

## ASET Science & Engineering Practice (SEP) Tool: Constructing Explanations

**Name or ID:**

**Lesson/Unit Title:**

**Intended Grade:**

### Directions for use

Indicate if a component is present using Y (yes) or N (no) and then, if it is present, fill in the right 2 columns.

A single lesson will most likely not address each of the components below.

The numbering of these components is not meant to indicate they should be used in sequence, they are simply for reference.

<b>SEP 6</b>	<p><b>Constructing Explanations and Designing Solutions:</b> The end-products of science are <b>explanations</b> of natural phenomena and the end-products of engineering are solutions to design problems.</p> <p><b>a. Constructing Explanations:</b> The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power than previous theories.</p> <p><b>b. Designing Solutions:</b> The goal of engineering design is to find a solution to problems that is based on scientific knowledge and models of the material world. During the design process models or prototypes are systematically tested, and iteratively revised based on performance. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.</p>			
<b>SEP 6a. Constructing Explanations</b>				
<b>Components of SEP</b> In this lesson/unit plan, it is clear that <u>students</u> have a structured opportunity to:		Present? Y/N	<b>What teacher actions were taken to facilitate this component for students?</b>	<b>What are the students doing?</b>
1) <b>Articulate a claim/explanation</b> (a testable statement or conclusion that answers a question about how or why) that is based on and consistent with available evidence				
2) <b>Identify and describe</b> appropriate and sufficient <b>evidence</b> that support the claim/explanation				
3) <b>Describe the reasoning</b> (mechanism of how or why) that connects the evidence to the claim/explanation using scientific ideas/principles				
4) <b>Revise</b> an explanation*				

\* Not present until 6-8 grade band

## ASET Grade Band Criteria (Grade Bands: K-2, 3-5)

<b>Science &amp; Engineering Practices</b>		
<p><b>SEP 6a: Constructing Explanations:</b> Constructing explanations in K-2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena. In 3-5 they build on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena.</p>		
<p><i>By the end of the grade band <b>students</b> will have had a structured opportunity to develop an understanding of each of these. Individual lessons or units should include opportunities for <b>students</b> to practice one or more of the following components .....</i></p>		
	<b>K-2 Grade Band</b>	<b>3-5 Grade Band</b>
1) <b>Articulate a claim/explanation</b> (a testable statement or conclusion that answers a question about how or why) that is based on and consistent with available evidence	Students articulate a claim about (an explanation of) a phenomenon that: <ol style="list-style-type: none"> <li>a. relates the given phenomenon to a scientific idea</li> <li>b. uses information from observations (firsthand or from media; e.g., books, videos, pictures, historical photos)</li> <li>c. is consistent with available evidence</li> </ol>	Students articulate a claim about (an explanation of) a phenomenon that: <ol style="list-style-type: none"> <li>a. relates the given phenomenon to a scientific idea</li> <li>b. uses information from observed relationships</li> <li>c. is consistent with available evidence</li> </ol>
2) <b>Identify and describe evidence</b> that support the claim/explanation	Students make observations (firsthand or from media; e.g., books, videos, pictures, historical photos) to serve as the basis for evidence	Identify and describe evidence (e.g., measurements observations, patterns) that: <ol style="list-style-type: none"> <li>a. can be used to construct or support the claim (an explanation of)</li> <li>b. are valid (relevant to phenomena)</li> </ol>
3) <b>Describe the reasoning</b> (mechanism of how or why) that connects the evidence to the claim/explanation using scientific ideas/principles	Students: <ol style="list-style-type: none"> <li>a. describe how their observations provide evidence to support their claim (explanation of)</li> <li>b. logically connect the evidence to support the claim or explanation. This may include inclusion of scientific ideas presented from formal content resources (e.g. books, videos)</li> </ol>	Students: <ol style="list-style-type: none"> <li>a. use reasoning to logically connect the evidence to support particular points of an explanation for the phenomenon</li> <li>b. identify, from a given explanation, the evidence that supports particular points in the explanation</li> <li>c. describe reasoning for how the evidence supports particular points of the explanation for the phenomenon</li> </ol>
4) <b>Revise</b> an explanation*	Not present until 6-8 grade band	Not present until 6-8 grade band

\* Not present until 6-8 grade band