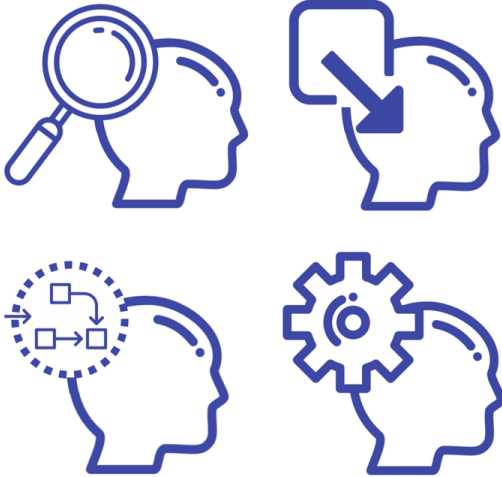
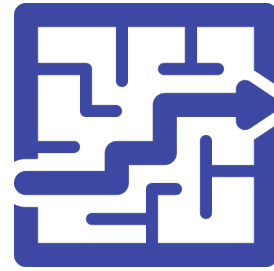


What do you wonder?



Asking Questions

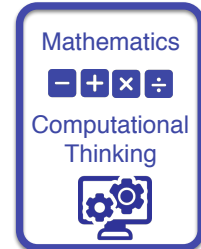
What do you think?



Constructing Explanations



Developing and Using Models



Mathematics
Computational Thinking

How do you investigate?



Planning and Carrying Out Investigations

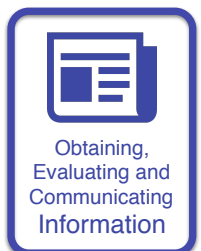
How do you know?



Engaging in Argument from Evidence



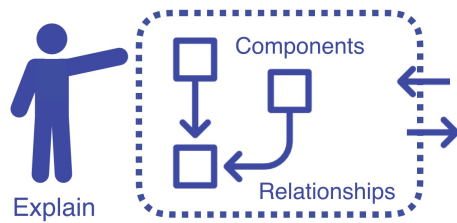
Analyzing and Interpreting Data



Obtaining, Evaluating and Communicating Information

What do you think?

Constructing Explanations

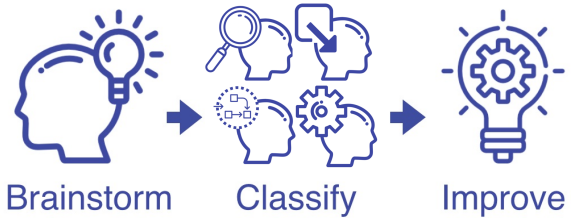


Good Explanations:

- Identify a scientific **cause**
- Identify the **components** of the system
- Use connections between the components to **explain**, describe and predict
- Represent the **components** of the system mathematically
- Use **computational thinking**

What do you wonder?

Asking Questions



Good Questions:

- Address the **phenomenon** or **problem**
- Identify the **nature** of the question
 - Observational - What do I notice?
 - Explanatory - How does it work?
 - Systems - What happens in the system?
 - Engineering - What is the problem?
- Can be empirically **tested**

How do you know?

Engaging in Argument From Evidence



Good Arguments:

- Obtain, evaluate** and **organize** the evidence
- Identify **patterns** within and between datasets
- Identify a **claim**
- Link the evidence and claim with a chain of **reasoning**.
- Communicate** information using the appropriate style and format

How do you investigate?

Planning and Carrying Out Investigations



Good Investigations:

- Investigate a **phenomenon** or **design**.
- Identify the **evidence** that will be collected
- Have a **plan**
- Collect **evidence**
- Improve** the design of the investigation

What do you notice?

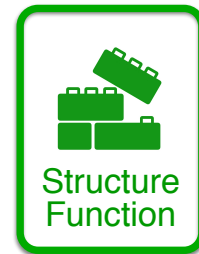


Patterns

How does it work?



Cause & Effect



What happens in the system?



Systems

System Models



What is happening?

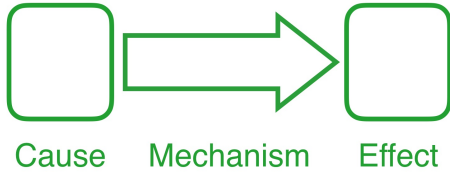


Phenomenon

Observable events in the real world

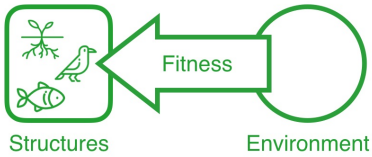
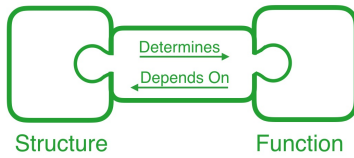
How does it work?

Cause & Effect



What's the structure?

What's the function?



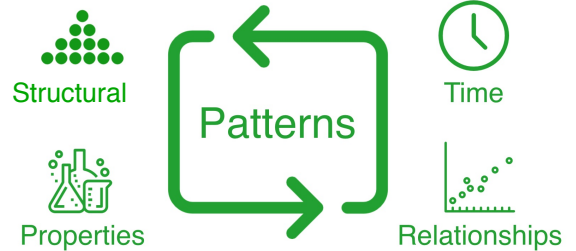
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What do you notice?

Patterns

See - Hear - Touch - Smell - Taste



What are the parts?
How does it change?
What stays the same?
What is related?

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What is the problem?

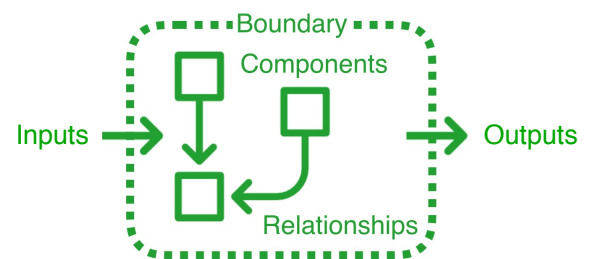


Problem

Human needs and wants

What happens in the system?

Systems and System Models



What is the boundary?
What flows? What cycles?
What makes it change?
What keeps it stable?
What is important?

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