Item Specifications for the Indiana Assessment Grade 6 Science (Beginning 2018-19 School Year)

These item specifications serve as a foundational resource in the assessment development process. This document is the first in a series of documents that will be made available in the future.

Item specifications identify the standards being assessed in addition they provide information about each of the related items including evidence elicited, depth of knowledge (DOK), limits and constraints, and item types. Panels of content teachers at each grade level, representative of Indiana student populations, in partnership with the Department of Education developed the item specifications.

The 2016 Indiana Science Standards increased the breadth and scope of the 2010 standards by adding a new component: process standards. Students are expected to identify and explain content, as well as understand how the data were collected and analyzed to reach those conclusions (scientific and engineering process). The Indiana assessment is designed to test students' understanding of science and engineering processes in conjunction with content. They are expected to integrate both into their understanding and answers.

In addition to the new content and process standards, Indiana added computer science standards to keep up with the changing technological environment our students face. These standards help prepare them to be responsible digital citizens and understand the role technology plays in modern society. Federal accountability requires that these be tested with the science content and process standards.

Overview

The rows of each item specification highlight key features of items included on Indiana assessments as follows:

Reporting Category: The broad content category for the standard representing a segment or domain of content approved by educators as key for reporting. Examples across content areas may include: Number Sense in Mathematics (7.NS); Physical Science in Science (4.PS); and Writing in English/Language Arts (9-10.W).

Standard: Each Indiana Academic Standard is noted under the Reporting Category.

Evidence Statement(s): Statements that describe the knowledge and skills that an assessment item should elicit from students.

Content Limit(s)/ Constraint(s): Statements that list the boundaries or limits of the statements included in the items.

Depth of Knowledge: Webb's Depth of Knowledge which categorizes items by the complexity of thinking required. Descriptions of each level are: (1) recall and reproduction, (2) skills and concepts, (3) strategic thinking, and (4) extended thinking. For a complete description of each go to: http://www.doe.in.gov/sites/default/files/assessment/depth-knowledge-powerpointenglish-10.pdf

Item Type(s): Four possible item types including multiple choice (MC), constructed response (CR), technology-enhanced (TE), and extended response (ER).

Sample Item Stem(s): Examples of items stems that satisfy the requirements of the specification.

Sample Item(s): Full example items that satisfy the requirements of the specifications.

Reporting Category	6.PS - Physical Science
Standard	6.PS.1 - Distinguish between the terms position, distance, and displacement, as well as, the terms speed and velocity.
Evidence Statement(s)	Through the use of diagrams, students identify/distinguish the difference between position, distance, displacement, speed, and velocity. Given a context, students distinguish speed from velocity.
Content Limit(s)/ Constraint(s)	Assess the standard using clear, precise diagrams. Displacement should be in the physics realm, and how it ties into position and distance—not the displacement method of measuring volume.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	According to this diagram, what was the speed/velocity/displacement of...?

Reporting Category	6.PS - Physical Science
Standard	6.PS.2 - Describe the motion of an object graphically showing the relationship between time and position.
Evidence Statement(s)	Students explain the relationship between time and position. Students describe the motion of the object using the data presented in a graph.
Content Limit(s)/ Constraint(s)	This standard is not about making a graph; it's about explaining what is shown in a graph and or interpreting time and position data.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Using the data in the graph, at what time did the car move/stop/return? Using the data in the graph, did the car…?

Reporting Category	6.PS - Physical Science
Standard	6.PS.3 - Describe how potential and kinetic energy can be transferred from one form to another.
Evidence Statement(s)	Students correctly describe or explain the transfer between different types of kinetic and potential energy.
Content Limit(s)/ Constraint(s)	Do not assess mechanical energy, conduction, convection, or radiation. Light and sound energy are covered in 6.PS.4, so do not assess here.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	At what point does {object} have the most/least kinetic/potential energy? When does energy change from potential/kinetic to kinetic/potential in this graph/diagram?

Reporting Category	6.PS - Physical Science
Standard	6.PS.4 - Investigate the properties of light, sound, and other energy waves and how they are reflected, absorbed, and transmitted through materials and space.
Evidence Statement(s)	Students identify differences between reflected, absorbed, and transmitted energy including light and sound waves.
Content Limit(s)/ Constraint(s)	Water is the only assessable liquid.
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	In this diagram, when are the {waves} being transmitted/reflected/absorbed?

Reporting Category	6.ESS - Earth and Space Science
Standard	6.ESS.1 - Describe the role of gravity and inertia in maintaining the regular and predictable motion of celestial bodies.
Evidence Statement(s)	Students distinguish between gravity and inertia. Using diagrams and models, students describe the role of gravity and inertia and identify the direction of gravity and inertia.
Content Limit(s)/ Constraint(s)	Do not assess man-made objects (e.g., satellites, space station).
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	How does gravity/inertia affect…? Which object has more gravity/inertia?

Reporting Category	6.ESS - Earth and Space Science
Standard	6.ESS.2 - Design models to describe how Earth's rotation, revolution, tilt, and interaction with the sun and moon cause seasons, tides, changes in daylight hours, eclipses, and phases of the moon.
Evidence Statement(s)	Students place the Earth, moon, and sun in the correct positions for eclipses, seasons, tides, and moon phases. Given the position of the Earth, moon, and sun, students describe which phenomenon is occurring.
Content Limit(s)/ Constraint(s)	Do not assess waxing and waning. Do not assess shadows. For tides, do not assess the positions of the sun, Earth, and the moon during neap and spring tides. Use diagrams/graphics whenever possible.
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	What phenomena is this diagram showing? How would the positions of Earth/moon/sun change to show…?

Reporting Category	6.ESS - Earth and Space Science
Standard	6.ESS.3 - Compare and contrast the Earth, its moon, and other planets in the solar system, including comets and asteroids. (Comparisons should be made in regard to size, surface features, atmospheric characteristics, and the ability to support life.)
Evidence Statement(s)	Students sort/compare objects in the solar system by different characteristics. Students make comparisons of inner and outer planets. Students make comparisons of comets and asteroids.
Content Limit(s)/ Constraint(s)	Do not compare planets to comets and asteroids. Make sure wording is clear so that students don't confuse planets and plants.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Which planets in the solar system…? What is the difference between…? Compare/contrast planets/comets/asteroids…

Reporting Category	6.LS - Life Science
Standard	6.LS.1 - Investigate and describe how homeostasis is maintained as living things seek out their basic needs of food, water, shelter, space, and air.
Evidence Statement(s)	Students identify how homeostasis is impacted when an organism's basic needs are not met.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	What would happen in this ecosystem if…?

Reporting Category	6.LS - Life Science
Standard	6.LS.2 - Describe the role of photosynthesis in the flow of energy in food chains, energy pyramids, and food webs. Create diagrams to show how the energy in animals' food used for bodily processes was once energy from the sun.
Evidence Statement(s)	Students identify producers in a food chain/web and explain how their energy supports the rest of the organisms in the food chain/web. Students describe the general process of photosynthesis and its role in providing energy to organisms. Students understand the relationship between energy available at different levels in the pyramid.
Content Limit(s)/ Constraint(s)	Do not calculate the energy in a pyramid.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Where is the most/least energy…? How is energy transferred in this ecosystem? What is the role of…?

Reporting Category	6.LS - Life Science
Standard	6.LS.3 - Describe specific relationships (predator/prey, consumer/producer, parasite/host) and symbiotic relationships between organisms. Construct an explanation that predicts why patterns of interactions develop between organisms in an ecosystem.
Evidence Statement(s)	Students explain relationships between predator/prey, consumer/producer, parasite/host, or in symbiotic relationships. Students explain patterns of interactions that develop between organisms in an ecosystem.
Content Limit(s)/ Constraint(s)	Student could be asked to describe a symbiotic relationship, but not name specific type (mutualism, commensalism, etc.). Use Indiana-based organisms when possible and/or provide enough context in the item for the student to be able to describe/determine the relationship.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Given the data in this graph, describe the interaction…

Sample item (MC):

In a food chain, mice feed on grain crops, and snakes feed on mice. Which of these would MOST LIKELY occur in a year when grain crops are more plentiful?

A. The snake population will increase

B. The mouse population will decrease

C. The snake population will not change

D. The mouse population will not change

Key: A

Reporting Category	6.LS - Life Science
Standard	6.LS.4 - Investigate and use data to explain how changes in biotic and abiotic components in a given habitat can be beneficial or detrimental to native plants and animals.
Evidence Statement(s)	Students interpret data to determine whether specific biotic and abiotic components are beneficial or detrimental to organisms in a habitat. Students describe a scenario that displays the impact of biotic and abiotic components in a habitat. Students explain the concept of carrying capacity.
Content Limit(s)/ Constraint(s)	Use real-life examples such as the Kaibab deer population's impact on the environment whenever possible.
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Describe what would happen if … became limited in this ecosystem. Explain what abiotic/biotic components affect this population.

Reporting Category	6.LS - Life Science
Standard	6.LS.5 - Research invasive species and discuss their impact on ecosystems.
Evidence Statement(s)	Students identify or explain how a species can become invasive and how the species impacts the ecosystem. Given a passage or scenario, students discuss the possible impacts of an invasive species on ecosystems. Given ecosystem impacts, identify what likely caused the impacts (related to invasive species).
Content Limit(s)/ Constraint(s)	Provide enough context about the invasive species so students are able to discuss their impact on ecosystems without prior background knowledge of the species being discussed. Use real-world examples. Do not assess how to stop the invasive species.
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Identify the invasive species in this ecosystem. What would happen if an invasive species took over this role/niche?

Reporting Category	6.E - Engineering
Standard	6.E.1 - Identify the criteria and constraints of a design to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
Evidence Statement(s)	Students identify criteria and constraints of a single design. Students explain how the potential impacts to humans/environment influence the criteria and constraints needed for a successful design solution.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Identify what is required for this design solution. Why can the engineer not…?

Reporting Category	6.E - Engineering
Standard	6.E.2 - Evaluate competing design solutions using a systematic process to identify how well they meet the criteria and constraints of the problem.
Evidence Statement(s)	Given details about designs, students explain or give reason(s) why one design would be more successful than the other(s).
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Which is the best design? Explain.

Reporting Category	6.E - Engineering
Standard	6.E.3 - Analyze data from investigations to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
Evidence Statement(s)	Students compare data about components of different designs to determine which characteristics from each design are most successful in order to combine them into a new and improved design solution.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Describe which parts of the {set/list of designs} could be combined to create a different, better design.

Reporting Category	6.E - Engineering
Standard	6.E.4 - Develop a prototype to generate data for repeated investigations and modify a proposed object, tool, or process such that an optimal design can be achieved.
Evidence Statement(s)	Students complete the steps in the design process to develop a successful prototype.
Content Limit(s)/ Constraint(s)	Assessed in classroom
Depth of Knowledge	4
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE), Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Use the following steps to… What is the result of allowing these procedures…?

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.1 - Posing questions (for science) and defining problems (for engineering) A practice of science is posing and refining questions that lead to descriptions and explanations of how the natural and designed world(s) work and these questions can be scientifically tested. Engineering questions clarify problems to determine criteria for possible solutions and identify constraints to solve problems about the designed world.
Evidence Statement(s)	Students can pose questions that can be answered scientifically i.e. with controlled variables. Students pose questions to help determine criteria and constraints needed for a successful design solution.
Content Limit(s)/ Constraint(s)	Students need to be provided enough context to be able to come up with appropriate questions.
Depth of Knowledge	3
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	What is the question the scientist is testing? What question would you ask to meet the criteria/constraints?

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.2 - Developing and using models and tools A practice of both science and engineering is to use and construct conceptual models that illustrate ideas and explanations. Models are used to develop questions, predictions and explanations; analyze and identify flaws in systems; build and revise scientific explanations and proposed engineered systems; and communicate ideas. Measurements and observations are used to revise and improve models and designs. Models include, but are not limited to: diagrams, drawings, physical replicas, mathematical representations, analogies, and other technological models. Another practice of both science and engineering is to identify and correctly use tools to construct, obtain, and evaluate questions and problems. Utilize appropriate tools while identifying their limitations. Tools include, but are not limited to: pencil and paper, models, ruler, a protractor, a calculator, laboratory equipment, safety gear, a spreadsheet, experiment data collection software, and other technological tools.
Evidence Statement(s)	Students select the most appropriate model in a given situation and explain their selection. Students select the most appropriate tool in a given situation and explain their selection. Students identify situations in which it is appropriate to use a model. Students create a graph/model/diagram to represent data. Students use a "tool" to measure.
Content Limit(s)/ Constraint(s)	Context/models/graphs/tools should be grade-level appropriate.
Depth of Knowledge	3
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Graph the data in the table. Which graph best matches the data in the table?

Sample Item:

Eric predicted that warm water would boil faster than water at room temperature. He performed an experiment to determine whether water at 40°C boiled faster than water at 20°C. The table below shows his data.

Trial	Starting Temperature (°C)	Amount of Water (L)	Time Needed to Boil (minutes)
A	20	2	9
B	20	2	10
C	20	2	9
D	20	2	9.5
E	40	2	6
F	40	2	5
G	40	2	15
H	40	2	5.5

Name TWO tools Eric used to complete his experiment.

Key

Any two of the following would suffice for a correct response:

- Thermometer,
- stove/burner/hot plate,
- graduated cylinder/beaker

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.3 - Constructing and performing investigations Scientists and engineers are constructing and performing investigations in the field or laboratory, working collaboratively as well as individually. Researching analogous problems in order to gain insight into possible solutions allows them to make conjectures about the form and meaning of the solution. A plan to a solution pathway is developed prior to constructing and performing investigations. Constructing investigations systematically encompasses identified variables and parameters generating quality data. While performing, scientists and engineers monitor and record progress. After performing, they evaluate to make changes to modify and repeat the investigation if necessary.
Evidence Statement(s)	Students demonstrate knowledge of researching problems in order to identify solutions and how to reach those solutions by using a systematic approach. Students can identify the control and independent/dependent variable. Student can describe the steps in an investigation. Student can plan an investigation. Given the steps of investigation, students can order the steps.
Content Limit(s)/ Constraint(s)	Understand that researching analogous problems can provide useful information when trying to design solutions for a scientist's current investigation/engineer's design problem. Possible item context: Provide data from another scientist's investigation. Understand that there must be a plan before investigating. Understand that scientific investigations follow a logical sequence of steps, must be repeatable by self and others, and after each time an investigation is performed, it is analyzed to find ways to improve the procedure. Identify a variable in an investigation and understand the importance of a control. Analogous problems need to be grade-level appropriate.
Depth of Knowledge	3
Item Type(s)	Extended Response (ER), Constructed Response (CR)

Sample Item Stem(s)	What is the independent/dependent variable in {experiment}? Put the steps in the proper order. Why did the scientist include {specific step} in the experiment?

Sample Item:

Amy performed a science experiment in which she followed the following steps:

1. Fill two pots with the same type and amount of soil
2. Plant five seeds of the same plant type into each pot
3. Place Pot A next to a sunny window
4. Place Pot B in a dark room
5. Add the same amount of water to each pot every three days

After 4 weeks, Amy observed the plants in both pots. The plants in Pot A were green, with tall, thick stems. The plants in Pot B were yellow, with tall, thin stems. Explain whether or not this is a fair test.

Key

This is a fair test because all conditions were kept the same except for the one being tested, which was the light or lack of it that the plants were grown in.

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.4 - Analyzing and interpreting data Investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists and engineers use a range of tools to identify the significant features in the data. They identify sources of error in the investigations and calculate the degree of certainty in the results. Advances in science and engineering makes analysis of proposed solutions more efficient and effective. They analyze their results by continually asking themselves questions; possible questions may be, but are not limited to: “Does this make sense?” "Could my results be duplicated?" and/or “Does the design solve the problem with the given constraints?”
Evidence Statement(s)	Students demonstrate how data are analyzed in order to identify problems and solutions. Students analyze data from tables, etc., to notice trends. Students find a piece of data that is an outlier (way off) from the pattern. Students make predictions/conclusions about what may have gone wrong to result in outliers.
Content Limit(s)/ Constraint(s)	Make sure the data are presented in a grade-level appropriate format.
Depth of Knowledge	3
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Which {data point} does not match the others? Explain why it might not match. Which statement best describes how the graph is trending?

Sample Item:

Eric predicted that warm water would boil faster than water at room temperature. He performed an experiment to determine whether water at 40°C boiled faster than water at 20°C. The table below shows his data.

Trial	Starting Temperature (°C)	Amount of Water (L)	Time Needed to Boil (minutes)
A	20	2	9
B	20	2	10
C	20	2	9
D	20	2	9.5
E	40	2	6
F	40	2	5
G	40	2	15
H	40	2	5.5

Part 1: Explain whether or not the data support Eric's prediction.

Part 2: Look at the data for Trial G. Describe ONE possible explanation for why this trial has different outcome from the other trials.

Key

Part 1: A correct response is any response that indicates that:

Most of the data support Eric's prediction because the 40°C water in trials E, F, and H all took less time to boil than the 20°C water in trials A-D. However, the 40°C water in trial G took longer to boil than the water in all the other trials. Because trial G's results are so different from the rest, this trial should be thrown out and the conclusion should be that Eric's prediction has been proven.

Part 2: A correct response is any response indicating that:

Trial G may be different because:

- The temperature of the stove/burner/hot plate used to heat the water sample in trial G might not have been the same as those used to heat the other samples.
- The water sample in trial G might have had something/another chemical in it in addition to the water, which made the boiling point higher for that sample than for the others.
- The original temperature of the water in trial G might have been lower than 40°C and its initial temperature recorded incorrectly in the table.

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.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 such predictions. Scientists and engineers understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
Evidence Statement(s)	Students explain that mathematics and computations support science and these can be used to predict, confirm, and/or express information. Students predict the next data point in a pattern or trend. Students can perform grade-appropriate calculations.
Content Limit(s)/ Constraint(s)	Math concepts assessed should be one grade level below students' current grade and numbers should be whole numbers. Context should be covered in the content standards for the grade.
Depth of Knowledge	2
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Predict the next data point on this graph. What is the average of this set of data?

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.6 Constructing explanations (for science) and designing solutions (for engineering) Scientists and engineers use their results from the investigation in constructing descriptions and explanations, citing the interpretation of data, connecting the investigation to how the natural and designed world(s) work. They construct or design logical coherent explanations or solutions of phenomena that incorporate their understanding of science and/or engineering or a model that represents it, and are consistent with the available evidence.
Evidence Statement(s)	Students demonstrate how results can be used as evidence. Students give the scientific explanation for why something works. (Use the evidence as a springboard to explain why something works that way/or doesn't work). Students use background knowledge to explain the science behind a given scientific scenario.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Do the data support/reject the hypothesis? Which of the following conclusions are best supported by this graph/data table?

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.7 - Engaging in argument from evidence Scientists and engineers use reasoning and argument based on evidence to identify the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation, the process by which evidence-based conclusions and solutions are reached, to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims.
Evidence Statement(s)	Students support arguments with evidence or explain why an argument is not supported. Given opposing conclusions or ideas, students select which one the evidence supports. Students compare and contrast opposing conclusions/explanations/solutions.
Content Limit(s)/ Constraint(s)	No more than two conclusions, etc., to compare.
Depth of Knowledge	3
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Which conclusion is best supported by the evidence? Explain why this argument is not supported by the evidence.

Reporting Category	SEPS - Science & Engineering Process Standards ER and CR Items are dual-aligned with content standards.
Standard	SEPS.8 - Obtaining, evaluating, and communicating information Scientists and engineers need to be communicating clearly and articulating the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations, as well as, orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs.
Evidence Statement(s)	Students demonstrate how scientists and engineers use a variety of ways to communicate ideas and critique work. Students communicate using tables/graphs.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	2
Item Type(s)	Extended Response (ER), Constructed Response (CR)
Sample Item Stem(s)	Create a graph from the data table. Which graph would be the best to share the results of the experiment with other scientists/students?

Sample item:

Eric predicted that warm water would boil faster than water at room temperature. He performed an experiment to determine whether water at 40°C boiled faster than water at 20°C. The table below shows his data.

Trial	Starting Temperature (°C)	Amount of Water (L)	Time Needed to Boil (minutes)
A	20	2	9
B	20	2	10
C	20	2	9
D	20	2	9.5
E	40	2	6
F	40	2	5
G	40	2	15
H	40	2	5.5

Eric's teacher suggests that Eric communicate his results to other scientists. Explain why it is important for scientists to communicate their results with other scientists.

Key

A correct response is any response indicating any of the following:

Communicating results of experiments with other scientists is important because:

- other scientists can then repeat the experiment to make sure the results are reliable
- other scientists can use the information to inform their own work on similar experiments/research
- other scientists can use the information as a basis for new research/experiments

Reporting Category	6-8.DI - Data and Information
Standard	6-8.DI.1 - Use the basic steps in algorithmic problem-solving to design solutions (e.g., problem statement and exploration, examination of sample instances, design, implementing a solution, testing, and evaluation).
Evidence Statement(s)	Students put the steps of an algorithm in order. Students identify a missing step in a given algorithm.
Content Limit(s)/ Constraint(s)	The scenario would need to be in the context of what a sixth grader knows.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Choose the correct step to fill in the step missing from {set of procedures}. Put the following steps in the correct order to successfully complete the program/solve the problem.

Reporting Category	6-8.DI - Data and Information
Standard	6-8.DI.2 - Describe the process of parallelization as it relates to problem solving.
Evidence Statement(s)	
Content Limit(s)/ Constraint(s)	Assessed in classroom
Depth of Knowledge	2
Item Type(s)	NA
Sample Item Stem(s)	Choose the example that shows parallelization. (Can be using technology, like processors, or non-technology, like several students in a classroom working on the same project.)

Reporting Category	6-8.DI - Data and Information
Standard	6-8.DI.3 - Represent data in a variety of ways (e.g., text, sounds, pictures, and numbers), and use different visual representations of problems, structures, and data (e.g., graphs, charts, network diagrams, flowcharts).
Evidence Statement(s)	Students choose the most appropriate/correct way to represent data in given situations. Given data, students create the appropriate graph (circle/bar), diagram, or table.
Content Limit(s)/ Constraint(s)	Make sure any graphing skills are aligned with what students have already learned in math.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	What type of graph would best fit the data in this table? In which format should the data from this experiment be presented/captured? Graph the data from the table.

Reporting Category	6-8.DI - Data and Information
Standard	6-8.DI.4 - Understand the notion of hierarchy and abstraction in computing including high-level languages, translation, instruction set, and logic circuits.
Evidence Statement(s)	Above grade level.
Content Limit(s)/ Constraint(s)	Assessed in classroom
Depth of Knowledge	3
Item Type(s)	NA
Sample Item Stem(s)	NA

Reporting Category	6-8.DI - Data and Information
Standard	6-8.DI.5 - Demonstrate interdisciplinary applications of computational thinking and interact with content-specific models and simulations to support learning and research.
Evidence Statement(s)	None
Content Limit(s)/ Constraint(s)	Assessed in classroom
Depth of Knowledge	4
Item Type(s)	NA
Sample Item Stem(s)	NA

Reporting Category	6-8.CD - Computing Devices and Systems
Standard	6-8.CD.1 - Demonstrate an understanding of the relationship between hardware and software.
Evidence Statement(s)	Students describe the difference between hardware and software and how they work together to provide functional technology.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	1
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Which of these is hardware/software? Describe the interaction of hardware and software. Compare/contrast hardware and software.

Reporting Category	6-8.CD - Computing Devices and Systems
Standard	6-8.CD.2 - Apply troubleshooting strategies to identify and solve routine hardware and software problems that occur during everyday computer use.
Evidence Statement(s)	Given a basic technology problem, students use appropriate strategies to try to fix the problem.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	What would the next steps be to fix...?

Reporting Category	6-8.CD - Computing Devices and Systems
Standard	6-8.CD.3 - Describe the major components and functions of computer systems and network.
Evidence Statement(s)	Students describe the concepts of systems and networks in everyday life, not just as applied to technology. Students describe the actual components and functions of computer systems and networks.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Describe how networks function. What is a common non-technology network used in daily life?

Reporting Category	6-8.CD - Computing Devices and Systems
Standard	6-8.CD.4 - Describe what distinguishes humans from machines focusing on human intelligence versus machine intelligence and ways we can communicate, as well as ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
Evidence Statement(s)	Above grade level.
Content Limit(s)/ Constraint(s)	Assessed in classroom
Depth of Knowledge	3
Item Type(s)	NA
Sample Item Stem(s)	NA

Reporting Category	6-8.PA - Programs and Algorithms
Standard	6-8.PA.1 - Select appropriate tools and technology resources to support learning and personal productivity, publish individual products, and design, develop, and publish data, accomplish a variety of tasks, and solve problems.
Evidence Statement(s)	Students select/identify appropriate technology tools for given situations or to accomplish specific tasks.
Content Limit(s)/ Constraint(s)	Need to use technology-based tools. Use "generic" programs (spreadsheet vs. excel), word-processing, email, slide show software. No brand names.
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Which hardware/software should be used to accomplish…?

Reporting Category	6-8.PA - Programs and Algorithms
Standard	6-8.PA.2 - Implement problem solutions using a programming language that includes looping behavior, conditional statements, logic, expressions, variables, and functions.
Evidence Statement(s)	Students produce/recognize programming code that will accomplish a specific task. Students can sequence provided lines of coding to accomplish a given task.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Put the following lines/blocks of code into the proper order to complete the program. What would happen if {lines of code} were completed?

Reporting Category	6-8.PA - Programs and Algorithms
Standard	6-8.PA.3 - Demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge).
Evidence Statement(s)	Classroom observations of student dispositions.
Content Limit(s)/ Constraint(s)	Assessed in classroom
Depth of Knowledge	2
Item Type(s)	NA
Sample Item Stem(s)	NA

Reporting Category	6-8.NC - Networking and Communication
Standard	6-8.NC.1 - Collaboratively design, develop, publish, and present products (e.g., videos, podcasts, websites) using technology resources that demonstrate and communicate curriculum concepts.
Evidence Statement(s)	Provided a mock collaboration scenario, students determine the next appropriate step within the collaborative process.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	What should the students do next in order to…?

Reporting Category	6-8.NC - Networking and Communication
Standard	6-8.NC.2 - Exhibit dispositions necessary for collaboration: providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, socialization.
Evidence Statement(s)	Students provide concrete feedback that can be used to make improvements to a given sample of work. Given specific feedback, students incorporate the feedback to improve a given sample of work.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Provide feedback on this paper/presentation/experiment.

Reporting Category	6-8.IC - Impact and Culture
Standard	6-8.IC.1 - Exhibit legal and ethical behaviors when using technology and information and discuss the consequences of misuse.
Evidence Statement(s)	Students explain the concepts of copyright and terms of use. Given a scenario concerning technology, students determine whether it is legal and/or ethical. Students select the legal and ethical behaviors in different situations. Students identify the consequences of unethical/illegal behavior concerning technology.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	2
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Which use of technology is legal/illegal? Match consequences with the following uses of technology.

Reporting Category	6-8.IC - Impact and Culture
Standard	6-8.IC.2 - Analyze the positive and negative impacts of technology on one's personal life, society, and our culture.
Evidence Statement(s)	Students analyze or explain the positive and negative impacts of technology on life, society, and culture.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Describe how technology has impacted… Which of the following are positive/negative impacts of technology on...?

Reporting Category	6-8.IC - Impact and Culture
Standard	6-8.IC.3 - Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and biases that occur in electronic information sources.
Evidence Statement(s)	Students determine whether a given electronic information source is accurate, relevant, or a biased source of information.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	Which of the following sources are relevant for…? Explain how to know whether a web site/source is accurate/valid/useful for…

Reporting Category	6-8.IC - Impact and Culture
Standard	6-8.IC.4 - Describe ethical issues that relate to computers and networks (e.g., security, privacy, ownership, and information sharing), and discuss how unequal distribution of technological resources in a global economy raises issues of equity, access, and power.
Evidence Statement(s)	Students describe how the presence of technology has changed society in terms of equity, access, and power. Students describe ethical issues related to technology such as security, privacy, ownership, and information sharing.
Content Limit(s)/ Constraint(s)	None
Depth of Knowledge	3
Item Type(s)	Multiple Choice (MC), Technology-Enhanced (TE)
Sample Item Stem(s)	How has technology helped/harmed… Which use of technology is appropriate/inappropriate?