Frequently Asked Questions: Assessing the Pennsylvania STEELS Standards

The Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards are Pennsylvania's K–12 learning goals based on research of how students learn best. This resource addresses the following frequently asked questions related to assessment of the STEELS Standards:

- How will assessments change with the STEELS Standards?
- How can assessments support student learning of the STEELS Standards?
- What changes are happening with the Science PSSA and Biology Keystone Exam?
- Where can I learn more about assessing the STEELS Standards?

How will Assessments Change with the STEELS Standards?

These K–12 standards represent a significant shift away from rote memorization of facts toward student-centered learning to build deep conceptual understanding of real-world occurrences and solve meaningful problems.

A shift from "learning about" to "figuring out" is not just important in instruction—it's important in assessment too. Questions will no longer focus solely on content or skills, but instead they will require students use knowledge and skills together to apply reasoning to successfully complete a task. This will give educators more accurate information about student proficiency in the rigorous STEELS Standards.

Assessments to measure learning of the STEELS Standards should require students to make sense of a real-world occurrence or problem and use knowledge and practice together with an appropriate level of support.

Make sense of a phenomenon or design a solution to a problem.

To reveal how well students understand and can use the dimensions that make up the STEELS Standards, assessment tasks should focus on students making sense of a **phenomenon** (anything that is observable in the natural or designed world and causes us to wonder) or solving a **problem** (anything in the natural or designed world that causes us to seek a solution). This real-world focus can also provide opportunities for students to make connections between the task and their own experiences.

How is this different? Assessments require students to use reasoning and figure something out with both knowledge and practice rather than focusing only on asking students to provide rote or disconnected knowledge and skills.

Example of phenomenon-based task prompt:

Given the data, what argument can you make about why there are more tuskless elephants in recent years?

Example of topic-based task that is not based in a phenomenon or problem:

Describe an example of natural selection.

Use at least two dimensions together.

Multiple "dimensions" are combined to form each STEELS Standard, laying out the different skills, ideas, and concepts students need to know and be able to do to meet the learning goal. These dimensions include Disciplinary Core Ideas, Crosscutting Concepts, Science and Engineering Practices, and Technology and Engineering Practices.

From exit tickets to final exams, students should be required to use knowledge and practice — at least two dimensions — together to successfully complete a task.

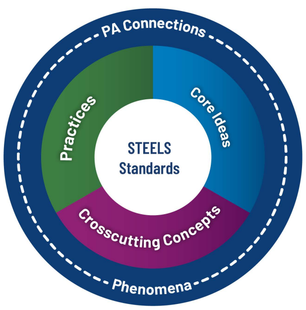
How is this different? Students should not be asked to show proficiency in just one of the dimensions at a time — such as analyzing data or creating a model — separate from their knowledge about cause and effect or ecosystems.

Example of multi-dimensional task:

Students develop a model of a design solution for a local flooding problem using science ideas about the water cycle and describing how parts of the system work together.

Example of a one-dimensional task:

Students match each phase of the water cycle with its definition.



Science, Technology, and Engineering Practices

A set of skills that scientists, technologists, and engineers use to explain the world or solve problems.

Example Practices: Communication; Planning and Carrying Out Investigations

Disciplinary Core Ideas

Explanatory ideas in each science discipline that scientists, technologists, and engineers use.

Example Disciplinary Core Ideas: Wave Properties; Weather and Climate

Crosscutting Concepts

Concepts that scientists, technologists, and engineers use to deepen their understanding of situations and make connections across subject areas.

Example Crosscutting Concepts: Cause and Effect; Structure and Function

Complete the task with appropriate support.

An assessment should include appropriate scaffolds, accessible language, a coherent flow, and multiple ways to represent thinking so it makes sense to students and they don't face unnecessary barriers showing what they know and can do with the dimensions.

See some assessment prompt examples with appropriate scaffolds, clear language, and coherent flow in the *Student Work is Gold, Part II* blog post.

How is this different? Task design should not limit a student's ability to answer the task based on things that are not being assessed, including:

- Only one right answer or only one way for students to make their thinking visible.
- Not enough scaffolds such that students do not know what they need to do to complete the task.
- Too many scaffolds for students to show where they are in their progression toward the learning goals.
- Language barriers.
- Questions or instructions that are unclear or don't make sense or don't make transparent to students why they are engaging in each part of a task.

How can Assessments Support Student Learning of the STEELS Standards?

There are several things to keep in mind about assessments in an LEA's science classrooms to ensure they are truly helping to further student learning and improve educational experiences.

A variety of assessments work together to paint a full picture of student learning.

Supporting student progress toward multi-dimensional standards like the STEELS Standards requires a variety of assessments. Different assessments work together for different purposes, uses, and audiences to gain a complete understanding of what students know and can do.

It is important to keep each type of assessment's purpose in mind. For example, both state and classroom assessments measure progress towards STEELS Standards, but they have different purposes. State assessments are intended to provide information to improve long-cycle systemwide policies and resource allocation, whereas curriculum-embedded assessments can provide information for adjustments in the classroom. Various assessment types exist at the classroom level as well: A pre-assessment may allow students to reveal prior knowledge, a self-assessment might allow students to be active participants in their own learning, and an end-of-instruction task might allow a teacher to determine a student's ability to transfer their learning to a new context.

> **"No one assessment — or assessment occasion — can meet all the needs for information about what students know and can do in science."**
>
> *National Academies of Sciences, Engineering, and Medicine. 2017.* Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom *The National Academies Press.*

Pennsylvania Department of Education Classroom Diagnostic Tools (CDTs) are available to help provide information that will help guide instruction by providing support to students and teachers. Read more about CDTs here.

In addition, the Pennsylvania Department of Education Firefly Benchmark Assessment is designed to be an interim assessment and can provide a prediction as to how students will perform on the Science PSSAs and Biology Keystone Exams.

With different assessments working together, schools and LEA can better support student learning.

Curriculum-embedded classroom assessments are particularly valuable to improve individual student learning.

Perhaps the most impactful assessments to improve learning for individual students are curriculum-embedded, formative assessments. These assessments are carefully designed to surface critical information about student learning in a timely manner so that educators can help students build on their current thinking to meet the targeted learning goals.

Of all types of assessments, teachers get the most data and have the most control over classroom-level assessments, allowing them to respond to student ideas in the moment.

Curriculum-Embedded Classroom Assessments	
Less like	**More like**
Assessment is a series of isolated events, often after all the learning has occurred.	**Assessments are embedded into learning throughout for targeted core ideas, practices, and concepts.** This is a more coherent and authentic way to assess and support learning along the way.
Assessments are given once, providing little chance for students to add to their thinking or revisit their ideas.	**Assessments build over time.** The iterative nature of assessment opportunities gives students many opportunities to add to their thinking and revisit their ideas. Not only does this support learning, but the practice of revising models helps them think of science as a process, rather than a discipline where they are right or wrong.
No or limited feedback; emphasis is on receiving a grade or score rather than opportunities to improve.	**Include varied types of feedback.** There are many opportunities for teacher feedback, and also peer feedback, across lessons. This can help students be aware of their own learning and develop their confidence that their ideas are valued and do not always have to look to the teacher as the sole source of information.

Using assessments to advance learning rather than to assign a grade.

To use assessments to guide instruction and advance student learning, teachers can analyze student work — which can include written items as well as student discourse — to look for insights into students' current thinking and abilities. They then use this information to adjust instruction in a way that deepens student learning in multiple dimensions.

That's why assessments are useful when teachers can analyze them in a timely manner and use data from them to inform next steps. This contrasts with grading tests and quizzes, entering scores in a gradebook, and never revisiting them.

Student work analysis is a powerful tool for supporting both teachers and leaders to make student-centered decisions with assessment data. For example, a community of practice analyzing student work for trends might help identify a greater need for all teachers — such as a professional learning focused on supporting students to develop models — and address issues on a systemic level.

> **"Making this shift requires more than simply providing teachers with three-dimensional assessments. It also requires cultivating a *community of practice* within a school or LEA regarding the use of assessment to inform instructional practice responsive to students' needs."**
>
> *Student Work is Gold* Blog Post

What Changes are Happening with the Science PSSA and Biology Keystone Exam?

The 5th and 8th Grade Science Pennsylvania System of School Assessment (PSSA) and Biology Keystone Exams will be updated to assess student learning of the STEELS Standards. The STEELS Standards are multi-dimensional, requiring students to use ideas and practices represented by these dimensions together — not separately — to make sense of the world and solve problems.

The Science PSSA and Biology Keystone exams will have multi-dimensional questions. That means questions will require students to use not only disciplinary core ideas but also practices and crosscutting concepts to successfully complete them.

See the focus areas for each state assessment of the STEELS Standards below.

Grade 5 Science PSSA

Life Science and Environmental Literacy & Sustainability; Science and Engineering Practices, and Crosscutting Concepts (25%)

Physical Science; and Engineering Practices, and Crosscutting Concepts (25%)

Earth and Space Science; and Engineering Practices, and Crosscutting Concepts (25%)

Technology & Engineering; Technology and Engineering Practices, and Disciplinary Core Ideas (25%)

Grade 8 Science PSSA

Life Science and Environmental Literacy & Sustainability; Science and Engineering Practices, and Crosscutting Concepts (25%)

Physical Science; and Engineering Practices, and Crosscutting Concepts (25%)

Earth and Space Science; and Engineering Practices, and Crosscutting Concepts (25%)

Technology & Engineering; Technology and Engineering Practices, and Disciplinary Core Ideas (25%)

Biology Keystone Exam

End of Course Biology Examination

For additional details, visit the Pennsylvania Department of Education science assessment websites:

- Science PSSA: https://www.education.pa.gov/K-12/Assessment%20and%20Accountability/PSSA/Pages/default.aspx
- Biology Keystone Exam: https://www.education.pa.gov/K-12/Assessment%20and%20Accountability/Keystones/Pages/default.aspx

Where can I Learn More about Assessing the STEELS Standards?

One of the best ways to begin learning about assessing the STEELS is participating in professional learning that immerses you as a learner to experience these changes firsthand and discuss implications for assessment.

Other resources that can support your work include:

- PDE STEELS Hub on SAS (https://www.pdesas.org/Page/Viewer/ViewPage/58/)
- STEELS Assessment Toolkit (https://www.pdesas.org/Page/Viewer/ViewPage/58/?SectionPageItemID=36868)
- STEM Teaching Tools related to assessment (https://stemteachingtools.org/tgs/Assessment)
- Task Annotation Project in Science (TAPS) (https://www.nextgenscience.org/task-annotation-project-science)
- SCALE Science Website (https://scalescience.wested.org/assessment/)
- Assessment Evaluation Tools (https://www.nextgenscience.org/task-screening-tools/science-assessment-task-screening-tools)