

## ASET Science & Engineering Practices (SEP) Tool: Planning and Carrying out Investigations

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 3</b>	<b>Planning and Carrying out Investigations:</b> Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.		
<b>Components of SEP</b> In this lesson/unit plan, it is clear that students 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? What sensemaking or intellectual work are students doing?</b>
1) <b>Identify the phenomenon</b> to be investigated and <b>purpose</b> of the investigation			
2) Take appropriate <b>parameters</b> into account <b>when planning how to investigate</b> a scientific question or test a design solution			
3) Make <b>predictions</b> and/or <b>hypotheses</b> about the outcome of an investigation*			
4) <b>Conduct</b> an investigation			
5) <b>Collect data</b> to answer a scientific question or test a design solution			
6) <b>Evaluate</b> and/or <b>revise</b> an experimental design			

\*This component is based on criteria required at the K-2 and 3-5 grade band. Making predictions/hypothesis may happen at the start of an experiment or towards the end depending on the level of experience students have with the content

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

<b>Science &amp; Engineering Practices</b>		
<p><b>SEP 3: Planning and Carrying out Investigations:</b> Planning and carrying out investigations to answer questions or test solutions to problems in K- 2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. In 3-5 they build on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.</p>		
<p>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 .....</p>		
	<b>K-2 Grade Band</b>	<b>3-5 Grade Band</b>
1) <b>Identify the phenomenon</b> to be investigated and <b>purpose</b> of the investigation	Students identify and describe: <ol style="list-style-type: none"> <li>the <b>phenomenon</b> under investigation (from a given investigation plan or for a plan they will design)</li> <li>describe the <b>purpose</b> of the investigation</li> </ol>	Students identify and describe: <ol style="list-style-type: none"> <li>the <b>phenomenon</b> under investigation (from a given investigation plan or for a plan they will design)</li> <li>the <b>purpose</b> of the investigation</li> </ol>
2) Take appropriate <b>parameters</b> into account <b>when planning how to investigate</b> a scientific question or test a design solution	Students <ol style="list-style-type: none"> <li>plan a <b>simple investigation</b> that takes into consideration if the design is based on fair tests.</li> <li>as part of planning <b>students describe</b> what they are investigating and key features to consider.</li> </ol> <p><b>In Kinder</b> this is done with guidance from the teacher</p>	Students: <ol style="list-style-type: none"> <li><b>plan an investigation</b> to answer a scientific question or test a design solution, <b>collaboratively with peers</b>. In the design <b>they consider</b>:               <ol style="list-style-type: none"> <li>will the data produced be <b>useful as evidence</b></li> <li>are they using <b>fair tests</b></li> <li>which <b>variables</b> are controlled</li> <li>the number of <b>trials</b> needed</li> </ol> </li> <li>individually will describe the <b>key features</b> of the plan and what materials will be used</li> </ol>
3) Make <b>predictions</b> and/or <b>hypotheses</b> about the outcome of an investigation*	Students make <b>relevant predictions</b> : <ol style="list-style-type: none"> <li>based on prior <b>experiences</b></li> <li>specifying the <b>outcome and reasons</b></li> </ol>	Students make <b>relevant predictions</b> : <ol style="list-style-type: none"> <li>about what would happen if a <b>variable changes</b></li> <li>based on prior <b>experiences</b> and/or observed <b>patterns</b></li> <li>specifying the <b>outcome and reasons</b></li> </ol>
4) <b>Conduct</b> an investigation	Students conduct a simple investigation (collaboratively with peers) based on the plan they developed to: <ol style="list-style-type: none"> <li><b>produce data</b> as evidence</li> <li><b>answer</b> a scientific question</li> </ol> <p><b>In Kinder</b> this is done with guidance from the teacher</p>	Students <b>collaboratively conduct an investigation</b> to answer a scientific question or test a design solution: <ol style="list-style-type: none"> <li>according to the <b>investigation plan</b> they developed</li> <li>to produce <b>data as evidence</b></li> <li>using <b>fair tests</b></li> <li>in which <b>variables are controlled</b></li> <li>in which the number of <b>trials</b> are considered</li> </ol>

<p>5) <b>Collect data</b> to answer a scientific question or test a design solution</p>	<p>Students make <b>observations</b> (firsthand or from media) and/or <b>measurements to:</b></p> <ul style="list-style-type: none"> <li>a. collect data that can be used to <b>make comparisons</b></li> <li>b. determine if a proposed object, tool, or solution solves a problem or <b>meets a goal</b></li> </ul>	<p>Students make <b>observations and/or measurements to:</b></p> <ul style="list-style-type: none"> <li>a. serve as the basis for evidence for an <b>explanation of a phenomenon</b> or test a design solution</li> <li>b. test two different models of the same proposed object, tool, or process to determine which better <b>meets criteria for success.</b></li> </ul>
<p>6) <b>Evaluate</b> and/or <b>revise</b> an experimental design</p>	<p><b>Students evaluate</b> (i.e. compare and determine which is better) different ways of observing and/or measuring a phenomenon to determine which way they <b>can answer a question.</b></p>	<p>Building on the K-2 band, students <b>evaluate methods and/or tools</b> for collecting data to determine the <b>most appropriate.</b></p>