

Essential Learning Event 1 (Secondary)

Students explore phenomena or design problems, make observations, and collect data through investigations.

Sample Student Actions for Essential Learning Event 1



Asking questions and defining problems (SEP1)

Initial Ideas and Questions about a Phenomenon

- ☐ Students make observations of a phenomenon.
- ☐ Students ask questions based on observations of a phenomenon.
- ☐ Students share initial ideas, perspectives, and previous experiences about the phenomenon.
- ☐ Students decide how to represent the phenomenon through drawings, words, or sketches. (SEP2)

Identify Questions that can be Investigated

- ☐ Students formulate specific questions based on examining models or theories. (SEP2)
- ☐ Students evaluate a question about a phenomenon to determine if it is empirically testable.
- ☐ Students ask questions that can be investigated within the scope of the classroom with available resources. (SEP3)
- ☐ Students describe what evidence is needed to answer questions and help build an explanation of the phenomenon. (SEP7)
- ☐ Students identify the variables in scientific questions. (SEP3)
- ☐ Students formulate follow-up questions to clarify or extend an investigation.

Defining Problems for Engineering

- ☐ Students define a design problem that can be solved through the development of an object, tool, process, or system.
- ☐ Students identify criteria and constraints of a design problem.

Planning and Carrying Out Investigations (SEP3)

Plan an Investigation

If students are planning the investigation:

- ☐ Students describe the phenomenon under investigation and question to be answered. (SEP1)
- ☐ Students discuss and decide what to measure or observe and why.
- ☐ Students identify independent and dependent variables and controls.
- ☐ Students identify what methods and tools are needed to collect data.
- ☐ Students decide how much data are needed to produce reliable measurements and consider any limitations on the precision of the data. (SEP4)
- ☐ Students decide how data and observations will be reported.
- ☐ Students predict possible outcomes for the investigation.

- ☐ Students write the procedure that will be followed in the investigation. (SEP8)

If students are planning for an investigation that is being provided:

- ☐ Students describe the phenomenon under investigation and question to be answered. (SEP1)
- ☐ Students ask clarifying questions about the written procedure. (SEP8)
- ☐ Students identify and discuss what will be measured or observed and why. (SEP8)
- ☐ Students identify which variables are controlled in an experiment.
- ☐ Students identify independent and dependent variables and controls.
- ☐ Students explain how tools and methods will be used to collect data.
- ☐ Students describe how data and observations will be reported. (SEP4)
- ☐ Students decide how to produce reliable measurements and consider any limitations on the precision of the data. (SEP4)
- ☐ Students predict possible outcomes for the investigation.
- ☐ Students discuss and identify safety concerns and ethical considerations for the investigation being planned. (SEP8)

Carry Out an Investigation and Record Data/Observations

- ☐ Students determine and agree on roles/jobs to support the investigation.
- ☐ Students read and follow written procedures to carry out the investigation. (SEP8)
- ☐ Students identify, discuss, and follow safety and ethical considerations for the investigation. (SEP8)
- ☐ Students make and record observations and collect data.
- ☐ Students make drawings, label components, and describe what is happening before, during, and after an experiment. (SEP2)
- ☐ Students ask questions about data that has been collected. (SEP1)
- ☐ Students organize data in charts, tables, and/or graphs to represent phenomena. (SEP4)
- ☐ Students clearly describe what each data set represents. (SEP2)
- ☐ Students refine the investigation, if necessary, to produce more accurate and precise data (that might better explain the phenomenon).
- ☐ Students discuss data and share observations with others. (SEP8)
- ☐ Students refine a design solution to better address an engineering problem.

Sample Questions to Support the Use of the Science and Engineering Practices Foregrounded in Essential Learning Event 1



SEP 1: Asking questions and defining problems

Initial Ideas and Questions about a Phenomenon

- How would you describe what you are observing?
- How might you sketch or draw what you are observing?
- What experience have you had with this phenomenon?
- What do you wonder about as you observe this phenomenon?
- What questions come to mind as you observe this phenomenon?

Identify Questions that can be Investigated

- Provide fill-in-the-blank questions for students. (Example: How does the _____ affect _____?)
- What questions can we ask about this phenomenon?
- How would you go about answering a scientific question?
- What variables might we investigate to learn more about this phenomenon?
- How might we test a question about a phenomenon?

SEP3: Planning and carrying out investigations

Plan an Investigation

- What question are you trying to answer? What problem are you trying to solve?
- How will the investigation you are planning answer your question about the phenomenon?
- What data will you be collecting? How will it be collected?
- How will you report that data?
- Describe the experimental procedure you will follow.
- How will the procedure help to collect reliable data?
- What safety considerations have you considered?
- What possible outcomes might you predict for this experiment? Why do you think this?
- What questions do you have about the experimental procedure?

Carry Out an Investigation and Record Data/Observations

- What changes are you having to make to the procedure as you are working and why?
- How might we translate our observations into a data table or other organizational structure?
- What data have you collected?
- How are you organizing the data? Is this organizational structure working and if not, what might you consider?
- What patterns does the data you have organized show?
- Why did you organize the data the way you did?
- How might you modify the experiment to produce more accurate and precise data?
- What new questions are you thinking about as you are conducting this experiment?
- How do the data and observations help you think about the phenomena we are studying?

This resource was developed by the Curriculum and Instruction Science Team at the San Diego County Office of Education, 2022. For additional resources and information about the Next Generation Science Standards, visit the SDCOE Science Resource Center at ngss.sdcOE.net.