Asking Questions

What do you wonder?

Planning and Carrying Out Investigations

How do you investigate?

Constructing Explanations

What do you think?

Engaging in Argument from Evidence

How do you know?

Mathematics
Computational Thinking
Developing and Using Models

Analyzing and Interpreting Data
Obtaining, Evaluating and Communicating Information
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**

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**

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

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
How does it work?

Cause & Effect

- Cause
- Mechanism
- Effect

What’s the structure?
What’s the function?

Structure
Function

Fitness
Environment

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

What do you notice?

Patterns

See - Hear - Touch - Smell - Taste

Structural

Properties

Time

Relationships

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

What is the problem?

Problem

Human needs and wants

What happens in the system?

Systems and System Models

Inputs

Boundary
Components

Relationships

Outputs

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