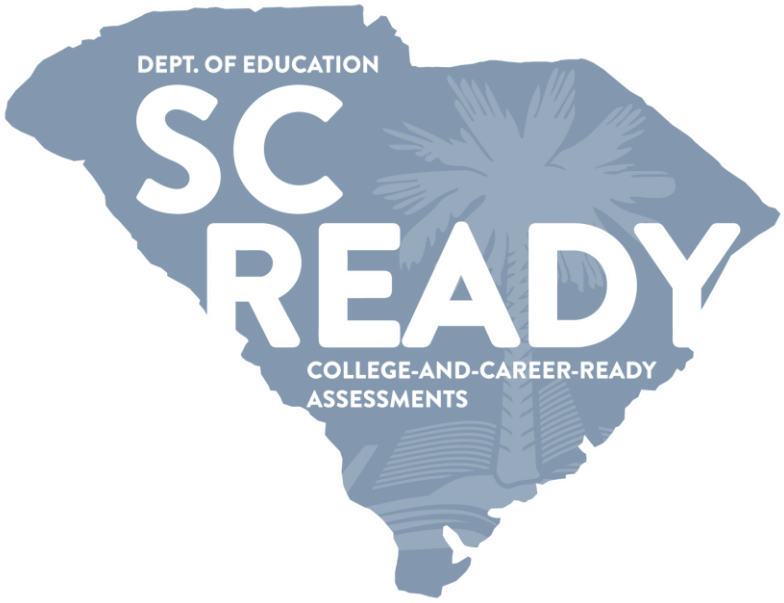
SOUTH CAROLINA
DEPARTMENT OF EDUCATION



SC READY Science Grade 4
2025 Data Review Report

Office of Assessment and Standards

September 2025

South Carolina Department of Education

Contents

Introduction

Data Recognition Corporation and the South Carolina Department of Education (SCDE) Office of Assessment and Standards convened a committee of content experts to review item-level data from the Spring 2025 SC READY Grade 6 Operational Test. The committee analyzed and discussed the items and the data. The committee acknowledged the demanding work of South Carolina educators and offered these relevant and useful instructional strategies.

The Data Review committee was mindful that the *South Carolina College- and Career-Ready Science Standards 2021* were fully implemented for the first time in the 2023–2024 school year. These strategies reflect the higher rigor of the new standards.

Assessing the Practices and Crosscutting Concepts in Science:

Science is unique among the content areas in that students are presented with a variety of graphics that communicate data and information about the natural world. This requires assessment items (test questions) to present a variety of graphics, for example, models, data tables, graphs, diagrams, etc. These types of graphics and the tools and features of the testing platform are presented for students to practice with on the Online Tools Training (OTT). Thus, students need to have opportunities to interact with the OTT throughout the year to practice using these tools to support their performance on state science assessments.

We encourage teachers to use the resources posted on the SCDE website for guidance on instruction. Go to Instructional Resources to find the Vertical Articulations, Performance Targets, Bundling Guides, guidance on using the SEPs and CCCs and many more helpful resources.

Overarching Themes

The following main themes consistently emerged as areas of emphasis during committee discussions.

Claim-Evidence-Reasoning (CER)

The practice of CER builds critical thinking and argumentation skills, helps students use data to justify conclusions, and reinforces scientific literacy. CER weaves throughout all instruction and should become part of daily practice for students. The committee recommends the following instructional strategies using CER to deepen students' understanding of scientific concepts.

- Provide students opportunities to make claims and use evidence from data to support their claims.
- Allow students to be challenged by their peers and engage in argument using evidence from models, text, and experimental data.
- Require students to use chains of reasoning, especially with more complex observations.
- Ask students to make inferences based on text and provide evidence from the text and rationales supporting inferences.
- Require students to justify or provide reasoning for revisions of models, solutions, and designs.

Models

The development and use of models is consistently identified as an area for growth by data review committees. Models that explain or illustrate simple to complex systems and phenomena take many different forms and should be incorporated throughout instruction.

General Recommendations:

- Expose students to a variety of models and scaffold the development process of modeling. Students should be able to:
    - Identify the components of the model.
    - Explain the relationships among the components of the model.
    - Evaluate and revise models that better support the intent of the model.
    - Generate and peer-evaluate models.

Maps and Map Skills

- Strengthen and reinforce students' skills in the use and interpretation of maps by providing opportunities to interact with different examples.
    - Use of the compass rose and keys on maps
    - Maps that represent Earth features
        - Seafloor features indicating plate boundaries
        - Geological activity (volcanic and earthquake)

Modeling Systems

- Provide examples and require students to construct models representing sequences of events.
    - For example,
        - how energy changes as it moves through a circuit or through a design, or
        - a flow chart that represents how an animal or human responds to an environmental stimulus.

Collecting, Communicating, and Analyzing Data and Information

Students must use data and other information to explain the natural world by identifying patterns, trends, and cause-and-effect relationships. Science provides the opportunity for students to incorporate the skills developed in ELA and mathematics to become critical consumers of information. Science requires empirical data to support arguments and claims, which reinforces students' ability to become critical consumers of information.

- Using graphs, tables, and maps students should:
    - Identify trends.
    - Explain relationships among variables.
    - Summarize the data/information.
    - Use the data/information as evidence to evaluate whether an argument/claim/prediction is supported or not supported.
    - Recognize the average of all the trials. (Students are not expected to calculate averages.)
    - Understand that the variable that is being changed (independent variable) is always on the x-axis, and the variable being measured because of that change (dependent variable) is always on the y-axis.
- Use terminology that communicates quantity (e.g., greater, less, more, etc.) and check for student understanding. This is especially important when analyzing and communicating data collected during investigations or when making observations. Comparisons of quantitative data communicated numerically with the quantitative terms may help students understand how to communicate data.

Investigating the Natural World

Students should become fluent in planning and conducting investigations (experiments). While the terms "independent variable" and "dependent variable" are not being used on the state assessment, students should learn to use and apply these terms when conducting investigations.

- Provide a guided procedure or list of questions that will help students record their observations. Relinquish supports as students become more practiced.
    - Facilitate classroom conversation around observations and explain to students the scientific terminology that describes what they observed.
    - Require students to use the tools necessary to collect their data, for example, meter sticks and stop watches.
    - Run at least three trials for each level of the variable.
    - Require students to identify:
        - what variable is changing (independent variable),
        - what variable is being measured because of that change (dependent variable), and
        - what factors must remain unchanged (constants).
    - Explain how data will be collected.
- Ask students to predict what will occur when a variable is changed and provide a justification for their prediction.
    - Analyze the data from their investigation to determine whether the prediction was supported or not supported.
- Provide opportunities for students to plan their own investigations. Students should be able to do the following:
    - State the argument/claim/prediction.
    - Identify variables and constants.
        - What variable is being changed (independent variable)?
        - What variable is being measured because of that change (dependent variable)?
        - What are the constants in the investigation ?
    - Plan for at least three trials for each level of the independent variable.
    - Determine what evidence is needed to make a conclusion.
    - Explain how the dependent variable will be measured.
    - Make a conclusion whether the claim/hypothesis/prediction was supported or was not supported.
- Scaffold the experimental process in the beginning. For example, provide:
    - procedures for students to follow,
    - templates for students to record the experimental design, and
    - blank data tables and graphs and let students fill in the necessary information using scientific conventions.

Building Connections and Identifying Relationships

Students should make content connections among natural processes and the movement of energy and matter throughout the school year. The relationship between energy and matter is an overarching theme across the Performance Expectations (PE). The ability to make connections is foundational to science, moves beyond memorization, and helps students retain information and understand how to apply their knowledge to new contexts.

Connections Between Phenomena

- Make connections among natural processes/systems and require students to explain the relationship between them, for example connecting how speed and energy are related to weathering and erosion.
- In the Physical Science domain, students could build a roller coaster that connects 4-PS3-1, 2, and 3.
- Connect locations and features on maps to geological processes such as plate motion or weathering and erosion. For example, using a topographic map, ask students where erosion would be the greatest (steeper slopes), or what is causing a deep-sea trench (plates moving together).
- Connect the transmission of sound and light to how animals communicate with each other (See 4-PS4-3).

Scientific Terminology and Conventions

- Connect scientific concepts/terminology in everyday conversations.
    - Reinforce scientific terminology when discussing phenomena and expect students to communicate using it.
- Use the metric units! Familiarize students with the measurement system using the metric equivalents in daily discussions. Also, familiarize students with the Celsius scale by using it when discussing temperature of the daily weather.
- Expose students to the scientific conventions when building data tables and graphs.
- Emphasize the Greek and Latin roots and affixes and their meanings in scientific terminology. This connects to ELA.4.AOR.9.1, page 78 of the South Carolina College- and Career-Ready English Language Arts Standards 2023.

Classroom Assessments

- Make sure the test banks provided by your instructional materials are tightly aligned to the standards.
- Provide opportunities for groups of students to work through multi-dimensional questions. Encourage discourse and argumentation.
- Use entrance/exit tickets to measure daily understanding.
- Review test-taking strategies with your students.
    - Focus on showing how the tools in the Online Tools Training module can help students.
        - Use the cross-off tool to omit the answer options that are wrong.
        - Use the highlighter to emphasize essential information.
        - Use the magnifier tool to see parts of models more clearly.
        - Use the notepad to record thoughts and information relevant to the correct answer.
        - Use the flag to mark items to go back to before exiting the test.
    - Explain the importance of reading the stimulus and ALL answer options before answering the question.

Focused Strategies

The committee identified specific areas of concern during their discussions that connect to some of the overarching themes. Only relevant PEs are listed, and some of the overarching themes are repeated for specific PEs to reinforce the committee's conversations and recommendations.

4-PS3-1

- Provide opportunities for students to explore how speed and energy are related to a moving object and make observations in their own words.
- Reinforce that speed is the distance an object travels over a given amount of time.
    - Speed is represented by units of distance over a unit of time (e.g., m/s, m/h).
- Investigations should require students to manipulate variables, for example ramp height and distances.
- Make connections between this PE and the real world by presenting students with examples of speed and energy, for example, a bowling ball hitting pins, a batter hitting a baseball, or how speed and energy relate to each other when students are playing on equipment on the playground.
- Remind students that friction can cause an object to slow down. (4-PS3-2)
- Allow student groups to explore simple circuits and make observations.
    - When students are initially investigating energy transfer, provide a list of questions that will guide the observations they are expected to make.
    - Facilitate classroom conversation around observations and explain to students the correct scientific terminology used to describe what they observe.
    - Be sure students understand that electrical currents will not flow through a simple circuit if the switch is open.
- Allow students to observe that when two surfaces are rubbed together, friction causes the surfaces to heat up (motion energy is converted to heat energy).
- Emphasize that batteries are stored energy.
- Make connections between the transfer of energy by heat and light to the transfer of energy through a device, such as a solar oven.
- Reinforce the difference between the terms "transferred" versus "transformed (converted)."
    - Energy is transferred when it is moved from one location to another: for example, the sound of music from a speaker traveling to your ears.
    - Energy is transformed (converted) when it changes from one form to another. For example, sunlight heats up the sidewalk; light energy is transformed into heat energy.
- Require students to explain how energy is being transferred and transformed (converted) by devices/solutions.

4-PS3-3

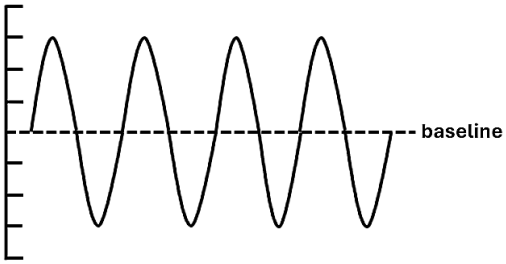
- Remind students that energy is not lost in a system but is transferred and transformed (converted) into other types of energy within the system.
- Allow students to model what happens when objects collide.
- Require students to answer questions about objects colliding, such as:
    - How is the energy from the collision transferred?
    - In what ways is energy being transformed/converted?
- Predict what will happen in a collision if an object is rolled or pushed with more force or less force.
- Connect the result of collisions to 4-PS3-2. For example, when objects collide a sound is produced.

4-PS3-4

- Familiarize students with lights and radios that are hand-cranked, solar ovens, wind turbines as devices that transform energy from one type to another.
- When investigating or evaluating designs/solutions for energy transfer, require students to:
    - Identify criteria and constraints that need to be considered before implementing designs.
    - Recommend revisions to make designs/ devices more efficient but require them to justify their revision.
    - Peer-evaluate and self-evaluate designs based on criteria.
- When modeling a simple circuit, emphasize that an electrical current does not flow through the wires if the switch is open.
    - Students should be drawing their own models of simple circuits with the expectation that they can identify the components and the relationship between them.
- Reinforce the effect of friction on moving parts in a design; it resists motion and transforms motion energy into heat energy.
- Students could design their own playground with criteria and constraints.
    - This could allow connections among 4-PS3-1, 4-PS3-2, 4-PS3-3: speed, energy, collisions, and energy transfer.

4-PS4-1

- Model how to construct waveforms before allowing students to generate their own examples representing amplitudes and wavelengths of different magnitudes.
- Explain to students that some waveforms might have a scale that infers magnitude. The scale is not numbered but provides a reference point for students.



- Allow practice for students to explain waves in terms of their properties (amplitude, wavelength) and use the terms that identify the parts of a wave (crest, trough).
- Model waves using ropes, string toys, and water.

4-PS4-2

- Provide students the opportunity to make observations and explore why and how objects are visible.
    - Students should be using mirrors, flashlights, and prisms to explore how light interacts with different media and record their observations.
    - Require students to use the correct terminology when describing the behaviors of light:
        - Absorb, absorption
        - Reflect, reflection
        - Transmit, transmission
    - Require students to use opaque, transparent, and translucent to describe media with which light is interacting.
    - Set the expectation that students generate ray diagrams of how light interacts with different media (opaque, transparent, translucent) to show what happens when light is absorbed, reflected, and transmitted.
    - Students should provide an explanation as to why the object is visible, blurry, or not visible using the correct terminology.

4-PS4-3

- Provide opportunities for students to investigate different solutions we use to communicate information.
- Make connections between PEs that show:
    - how light can be used to send a signal (4-PS4-2),
    - using sound to send signals (4-PS3-2, 4-PS3-4), and
    - how animals send signals to warn others of a predator (4-LS1-2).

4-LS1-1

- Students should compare the functions of the different structures of animals and plants.
    - Take students on a walk around the school's campus to find examples.
    - Ask students to bring in plants from their homes and require them to explain how the structures of the plant help it survive.
    - Ask someone who works in a nursery, zoo, or in agriculture to visit the classroom and talk about the animals and plants they work with every day.

4-ESS1-1

- Provide stratigraphic columns and have students describe in their own words what they see.
- Model how to interpret a stratigraphic column. Provide questions to guide students on how to interpret these models. For example:
    - How do we know the oldest layer is at the bottom?
    - What natural Earth processes can remove a layer of rock?
    - How do we know that a fault that cuts across rock layers is younger than the rock layers?
    - If only the fossils of fish and shells are found in a layer of rock, what was that environment like when the rock layer formed? What if only land plants and animals were present?
- Investigate building stratigraphic columns using available materials.

4-ESS2-1

- Allow students to use stream tables using diverse types of materials and surface types (e.g., vegetation, geographic differences, rocks).
    - Draw setups used in investigations.
    - Predict what will happen when a variable is changed.
    - Make and record measurements using the correct tools and units.
    - Require students to summarize data, draw conclusions, provide rationales.
- Present photographs, drawings, computer simulations, and videos of examples of weathering and erosion. Using their observations, students should:
    - Provide explanations backed up by evidence of what is or has happened.
    - Predict what will happen if the processes of weathering and erosion continue in a location.
    - Identify the mechanisms of weathering and erosion (e.g., wind, water, freeze-thaw cycle).

4-ESS2-2

Students need to interact with a variety of maps frequently during instruction, and should make connections between landforms and causative factors, for example plate movement, weathering, and erosion.

- Provide opportunities for students to explore maps of diverse types before providing direct instruction. During their exploration of maps, set expectations that students will:
    - Explain relationships in their own words,
    - Describe their observations in their own words, and
    - Identify any patterns they see and infer what caused the patterns or what those patterns might mean.
- Support student learning about topographic maps by allowing them to construct models using clay or carboard to show how the contour lines represent elevation.
- Compare diverse types of maps (e.g., plan views, relief, topographic, globe).
    - Explain that maps have different purposes.
    - Model how to identify/interpret features found on diverse types of maps.
        - Use information found in keys.
        - Use the compass rose.
            - Students must be able to use the compass rose to orient locations on maps. For example, Columbia, South Carolina is located northwest of Charleston, South Carolina.
        - Use and apply topographic map symbols. For example, students should know how to distinguish slope using the distance between contour lines or the top of a hill or mountain.
        - Use world maps that show landforms and ocean floor features, for example: bodies of water, deep-sea trenches, mid-ocean ridges, mountain ranges, and volcanoes.
- Reinforce the differences between mid-ocean ridges and deep-sea trenches.

4-ESS3-1

- Take students on virtual field trips to explore alternative and traditional forms of energy.
- Connect wind and solar energy production to 4-PS3-2 and 4-PS3-4.