

## ASET Science & Engineering Practices (SEP) Tool: Developing & Using Models

**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 2</b>	<b>Developing and Using Models:</b> A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations. Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineering systems. Measurements and observations are used to revise models and designs.		
<b>Components of SEP</b> In this lesson/unit plan, it is clear that students have a structured opportunity to:	Present? Y/N	What teacher actions were taken to facilitate this component for students?	What are the students doing? What sensemaking or intellectual work are students doing?
1) <b>Describe</b> components and characteristics of models			
2) <b>Develop</b> models consistent with prior evidence or theories to represent, explain, and/or describe a phenomenon			
3) <b>Use</b> models to describe relationships between components, predict outcomes, and/or test ideas to explain a phenomenon			
4) <b>Compare</b> and/or <b>evaluate</b> features and limitations of (a) model(s)			
5) <b>Revise</b> models based on additional evidence*			

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

### Science & Engineering Practices

**SEP 2: Developing and Using Models:** Modeling in K-2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represents concrete events or design solutions. Modeling in 3-5 builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

By the end of the grade band **students** will have had a structured opportunity to develop an understanding of each of these. Individual lessons or units should include opportunities for **students** to practice one or more of the following components .....

	K-2 Grade Band	3-5 Grade Band
1) <b>Describe</b> components and characteristics of models	From a <b>given model</b> (diagram, drawing, physical replica, diorama, dramatization, or storyboard) students: <ol style="list-style-type: none"> <li>a. <b>identify and describe</b> the parts of the model and</li> <li>b. how they <b>represent</b> the real-world phenomenon</li> </ol>	From a <b>given model</b> (diagram, drawing, physical replica, diorama, dramatization, or storyboard) students: <ol style="list-style-type: none"> <li>a. identify and describe the <b>parts of the model</b> and how they represent the real-world phenomenon, and the relationships between these parts</li> <li>b. Students (<b>with guidance</b>) may need to identify which parts of the model best help to explain the phenomenon</li> </ol>
2) <b>Develop</b> models consistent with prior evidence or theories to represent, explain, and/or describe a phenomenon	Students <b>develop a simple model</b> (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) based on: <ol style="list-style-type: none"> <li>a. <b>evidence to represent a given phenomenon</b>, proposed tool, object, or design system.</li> </ol>	Students: <ol style="list-style-type: none"> <li>a. develop a model to make <b>sense of a phenomenon</b></li> <li>b. collaboratively <b>develop</b> and/or <b>revise</b> a model:               <ol style="list-style-type: none"> <li>i. based on evidence</li> <li>ii. that shows the relationships among variables for <b>frequent and regular occurring events</b> using an <b>analogy, example, or abstract representation</b> to describe a scientific principle or design solution.</li> </ol> </li> </ol>
3) <b>Use</b> models to describe relationships between components, predict outcomes, and/or test ideas to explain a phenomenon	Students use models to: <ol style="list-style-type: none"> <li>a. represent and <b>describe</b> relationships between components in the model. These <b>could include</b> describing amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world.</li> <li>b. explain <b>scientific concepts</b> related to the phenomenon</li> </ol>	Adding to the K-2 band, students use models to: <ol style="list-style-type: none"> <li>a. <b>describe</b> and/or <b>predict phenomena</b> (scientific principles or design solutions).</li> <li>b. test <b>cause and effect relationships</b> or <b>interactions</b> concerning the functioning of a natural system.</li> </ol>
4) <b>Compare</b> and/or <b>evaluate</b> features and limitations of (a) model(s)	Students: <ol style="list-style-type: none"> <li>a. distinguish between a <b>model and the actual object</b>, process, and/or events the model represents</li> <li>b. <b>compare models</b> to identify common features and differences</li> </ol>	Adding to the K-2 band, students also <b>identify</b> limitations of models
5) <b>Revise</b> models based on additional evidence*	<b>Not present until 6-8 grade band</b>	<b>Not present until 6-8 grade band</b>