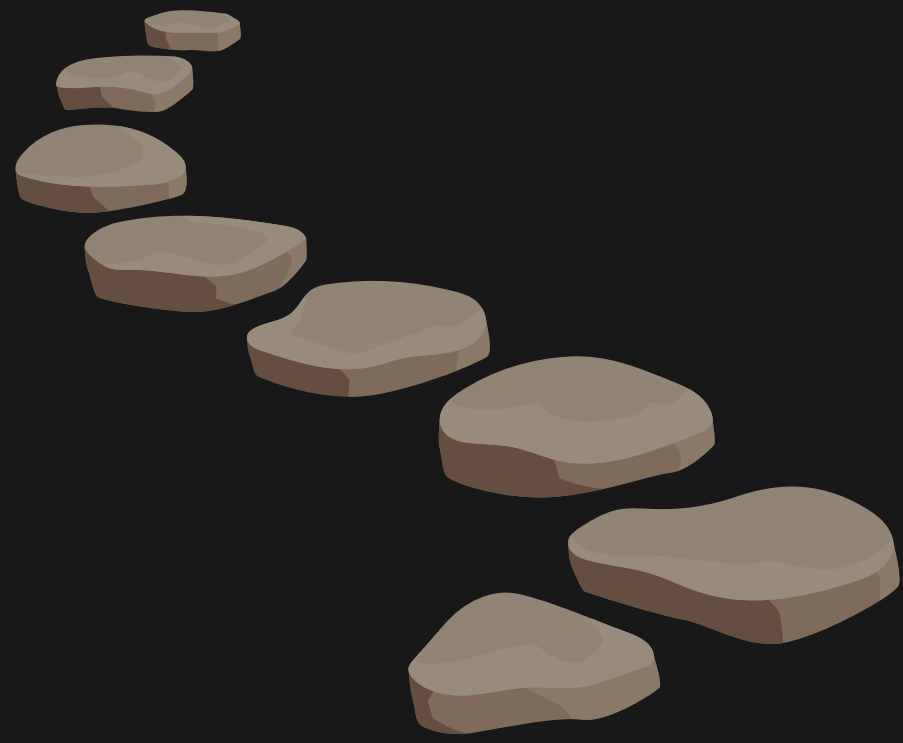
- **Determine the key entities and where they live in space.**
  - Ocean (lower-center)
  - CO<sub>2</sub> (upper-left)
  - pH (lower-right)



# CORE IDEA: Visual Pathway

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

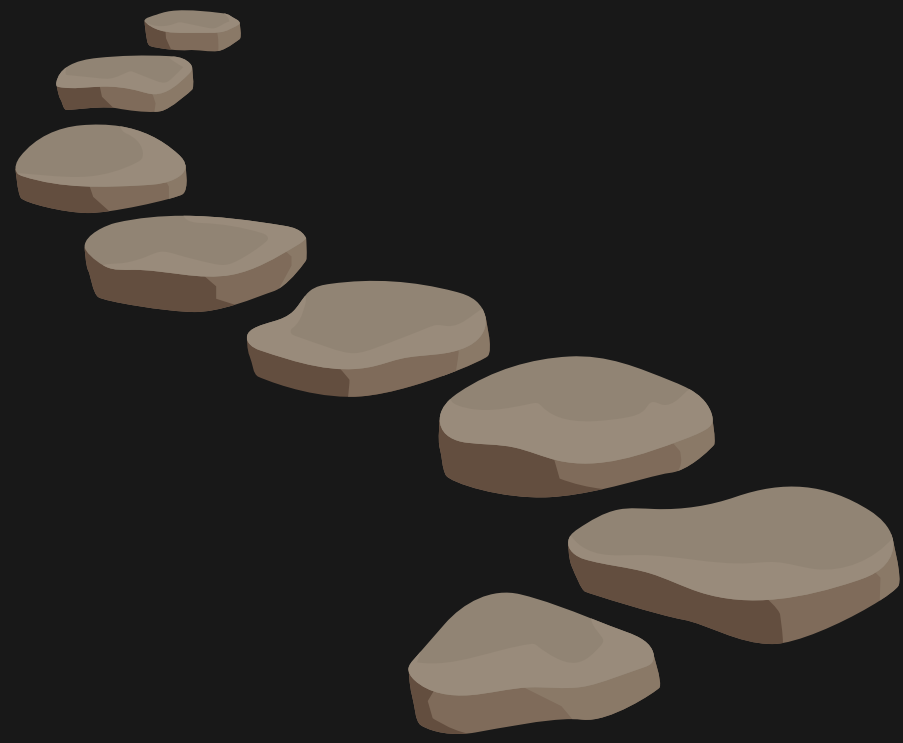
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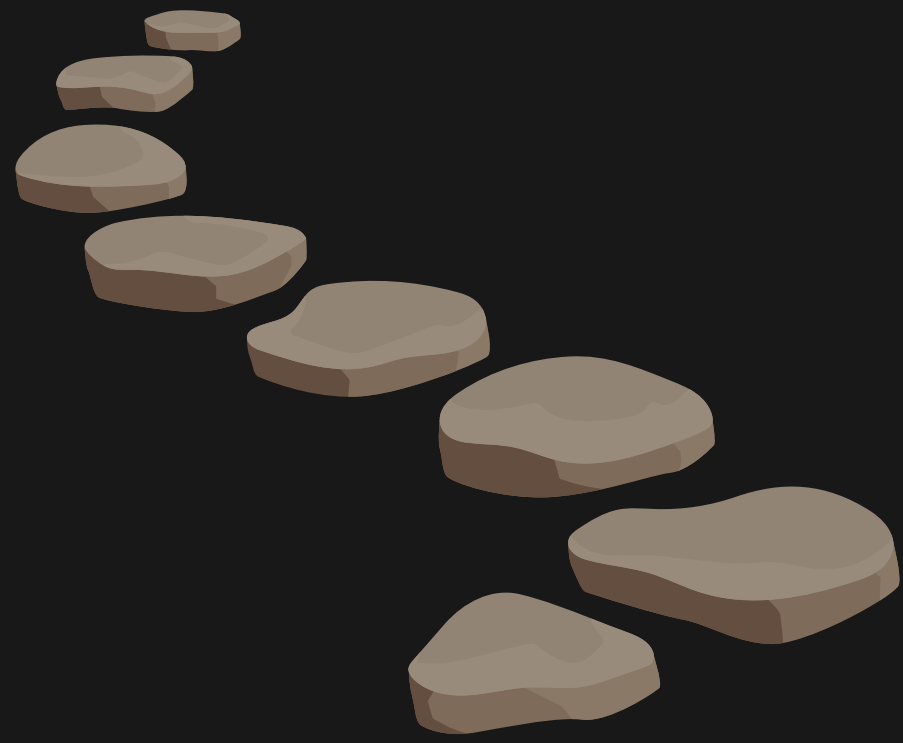
- Identify which entities must stay fixed (anchors) so the map doesn't drift.
  - CO<sub>2</sub> (anchor)
  - pH (anchor)
  - Ocean (anchor)



# CORE IDEA: Visual Pathway

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- Choose a visual template to show the relationships.



# CORE IDEA: Visual Pathway

**Ocean acidification happens as CO<sub>2</sub> increases and ocean pH decreases.**

- Choose a visual template to show the relationships.
  - CO<sub>2</sub> (left anchor) ↑, then
  - pH (right anchor) ↓

# MAPPING TEMPLATES

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## Cause & Effect



### Best for:

mechanisms, “because”,  
downstream impacts

# MAPPING TEMPLATES

## Cause & Effect



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(L) Cause → (R) Effect

(T) Cause → (B) Effect

# MAPPING TEMPLATES

## Cause & Effect



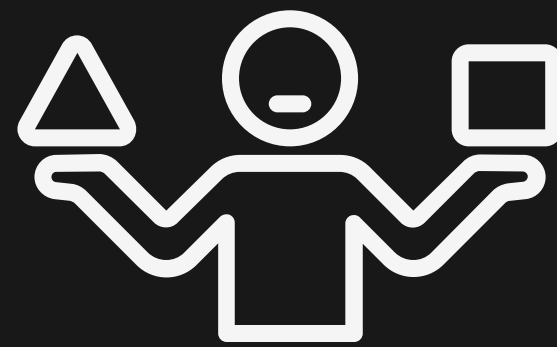
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X vs Y, pros/cons,  
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# MAPPING TEMPLATES

## Cause & Effect



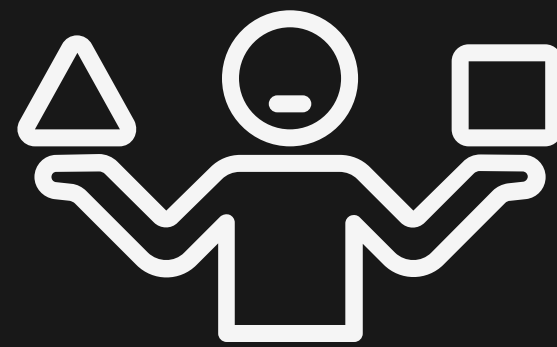
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## Cause & Effect



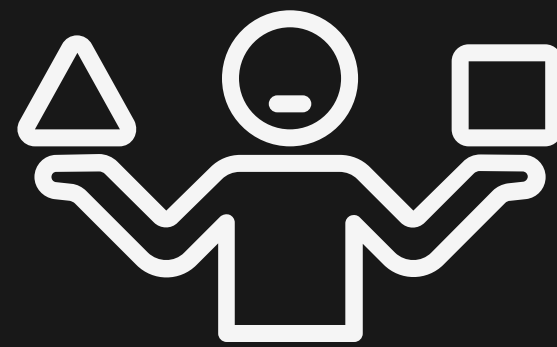
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## Hierarchy



### Best for:

categories, levels, types

# MAPPING TEMPLATES

## Cause & Effect



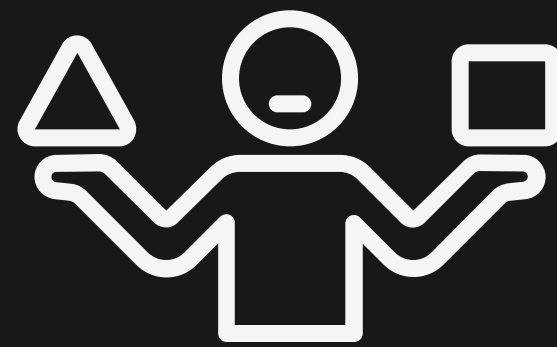
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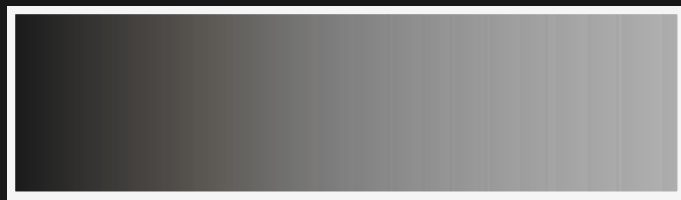
(T) Broad/Higher order



(B) Subtypes/Lower order

# MAPPING TEMPLATES

**Continuum**

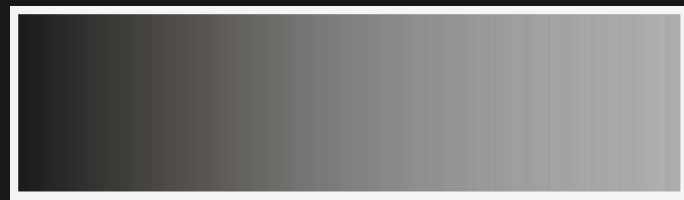


**Best for:**

more/less, gradient, intensity

# MAPPING TEMPLATES

**Continuum**



**Best for:**

more/less, gradient, intensity

**(L)** Low → **(R)** High

**(T)** High



**(B)** Low

# MAPPING TEMPLATES

## Continuum



**Best for:**

more/less, gradient, intensity

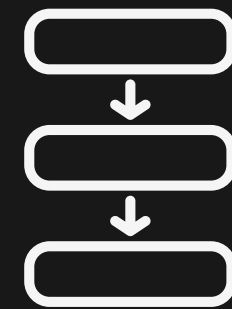
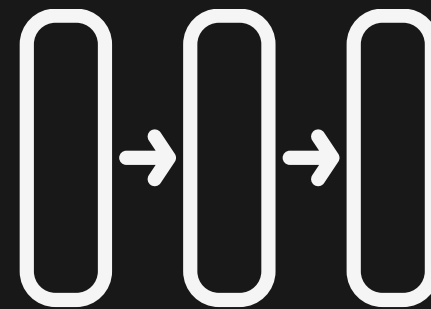
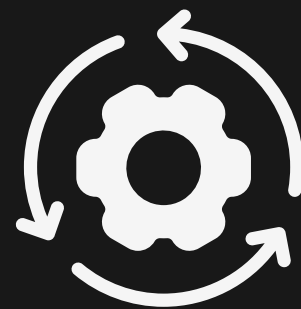
(L) Low → (R) High

(T) High



(B) Low

## Process



**Best for:**

steps, procedures, algorithms

# MAPPING TEMPLATES

## Continuum



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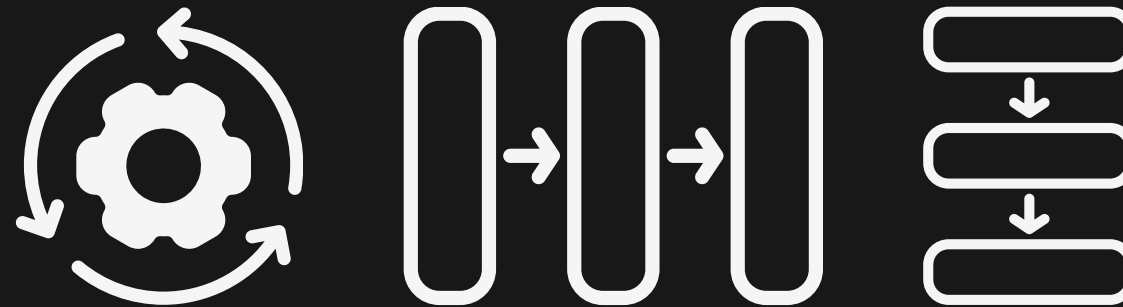
**(L)** Low → **(R)** High

**(T)** High



**(B)** Low

## Process



**Best for:**

steps, procedures, algorithms

**List**

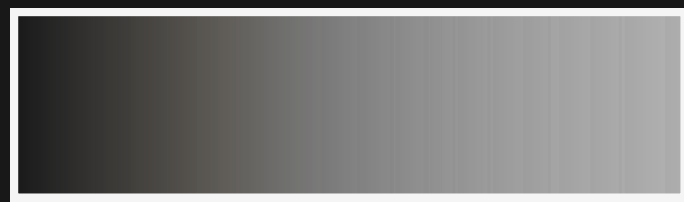
**Cycle**

**Steps**

(list-like, vertical, horizontal)

# MAPPING TEMPLATES

## Continuum



Best for:

more/less, gradient, intensity

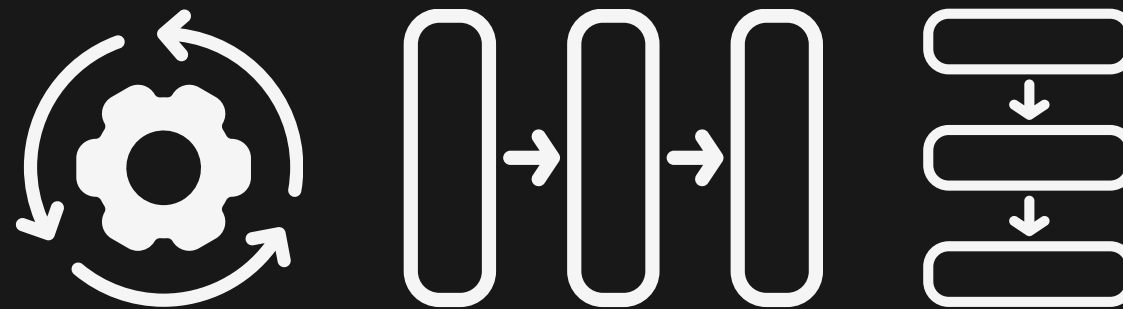
(L) Low → (R) High

(T) High



(B) Low

## Process



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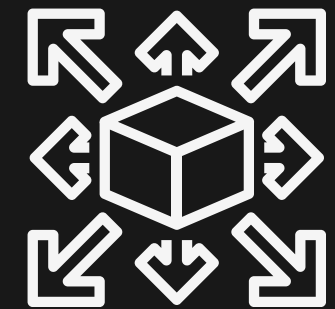
List

Cycle

Steps

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## Scale

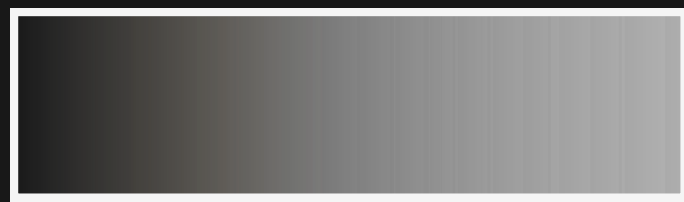


Best for:

sizes

# MAPPING TEMPLATES

## Continuum



**Best for:**  
more/less, gradient, intensity

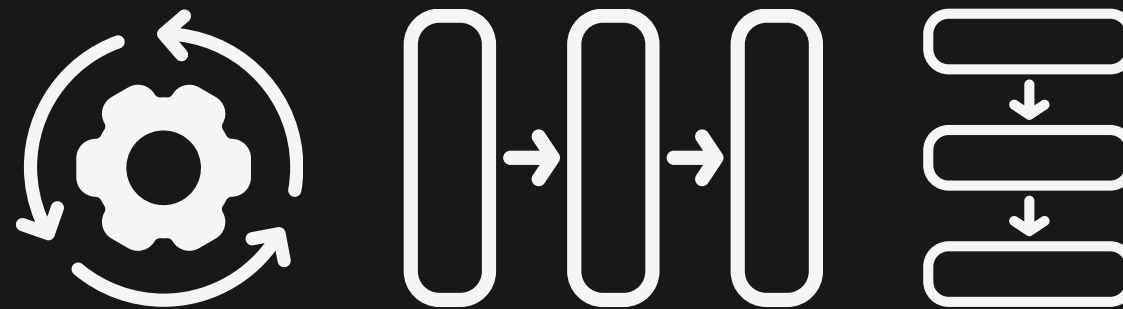
(L) Low → (R) High

(T) High



(B) Low

## Process

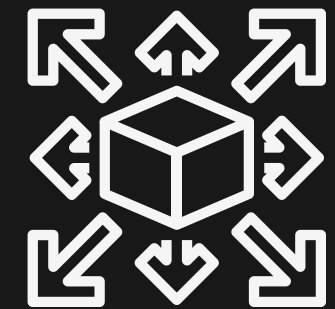


**Best for:**  
steps, procedures, algorithms

List  
Cycle  
Steps

(list-like, vertical, horizontal)

## Scale



**Best for:**  
sizes

(T) Larger size



(B) Smaller size

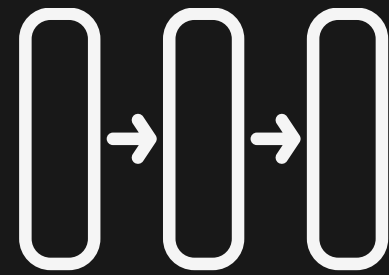
(Z-O) Larger size



(Z-I) Smaller size

# MAPPING TEMPLATES

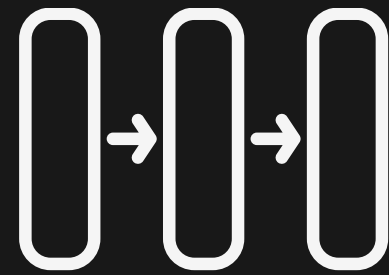
**Input → Process → Output**



**Best for:**  
engineering/design,  
energy transfer, pipelines

# MAPPING TEMPLATES

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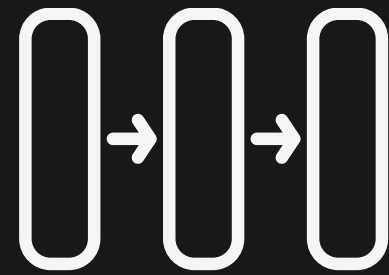


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**(L) Input → (M) Transformation → (R) Output**

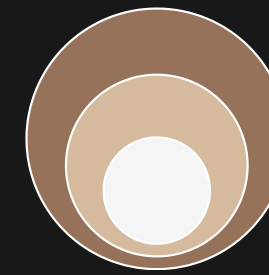
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**Input → Process → Output**



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**Parts Of A Whole**

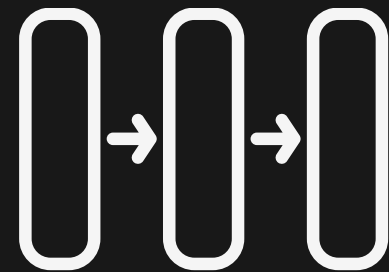


**Best for:**  
machines, ecosystems

**(L) Input → (M) Transformation → (R) Output**

# MAPPING TEMPLATES

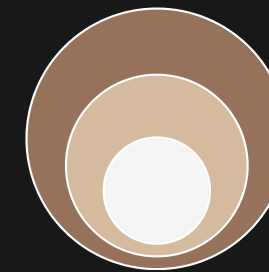
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**Parts Of A Whole**



**Best for:**  
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**(I) System**  
**(O) Elements**

**(O) System**  
**(I) Elements**

# MAPPING PRACTICE

Low pH means a solution is more acidic, a middle pH is neutral, and a high pH means it's more basic.

Cause & Effect

Compare & Contrast

Hierarchy

Continuum

Process

Scale

Input - Process - Output

Parts of a Whole

# MAPPING PRACTICE

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Cause & Effect

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Parts of a Whole

# MAPPING PRACTICE

Photosynthesis uses  
carbon dioxide, water, and  
light to produce glucose  
and oxygen.

Cause & Effect

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Parts of a Whole

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Cause & Effect

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**Input - Process - Output**

Parts of a Whole

# MAPPING PRACTICE

Cells form tissues, tissues form organs, organs work together in organ systems, and organ systems make up an organism.

Cause & Effect

Compare & Contrast

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Input - Process - Output

Parts of a Whole

# MAPPING PRACTICE

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Parts of a Whole

# MAPPING PRACTICE

Producers are eaten by primary consumers, primary consumers are eaten by secondary consumers, and secondary consumers are eaten by apex predators.

Cause & Effect

Compare & Contrast

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Parts of a Whole

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Producers are eaten by primary consumers, primary consumers are eaten by secondary consumers, and secondary consumers are eaten by apex predators.

Cause & Effect

Compare & Contrast

**Hierarchy**

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Scale

Input - Process - Output

Parts of a Whole

# MAPPING PRACTICE

When temperature increases,  
pressure increases.

Cause & Effect

Compare & Contrast

Hierarchy

Continuum

Process

Scale

Input - Process - Output

Parts of a Whole

# MAPPING PRACTICE

When temperature increases,  
pressure increases.

**Cause & Effect**

Compare & Contrast

Hierarchy

Continuum

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Scale

Input - Process - Output

Parts of a Whole

# MAPPING PRACTICE

Water evaporates, then condenses into clouds, falls as precipitation, and finally returns to the ground through runoff or infiltration.

Cause & Effect

Compare & Contrast

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Parts of a Whole

# MAPPING PRACTICE

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Cause & Effect

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Input - Process - Output

Parts of a Whole

# MAPPING PRACTICE

In a simple circuit, the battery pushes electricity through the wire to the light bulb, making it light up.

Cause & Effect

Compare & Contrast

Hierarchy

Continuum

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Parts of a Whole

# MAPPING PRACTICE

In a simple circuit, the battery pushes electricity through the wire to the light bulb, making it light up.

Cause & Effect

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Input - Process - Output

**Parts of a Whole**

# MAPPING PRACTICE

Renewable sources  
replenish naturally;  
nonrenewables are finite  
and run out.

Cause & Effect

Compare & Contrast

Hierarchy

Continuum

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Input - Process - Output

Parts of a Whole

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**Compare & Contrast**

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Parts of a Whole

# ANCHORING IS YOUR STEM SUPERPOWER



To effectively build a clear idea, you need to establish an **anchor**.

An **anchor** gives the viewer:

- A “home location” for a concept (so references stay trackable)
- A way to see relationships (cause, contrast, sequence, parts)
- A stable base so you can add classifiers/depiction without confusion

# ANCHORING IS YOUR STEM SUPERPOWER



Mapping templates are only as *strong* as their anchors.

Anchors must stay *stable* while language expands.

# ANCHOR RULES



- Set 2–3 anchors **early**
- Keep them **consistent** in space
- **Reuse** them again and again
- If you must change the map: **reset**

*clear → re-anchor → continue*

# ANCHOR-&-ADD

## EXAMPLE

Plants produce its own energy from the sun and nutrients. When a rabbit consumes plants, it gets a fraction of the energy generated by the plants.

# ANCHORING ISSUES

## EXAMPLE

Diamonds form under intense heat and pressure deep within the Earth, and among gemstones, diamond has very high hardness.

Diamonds form under intense heat and pressure deep within the Earth, and among gemstones, diamond has very high hardness.



# WHEN ANCHORS FALL APART

## *Common Problems + Fixes*

- **Map change without reset** → pause, clear, rebuild map

# ANCHORING ISSUES

## EXAMPLE

Factor the expression  $x^2 - 5x + 6$ , solve to find that  $x = 2$ , and then substitute it back in to verify that the expression equals zero.

Factor the expression  $x^2 - 5x + 6$ , solve to find that  $x = 2$ , and then substitute it back in to verify that the expression equals zero.



# WHEN ANCHORS FALL APART

## *Common Problems + Fixes*

- Map change without reset → pause, clear, rebuild map
- **Anchor drift** → re-index and re-place; slow down 2 seconds

# ANCHORING ISSUES

## EXAMPLE

The rough Endoplasmic Reticulum receives newly made proteins from ribosomes, folds them, and then sends them to the Golgi apparatus.

The rough Endoplasmic Reticulum receives newly made proteins from ribosomes on its surface, folds them, and then sends them to the Golgi apparatus.



# WHEN ANCHORS FALL APART

## *Common Problems + Fixes*

- Map change without reset → pause, clear, rebuild map
- Anchor drift → re-index and re-place; slow down 2 seconds
- **Too many anchors** → collapse to 2–3 “main actors,” park extras as “details later”

# ANCHOR-&-ADD

## EXAMPLE

Mars always orbits the Sun in the same counterclockwise direction, but when Earth (on a faster inner orbit) passes Mars, Mars can appear to move backward against the background stars because our viewing angle changes.

# ADVANCED TRICK:

## Swapping Anchor Between Hands



- *Use sparingly (only when it increases clarity)*
- **Why it helps:**
  - Keeps the “main concept” visible while the other hand depicts action/details
  - Lets you shift attention between:
    - action/explanation
    - stable reference (“hold” the concept)
- **Safety rule:** the viewer should always be able to answer: “Where is that concept living in space right now?”

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## EXAMPLE

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# SUMMARY

Clarity isn't more signs. It's a better map.

- **Decode before you encode:**
  - purpose → structure → entities → relationships
- **Build a visual pathway:**
  - choose anchors + a template so the message stays coherent
- **Anchors are your stability system:**
  - keep 2–3 fixed; reset/re-anchor when the map changes

**THANK YOU**

**for the honor of working with you!**

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in American  
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(ASL)



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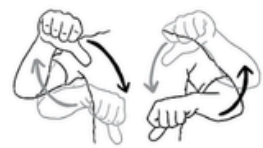


ASL STEM Resources



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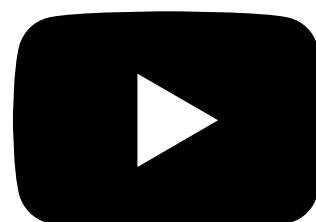
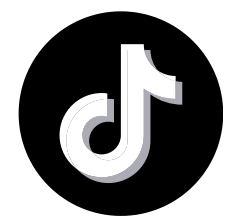
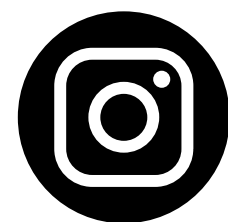
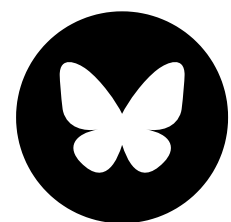
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Interpreter Giving Circle

