

## **Student Thinking I**

As the teacher students come to the end of an activity or investigation with data, they need to develop an understanding about science concepts from their observations, questions, and data. The data becomes part of the explanation. This requires time for reflection with the notebook and allows the teacher to assess and support how students develop concrete thoughts from evidence they gathered and developed new understandings.

When students write explanations do they include a claim (what they think), evidence (from the data), and logical reasoning based on their understanding and evidence in the science notebook?

### **Notebook Planning**

During the activity or investigation, students need time for regular reflections: a brief statement about their current thinking and questions they may have come up and opportunities to make predictions. The goal of science is to develop an explanation, a theory about the universe. Students need to look at the data they have collected and what they have learned from the teacher and develop their own explanation – using evidence from their notebook to support their idea/claim.

### **Periodic conclusions**

When students are moving to different parts or are close to finishing an investigation they need time to look for patterns and multiple pieces of data – they can write something more such as a summary, making predictions, or revisiting predictions and questions.

- In a k-1 classroom, making whole-class predictions and keeping them on chart paper or small group predictions at centers would be a more manageable way to handle predicting and revisiting predictions.
- Modeling making predictions by summarizing the data helps focus the students so that can make a prediction.

## Performance Checklist for Making Predictions

<b>Characteristics for Predicting</b>	<b>Performance Expectations</b>	
Accurate	Uses accurate evidence that relates to the focus question	
Evidence	Evidence is clearly considered from the investigation	
Reasoning	Student can communicate logical reason for the prediction based on evidence from the investigation	

## **Student Thinking II**

### **Final Conclusions**

Final conclusions can be made at the end of the activity or investigation. This requires a synthesis of the study. Students move from specific claims to a general conclusion. They explain what they discovered and how it relates to the evidence. Scientists present their explanations orally at meetings, and through writing reports. They communicate their discoveries and evaluate how their evidence relates to other information that currently exists. This is an opportunity for students to share what they've learned and demonstrate how their evidence relates to science concepts and content. Students should include the focus question and provide evidence for the answer.

### **Notebook Planning**

- Graphic organizers can help students organized multiple pieces of data: Have students return to their notebook and summarize data using graphic organizers to assist.
- Sentence starters are helpful to show students how to write about claims. The claim is the conclusion that answers the focus question.
- Students look at patterns from periodic summaries of data as they evaluate evidence for their claim.
- Students need time to reason how the claims may or may not be supported from evidence. And how this relates to teacher notes, readings, or research about the topic.
- In k-1 classes, drawings and narrative discussions allow teachers and young children to draw conclusions about their discoveries.
- This exercise allows teachers to see how prior knowledge and experiences have changed.

## Performance Checklist for Making Conclusions: Explaining

<b>Characteristics of Explanations</b>	<b>Performance Expectations</b>	
Claim	Student ideas relate to the investigation and focus question	
Evidence	Student clearly and accurately cites evidence from the investigation	
Reasoning	Student demonstrates the ability to logically related their claim and evidence to the scientific concept. Considers ways evidence may or may not support the claim	
Scientific Vocabulary	Student demonstrates proper use of vocabulary	

# Prompts for Organizing Explanations

**Describing Sound Energy: Use ALL your observations to develop a definition for SOUND energy**

A. Sound energy is made by

B. Sound moves...

C. Sound energy can move through...

D. The frequency of a sound wave depends on (3 things)...

*Put these ideas together. Write a definition for sound energy below.*

**My definition for sound:**

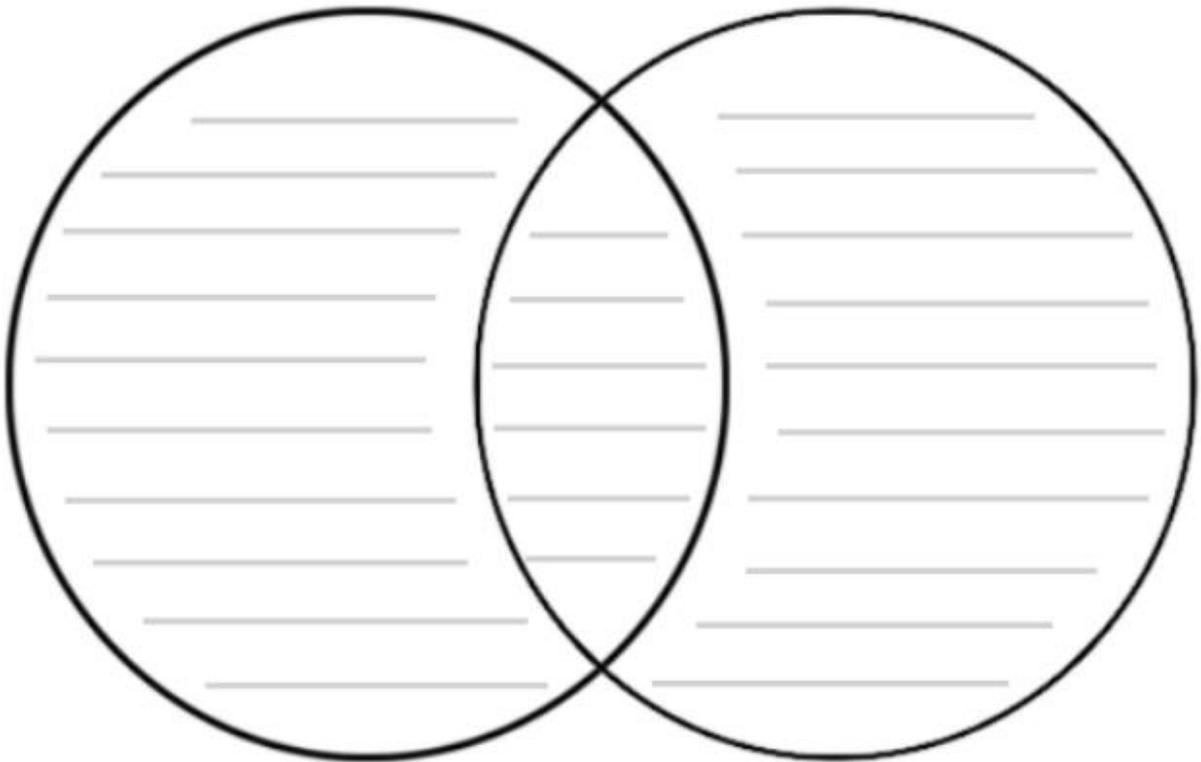
Organizing information for writing

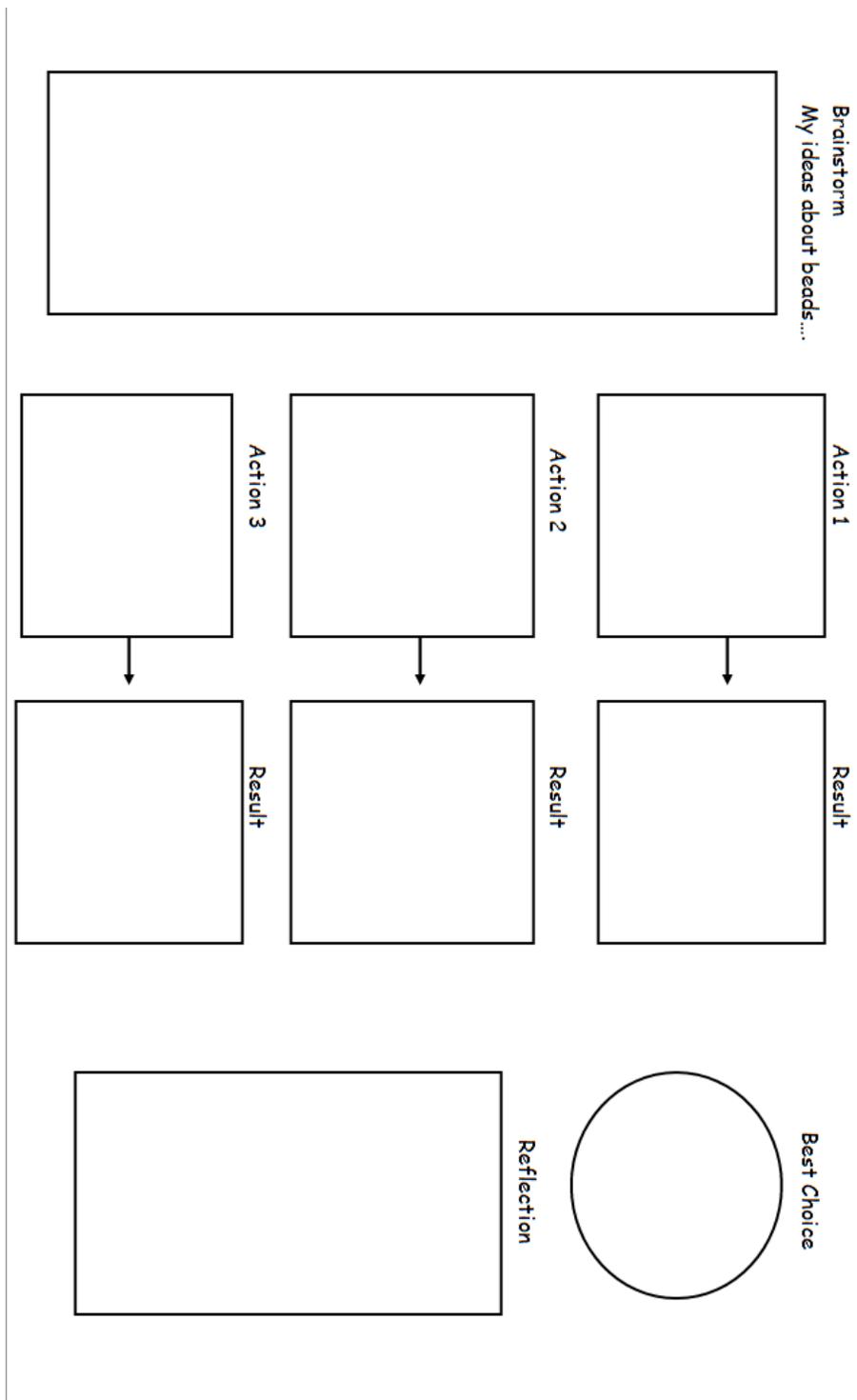
## SERIES and Parallel Circuits

SERIES CIRCUIT  
CIRCUIT

SERIES CIRCUIT

PARALLEL





This is a prompt to help students organize the variables they tested (actions) and the results.

## Looking for Patterns and Making sense of Data

Changes from week one to week two: What changes occurred in the larva before it became a pupa?

Revisit your questions. Which ones can you now answer? Include the evidence for you answer.

What would be an operational definition of the caterpillar larva for Painted Ladies?

