ASET Science & Engineering Practices (SEP) Tool: Using Mathematics and Computational Thinking

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.

SEP 5	**Using Mathematics and Computational Thinking:** In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of predictions.		
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?**
1) Identify mathematical and/or computational representation(s) that can be used to interpret and make sense of phenomena or assess solutions to design problems			
2) Apply mathematical and/or computational representation(s) of the phenomenon to identify relationships in the data and/or simulations			
3) Use analysis of the mathematical and/or computational representation(s) as evidence to explain phenomena or assess solutions to design problems			

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

Science & Engineering Practices		
SEP 5: Using Mathematics and Computational Thinking: Mathematical and computational thinking in K-2 builds on prior experiences and progresses to recognizing that mathematics can be used to describe the natural and designed world(s). In 3-5 they build on K–2 experiences and progress to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative 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) Identify mathematical and/or computational representation(s) that can be used to interpret and make sense of phenomena or assess solutions to design problems	Students describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs	Along with K-2 skills, students create best representations to support a phenomenon
2) Apply mathematical and/or computational representation(s) of the phenomenon to identify relationships in the data and/or simulations	Students use counting and comparing numbers to identify and describe patterns in the natural and designed world(s).	Along with K-2 skills, students organize simple data sets to reveal patterns that suggest relationships (e.g., cause and effect, structure and function, correlations)
3) Use analysis of the mathematical and/or computational representation(s) as evidence to explain phenomena or assess solutions to design problems	Students use identified patterns or quantitative data: a. as evidence to explain a given phenomenon b. to compare two alternative solutions to a problem	Students: a. describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems b. create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem

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