FAQ - MAP Growth Science for use with Next Generation Science Standards and other multidimensional science standards

map GROWTH

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MAP Growth Science for use with Next Generation Science Standards (NGSS)* assessments are available for elementary students in grades 3–5, middle school students in grades 6–8, and high school students in grades 9–12. These assessments measure student growth toward understanding of the multidimensional NGSS performance expectations. Similar state-specific assessments are available for states that have adopted multidimensional standards.

1. What are the Next Generation Science Standards and the NRC Framework?

The Next Generation Science Standards: For States, By States were developed in 2012–13 by a state-led collaboration between 26 states, Achieve, and science education experts. The NGSS were guided by a new research document, A Framework for K–12 Science Education (2012 National Research Council), also called the NRC Framework, that described the dimensions needed for student understanding of science and engineering: Disciplinary Core Ideas (DCI), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC).

Previous science standards were guided by research from 20 years ago and were not multidimensional. They had process or inquiry skills separated from content and themes. In addition, previous standards were intended to guide the entire curriculum, whereas the NGSS are intended to guide assessment.

Most states have adopted standards based on the NRC Framework document that guided the development of the NGSS, even if those states have not adopted the NGSS directly.

2. What is the purpose of MAP Growth Science for use with NGSS assessments and for similar assessments for states with multidimensional science standards?

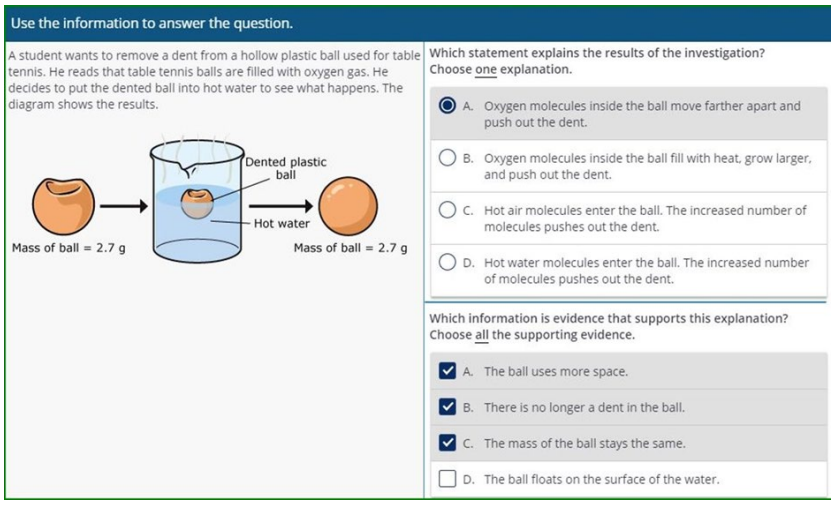
These assessments are designed to be a growth measure as students build an understanding of multidimensional standards. The assessments do not provide a summative or diagnostic measure of a student's proficiency in the standards or their dimensions. The results of the 3–5, 6–8, and 9–12 MAP Growth Science for use with NGSS (or similar state-specific) assessments can be used as a growth measure of general student understanding of the standards with an overall score, as well as scores in the disciplinary areas of the assessments. Taking these interim, adaptive assessments allows students to gauge their growth throughout the school year and from year to year.

3. How are the items in MAP Growth Science aligned to the dimensions of NGSS and similar standards?

All existing science items are rated for their degree of alignment to the three dimensions of a particular NGSS standard (known as a performance expectation, or PE). The dimensions are: Disciplinary Core Ideas (DCI), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC). These dimensions are outlined in *A Framework for K–12 Science Education (2012 NRC)*. Well-aligned items must address at least two of these dimensions in the context of a phenomenon or problem, rather than assessing isolated skills or knowledge. After alignment, multidimensional learning statements are written to reflect the aligned dimensions of each item.

4. How do multidimensional items compare to single dimensional items?

On tests aligned to multidimensional standards, some items assess all dimensions of the item's aligned standard, and others assess different combinations of the dimensions. All items provide measures of growth toward students' understanding of the DCI, SEP, and CCC of the NRC Framework. Over time, more and more of the items in the assessment pools will be three-dimensional like the sample item below, which is aligned to the life sciences DCI of information processing, the SEP of developing and using models, and the CCC of cause and effect. In addition, the assessments have begun to include sets of items that all focus on making sense of a single phenomenon or solving a problem. Moving forward, item development will focus exclusively on phenomenon or problem-based item sets.



5. What are the assessment blueprints like?

Like previous MAP Growth Science assessments, the MAP Growth Science assessments for use with NGSS and other state-specific multidimensional standards have blueprints with three goals: life sciences, physical sciences, and earth and space sciences. The subgoals are the same as the DCI of the NGSS, or they follow a state's organizational structure. One difference is that each goal now includes the discipline of engineering design (for NGSS and other states that incorporate engineering design practices and/or content).

MAP Growth Science for use with NGSS assessments are valuable growth measures for all elementary, middle, and high school students in classrooms implementing the NGSS or similar multidimensional standards. State-specific versions are available or are planned for production for most states that have not adopted the NGSS in its entirety.

The assessments have items that provide evidence of growth toward understanding the multidimensional standards for an appropriate range of grades. The assessments for grades 6–8 include items aligned to the NGSS middle school standards, plus items aligned to grades 3–5 and well-connected high school standards to form a content progression. Similarly, the blueprints for the assessments for grades 3–5 include lower- and well-connected upper-grade standards. The 9–12 assessments include middle school standards and all the high school standards. In this way, the assessments can adapt down and/or up to establish a student's zone of proximal development.

6. Which MAP Growth Science for use with NGSS assessment (or similar state-specific assessment) should my students use? For example, is MAP Growth Science for use with NGSS for grades 6–8 useful for high school students?

Elementary school students: The MAP Growth Science for use with NGSS for grades 3–5 is recommended for elementary students who can already read.

Middle school students: NWEA® recommends using the MAP Growth Science for use with NGSS for grades 6–8 for all middle school students—even higher- and lower-achieving students—because of the adaptive nature of the assessment.

High school students: NWEA recommends using the MAP Growth Science for use with NGSS for grades 9–12 for high school students. You may have already used a MAP Growth Science assessment for your high school students. The MAP Growth Science for use with NGSS for grades 6–8 may also be useful for some high school students. However, the 6–8 blueprint includes only the 9–12 NGSS PEs that form a content progression from the 6–8 PEs; there is no new content. Therefore, only 26 of the 71 high school NGSS PEs are in the 6–8 blueprint. However, the blueprint for MAP Growth Science for use with NGSS for grades 9–12 includes all high school PEs.

The guidance above applies for other state specific assessments as well.

High school students in biology or life science courses that are based on the NGSS or NRC Framework: The MAP Growth Life Science 9–12 for use with NGSS assessment is recommended for these students.

7. How does the MAP Growth Science 9–12 for use with NGSS test compare to the MAP Growth Life Science 9–12 for use with NGSS test?

Purpose and reporting categories for each test:

- Life Science 9–12 for use with NGSS: ideal for students in high school biology or life science courses; provides overall life science RIT score as well as scores in the following instructional areas:
    - From molecules to organisms: structures and processes
    - Ecosystems: interactions, energy, and dynamics
    - Heredity: inheritance and variation of traits; biological evolution: unity and diversity

- Science 9–12 for use with NGSS: ideal for students in high school integrated science classes or for placement into appropriate high school courses; provides scores in the following instructional areas:
    - Life science (aka biology)
    - Physical sciences (e.g., physics and chemistry)
    - Earth and space sciences
- Both tests will have a topic-view learning continuum report. We will reassess our pool in following years to determine whether a standard-view report can be released.

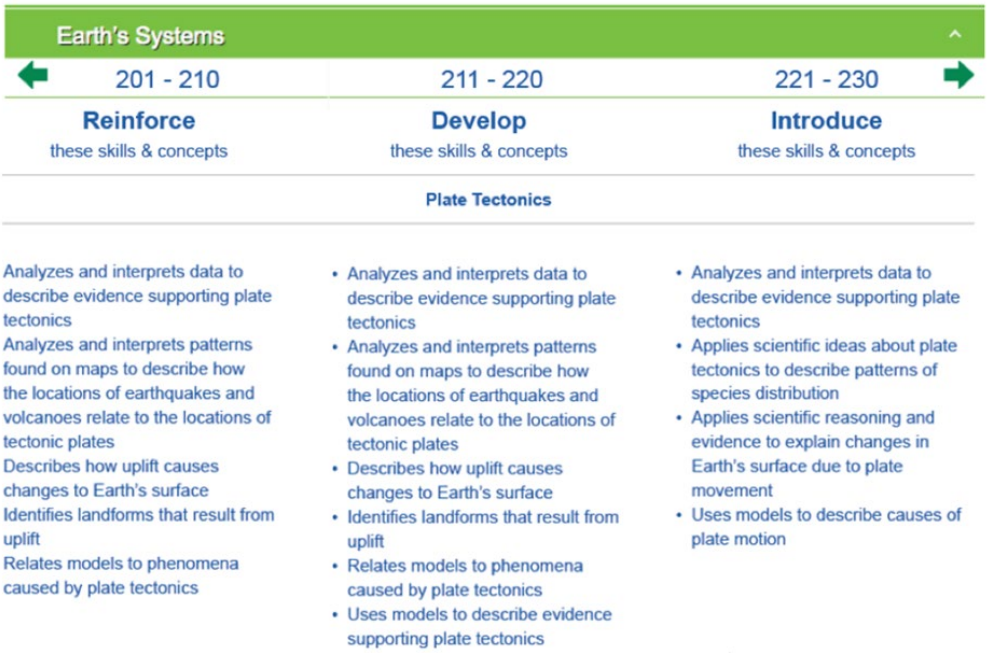
Test design:

- NGSS arranges standards (aka performance expectations or PEs) into grade bands for 6–8 and 9–12, so both tests adapt by grade band rather than two grades below.

8. How does the learning continuum report reflect multidimensional standards?

The MAP Growth Science learning continuum reports are populated with multidimensional NWEA learning statements. These statements give teachers information about how students are performing in the dimensions of the NGSS. The 3–5 and 6–8 tests include both topic-view and standard-view learning continuum reports. The 9–12 tests include a topic-view report.

A learning statement often has many items associated with it and these items have a range of RITs. In the reports, the learning statements appear for the RIT range of their items. For example, this is a sample report for the physical sciences goal and waves topic in typical middle school RIT bands:



9. Are there growth and status norms for multidimensional science assessments?

The NWEA research team regularly studies the norms and publishes updates. Student achievement norms, status (comparative) norms, growth norms, and school norms are available for science assessments that cover the three disciplines of life, earth/space, and physical science. Growth norms and school norms are available for course-specific science assessments. However, course-specific science tests aren't available on the student profile report.

Detailed information can be found here:
2020 MAP Growth norms overview
2020 comparative data to inform instruction

10. Are MAP Growth Science scores linked to state summative tests?

The NWEA research department generates linking studies when enough students in the state have taken both the MAP Growth Science test and the state summative test. It may take a few years for states where MAP Growth is less widely used.

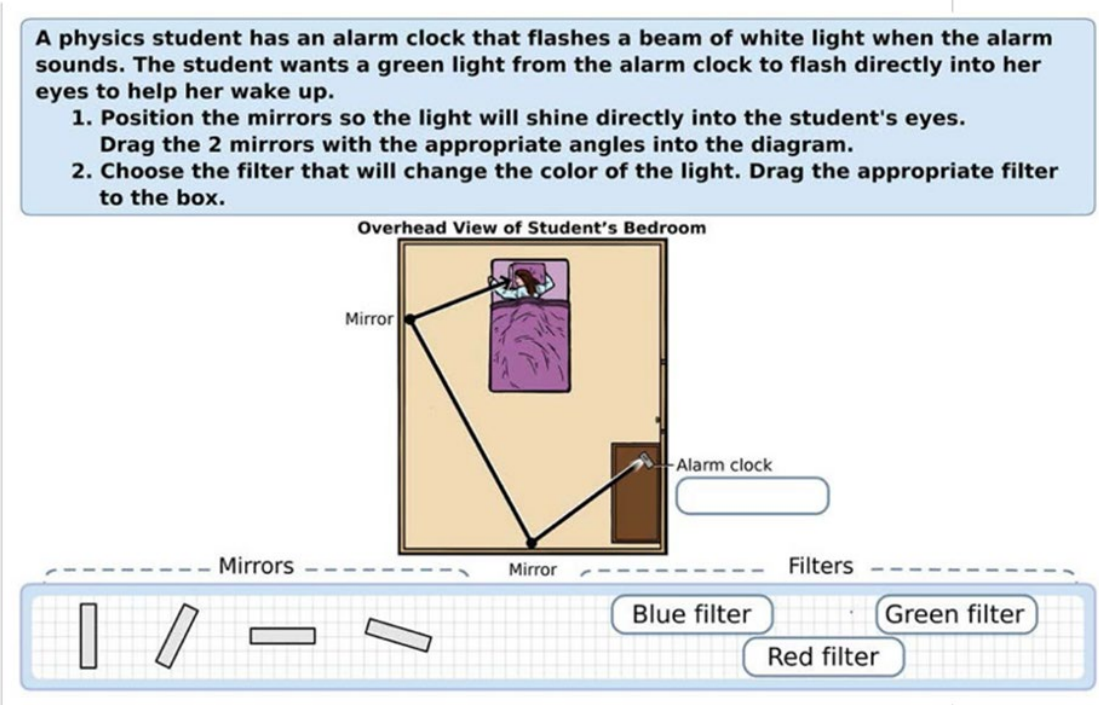
11. What does engineering design look like in the assessments?

Items measuring student understanding of engineering design are included in the goals and subgoals of the life sciences, physical sciences, and earth and space sciences. This sample item is aligned to both the NGSS performance expectation MS-PS4-2 and MS-ETS1-4 and will be reported in the physical sciences goal under the waves subgoal.

	DCI:	SEP:	CCC:
Aligned NGSS PEs: MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.** MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.**	• Electromagnetic Radiation • Developing Possible Solutions • Optimizing the Design Solution	Developing and Using Models	Structure and Function
NWEA Learning Statement: Develops design solutions involving the reflection, transmission, or absorption of light, using models	• Electromagnetic Radiation • Developing Possible Solutions	Developing and Using Models	Structure and Function

Item RIT: 213 **Item DOK:** 2

**NGSS Lead States. 2013. Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.



12. How does NWEA ensure MAP Growth Science for use with NGSS item pools provide a wide range of content complexity and cognitive rigor?

In order to measure students' learning and growth in science, the pool of science items must span a full range of cognitive levels and skills. MAP Growth Science for use with NGSS items vary by the number of dimensions assessed, the degree to which a student engages in each of those dimensions, the complexity of the scenarios, the item types used (including selected response and technologically enhanced items), the use of item sets that explore multiple facets of a phenomenon or problem like summative assessments do, and content complexity. To meet the goal of a wide range of content complexity, science content specialists evaluate all items using Webb's Depth of Knowledge (DOK), Bloom's Taxonomy, and Achieve's cognitive framework.

Science content specialists received training on DOK from Norm Webb's organization. The team also received training on Achieve's cognitive framework from Aneesha Badrinarayan. The general NWEA science item pool has items at DOK levels 1, 2, and 3. However, DOK 1 items are excluded from the NGSS suite of tests as well as from many of the tests for states with similar standards.

DOK 1 items involve the recall of information or performance of rote skills. DOK 2 items involve a higher level of thinking than DOK 1 items, including some decision-making around how to approach the item. DOK 3 items require strategic thinking. DOK 3 items demand the use of reasoning, planning, and/or evidence to solve and justify responses to problems with typically more than one possible answer.

Examples of cognitive engagement in MAP Growth Science for use with NGSS assessments include:

- Representing scientific relationships using words or diagrams (DOK 1)
- Describing examples and non-examples of scientific concepts (DOK 1 or 2)
- Interpreting data from graphical displays (DOK 2)
- Designing investigations around scientific questions (DOK 2 or 3)
- Evaluating models of engineering solutions (DOK 2 or 3)
- Justifying conclusions based on experimental data with reasoning and evidence (DOK 2 or 3)

Because MAP assessments are adaptive, the overall distribution of DOK for any given test event will vary based on individual student achievement and other factors.

13. Are there course-specific science assessments?

A life sciences assessment is available for grades 9–12. This assessment covers biology content and can be used to track growth for students taking biology (life science) courses. This is suitable for partners who have adopted NGSS or similar standards based on the NRC Framework. Additional course-specific assessments aren't on the roadmap at this time.

14. Are there plans for instructional connections for MAP Growth Science for use with NGSS?

The science curriculum and resource industry has been intentionally slow to produce high-quality science materials, due to the significant shifts introduced by the NRC Framework. NWEA continues to monitor the offerings, and one of our staff members has served on Achieve's EquiP rubric panel, which reviews and rates classroom materials for their alignment to NGSS. As more materials become available, we will continue to review and determine suitability for MAP Growth Science connections.

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