



Washington Office of Superintendent of  
**PUBLIC INSTRUCTION**



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# *WCAS Item Specifications*

## SEP Bullets

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## SEP Bullets

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### Purpose and Structure of This Document

The Details and Clarifications section of an item specification for a Performance Expectation (PE) includes a set of bulleted statements that describe how the Science and Engineering Practice (SEP) specific to that PE could be assessed on the WCAS. The statements are derived from the SEP progressions in [Appendix F](#) of the [Next Generation Science Standards](#) and were informed by experience in developing the WCAS. The set of bulleted SEP statements is always listed first in a Details and Clarifications section.

This document shows the set of bulleted statements for each SEP at each grade level. The NGSS PEs can refer to the same SEP in a variety of ways. The first bullet in each set shows all those different ways. The sub-bullets are templated for the SEP at the grade band.

This document provides SEP information for the [WCAS Test Design and Item Specifications](#) which are used for developing items for the state science assessment. There are additional ways to assess each SEP. It is important that the information in this document does not limit classroom instruction and assessment.

# 1. Asking Questions and Defining Problems

## Grades 3–5

- **Ask questions OR**

**Define a simple design problem** is expanded to include:

- asking questions about what would happen if a variable is changed
- asking and/or identifying questions that can be answered through observation and/or investigation
- predicting the outcome of questions that can be answered through observation and/or investigation
- asking questions about observations, data, claims, and/or proposed designs
- defining a simple design problem that can be solved through the development of an object, tool, process, and/or system
- describing criteria for a successful solution
- describing constraints on materials, time, or cost that could limit the success of a solution

## Grades 6–8

- **Ask questions OR**

**Define the criteria and/or constraints of a design problem** is expanded to include:

- asking and/or identifying questions that arise from observation and/or investigation to seek additional information
- asking questions to determine relationships between independent and dependent variables
- asking questions to clarify and/or refine a model, an explanation, and/or an engineering problem
- asking questions that frame a hypothesis based on observations and scientific principles
- defining a design problem that can be solved through the development of an object, tool, process, and/or system
- describing criteria for a successful solution
- describing constraints that could limit the success of a solution

## High School

- **Ask and/or evaluate questions OR**

**Analyze a global challenge** is expanded to include:

- asking and/or identifying questions that arise from observation and/or investigation to seek additional information
- asking questions to determine quantitative and/or qualitative relationships, between independent and dependent variables
- asking questions to refine a model, an explanation, and/or an engineering problem
- asking questions to determine if a question is testable and/or relevant
- asking questions that frame a hypothesis based on observations and/or scientific principles
- asking questions that challenge an argument, data set, and/or design
- defining a design problem that involves the development of a process and/or system with interacting components
- describing social, technical, and/or environmental criteria for a successful solution
- describing social, technical, and/or environmental constraints that could limit the success of a solution

## 2. Developing and Using Models

### Grades 3–5

- **Develop** and/or **use a model** is expanded to include:
  - revising a complete or partial model
  - comparing complete or partial models
  - using a model to describe a scientific principle
  - using a model to describe a process
  - using a model to make predictions

### Grades 6–8

- **Develop** and/or **use a model** is expanded to include:
  - using a given complete or partial model to make predictions and/or to describe phenomena
  - using a model to show relationships among variables
  - revising a given complete or partial model
  - describing the limitations of a complete or partial model
  - using a model to represent current understanding of a system
  - using a model to aid in the development of questions and/or descriptions

### High School

- **Develop** and/or **use a model** OR **Develop** and/or **use a quantitative model** is expanded to include:
  - developing, revising, and/or using a model to generate data
  - developing, revising, and/or using a model to show relationships between the components of a system and/or between systems
  - using a given complete or partial model to make predictions and/or to describe phenomena
  - revising a given complete or partial model
  - describing the limitations of a complete or partial model
  - comparing models of a given system

### 3. Planning and Carrying Out Investigations

#### Grades 3–5

- **Plan** and/or **conduct** an **investigation** OR  
**Plan** and/or **carry out fair tests** OR  
**Make observations** OR  
**Make observations** and/or **measurements** is expanded to include:
  - identifying relevant variables and/or data to be gathered in an investigation
  - describing appropriate methods and/or tools to collect data
  - collecting data that can be used to support an explanation, make comparisons, and/or make predictions

#### Grades 6–8

- **Plan** an **investigation** OR  
**Plan** and/or **conduct** an **investigation** OR  
**Conduct** and/or **evaluate** an **investigation** OR  
**Collect data** is expanded to include:
  - conducting an investigation to produce evidence
  - identifying independent, dependent, and/or controlled variables
  - making predictions about what would happen if a variable changes
  - evaluating appropriate methods and/or tools for collecting and/or recording data

#### High School

- **Plan** and/or **conduct** an **investigation** is expanded to include:
  - planning for and/or producing data to serve as evidence for developing and/or revising models, supporting an explanation, and/or testing a solution
  - planning for and/or evaluating an investigation to identify possible confounding variables and/or to ensure that variables are controlled
  - determining the type, amount, and/or accuracy of data needed to produce reliable measurements and/or considering limitations on the precision of the data (e.g., number of trials, cost, risk, time)
  - selecting appropriate processes, methods, and/or tools to collect, record, analyze, and/or evaluate data
  - predicting what happens to a dependent variable when an independent variable is manipulated
  - identifying failure points and/or describing performance relative to criteria for success

## 4. Analyzing and Interpreting Data

### Grades 3–5

- **Represent data** OR  
**Analyze** and/or **interpret data** is expanded to include:
  - recording observations
  - organizing data in a table or graphical display (e.g., chart, graph)
  - summarizing data to identify relationships between data sets
  - comparing and/or contrasting data collected by different groups

### Grades 6–8

- **Analyze** and/or **interpret data** OR  
**Analyze pictorial data** OR  
**Collect data** OR  
**Construct** and/or **interpret** graphical displays of **data** is expanded to include:
  - organizing and/or interpreting data
  - identifying similarities and/or differences in findings
  - using patterns in data to distinguish between causal and/or correlational relationships and/or to draw conclusions based on data

### High School

- **Analyze data** OR  
**Analyze geoscience data** OR  
**Apply concepts of statistics** and/or **probability** is expanded to include:
  - organizing and/or interpreting data using tables, graphs, and/or statistical analysis
  - identifying relationships in data using tables and/or graphs
  - identifying limitations (e.g., measurement error, sample selection) in data
  - comparing the consistency in measurements and/or observations in sets of data
  - using analyzed data to support a claim and/or an explanation

## 5. Using Mathematics and Computational Thinking

### Grades 3–5

- **Describe** and/or **graph quantities** OR  
**Measure** and/or **graph quantities** is expanded to include:
  - using mathematics to represent variables and their relationships
  - measuring, comparing, and/or organizing quantitative attributes (e.g., area, volume, mass) to reveal patterns that suggest relationships
  - graphing quantities to address scientific questions and/or problems

### Grades 6–8

- **Use mathematical representations** is expanded to include:
  - analyzing data sets for patterns and trends
  - using mathematical representations to describe and/or support scientific conclusions and/or design solutions
  - ordering steps to solve a problem
  - applying mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems
  - using digital tools, mathematical concepts, and/or mathematical arguments to compare proposed solutions to an engineering design problem

### High School

- **Use mathematical representations** OR  
**Use mathematical** and/or **computational representations** OR  
**Create a computational model** OR  
**Create** and/or **use a computational simulation** OR  
**Create** and/or **revise a simulation** OR  
**Use a computational representation** OR  
**Use a computer simulation** is expanded to include:
  - describing and/or revising a computational model or simulation of a phenomenon, designed device, process, or system
  - using mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations
  - applying techniques of algebra and/or functions to represent and/or solve scientific and engineering problems

## 6. Constructing Explanations (for Science) and Designing Solutions (for Engineering)

### Grades 3–5

- **Identify** evidence OR  
**Use evidence** OR  
**Generate** and/or **compare solutions** OR  
**Compare solutions** OR  
**Apply scientific ideas to solve a design problem** is expanded to include:
  - using measurements, observations, or patterns to support an explanation
  - using measurements, observations, or patterns to generate and/or compare solutions to a problem
  - using evidence to design a solution to a problem
  - comparing solutions to a problem as to how well they meet criteria for success
  - comparing solutions in terms of constraints that limit the success of the solution

### Grades 6–8

- **Construct** an **explanation** OR  
**Construct** a **scientific explanation** OR  
**Construct, test, and/or modify** a **device** OR  
**Design** a **solution** OR  
**Apply scientific ideas to construct** an **explanation** OR  
**Apply scientific principles to design** a **method** OR  
**Apply scientific and design principles to design, test, and modify** a **device** is expanded to include:
  - using valid data, models, and/or scientific knowledge to construct, revise, and/or support an explanation and/or design a solution
  - using qualitative and/or quantitative relationships between variables to predict and/or describe phenomena
  - using models and/or evidence to support explanations
  - applying scientific principles to design a tool, process, or system that meets specific criteria and/or constraints

### High School

- **Construct** an **explanation** OR  
**Construct** and/or **revise** an **explanation** OR  
**Apply scientific principles and/or evidence to provide** an **explanation** OR  
**Apply scientific reasoning and/or evidence to construct** an **explanation** OR  
**Apply scientific and/or engineering ideas** OR  
**Design** a **solution** OR  
**Design, evaluate, and/or refine** a **system** OR  
**Design, evaluate, and/or refine** a **solution** OR  
**Design, evaluate, and/or refine** a **device** OR  
**Evaluate** a **solution** OR  
**Evaluate** and/or **refine** a **technological solution** is expanded to include:
  - making claims about relationships between dependent and independent variables
  - using valid and/or reliable evidence to construct and/or revise an explanation
  - applying scientific ideas, principles, and/or evidence to describe a scientific phenomenon and/or solve a problem
  - using evidence to evaluate how well a solution meets the criteria for success
  - using evidence to evaluate the constraints that may limit the success of a solution
  - using knowledge, evidence, criteria, and/or tradeoffs to evaluate and/or refine a solution



## 7. Engaging in Argument from Evidence

### Grades 3–5

- **Make a claim** OR  
**Support an argument** OR  
**Construct an argument** is expanded to include:
  - using evidence to support an argument and/or a claim
  - developing an argument and/or making a claim based on evidence, data, and/or a simple model
  - distinguishing between observations and inferences in an explanation and/or argument
  - comparing and/or refining arguments and/or claims based on evidence
  - using evidence to make a claim about the merit of a solution to a problem by describing how well the solution meets the criteria and/or the constraints of a problem

### Grades 6–8

- **Construct an argument** OR  
**Construct and/or present arguments** OR  
**Construct, use, and/or present an argument** OR  
**Use an argument** OR  
**Evaluate competing design solutions** is expanded to include:
  - describing the similarities and/or differences between two arguments
  - developing an argument and/or making a claim based on observations, data, and/or a model
  - using evidence and/or scientific reasoning to support or refute an explanation and/or a model
  - identifying flaws in explanations, procedures, models, and/or solutions
  - evaluating competing design solutions based on how well the solutions meet the criteria and/or the constraints of a problem

### High School

- **Construct an argument** OR  
**Evaluate the evidence** OR  
**Make and/or defend a claim** OR  
**Evaluate the claims, evidence and/or reasoning** OR  
**Evaluate competing design solutions** is expanded to include:
  - describing criteria used to critique claims
  - using evidence to compare and/or evaluate competing arguments and/or solutions
  - using evidence to determine the merit of an argument and/or an explanation
  - using evidence to construct and/or support an argument and/or a claim
  - evaluating competing design solutions to real-world problems using scientific ideas and/or evidence and/or relevant economic, societal, and/or environmental considerations

## 8. Obtaining, Evaluating, and Communicating Information

### Grades 3–5

- **Obtain** and/or **combine information** is expanded to include:
  - summarizing information to describe a scientific concept and/or support a scientific claim
  - comparing information to describe a scientific concept and/or support a scientific claim
- **Information** formats may include, but are NOT limited to:
  - text
  - diagrams
  - graphs
  - tables
  - models
  - animations

### Grades 6–8

- **Gather** and/or **synthesize** information OR  
**Integrate** qualitative scientific and/or technical **information** is expanded to include:
  - using patterns in and/or evidence from information to support a claim and/or describe a scientific phenomenon
  - evaluating the credibility and/or accuracy and/or bias of claims from different sources.
- **Information** formats may include, but are NOT limited to:
  - text
  - diagrams
  - graphs
  - tables
  - models
  - animations

### High School

- **Communicate information** OR  
**Communicate technical information** OR  
**Communicate scientific information** OR  
**Communicate scientific ideas** OR  
**Evaluate** the validity and/or reliability of **claims** is expanded to include:
  - identifying scientific and/or technical evidence, concepts, processes, or information
  - evaluating the validity and/or reliability of claims from different sources
  - integrating multiple sources of information to construct and/or support an explanation
  - summarizing complex information
- **Information** formats may include, but are NOT limited to:
  - text
  - diagrams
  - graphs
  - tables
  - models
  - animations
  - equations