

ASET Science & Engineering Practices (SEP) Tool: Asking Questions and Defining Problems

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.

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| SEP 1 | Asking Questions and Defining Problems: A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world(s) work and which can be empirically tested. Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world. Both scientists and engineers also ask questions to clarify ideas. | | |
| Components of SEP 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) Ask questions based on observations and/or other appropriate information of a scientific phenomenon | | | |
| 2) Generate, identify, and/or evaluate questions that can be systematically investigated (i.e., questions that are testable/investigable/scientific) | | | |
| 3) Ask questions that challenge the premise of an argument or interpretation of a data set * | | | |
| 4) [Engineering] Define or describe a problem that can be solved (through an object, tool, process, and/or system) | | | |

* Not present until 6-8 Grade Band

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

| Science & Engineering Practices | | |
|--|---|--|
| SEP 1: Asking Questions and Defining Problems: Asking questions and defining problems in the K-2 builds on prior experiences and progresses to simple descriptive questions that can be tested. In 3-5 they build on K-2 experiences and progresses to specify qualitative relationships. | | |
| 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 | | |
| | K-2 Grade Band | 3-5 Grade Band |
| 1) Ask questions based on observations and/or other appropriate information of a scientific phenomenon | Students generate their own questions based on observations/curiosity/and/or prior experiences to find more information about the natural and/or designed world(s) | Students will: a. continue from K-2 to generate their own questions based on observations/curiosity/and/or prior experiences to find more information about the natural and/or designed world(s) b. generate their own questions about what would happen if a variable changes |
| 2) Generate, identify, and/or evaluate questions that can be systematically investigated (i.e., questions that are testable/investigable/scientific) | Students will ask and/or identify questions that can be answered by an investigation | Students will: a. identify scientific (testable) and non-scientific (non- testable) questions b. ask questions that can be investigated within the scope of the classroom or an outdoor environment and predict reasonable outcomes based on patterns such as cause and effect relationships |
| 3) Ask questions that challenge the premise of an argument or interpretation of a data set * | Not present until 6-8 Grade Band | Not present until 6-8 Grade Band |
| 4) [Engineering] Define or describe a problem that can be solved (through an object, tool, process, and/or system) | Students will define a simple problem that can be solved through the development of a new or improved object or tool. | Students will: a. use prior knowledge to describe problems that can be solved b. define a simple design problem that can be solved through the development of an object, tool, process, or system and c. identify and describe criteria (desirable features) for success and constraints (limits) on materials, time, or cost |

* Not present until 6-8 Grade Band