NWEA EXTERNAL FAQ

MAP Science for use with Next Generation Science Standards

Measures of Academic Progress® (MAP®) Science for use with Next Generation Science Standards (NGSS)* assessments are available for the 2016–17 school year. These new assessments measure student growth toward understanding of the multidimensional NGSS performance expectations.

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1. What are the Next Generation Science Standards (NGSS)?

Next Generation Science Standards: For States, By States was developed in 2012–13 by a state-led collaboration among 26 lead states, Achieve, and science education experts. The Next Generation Science Standards (NGSS) were guided by a new research document titled *A Framework for K-12 Science Education* (2012 National Research Council) that described the dimensions needed for student understanding of science and engineering. These dimensions are: Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs).

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.

2. What is the purpose of MAP Science for use with NGSS assessments?

MAP Science for use with NGSS assessments are designed to be growth measures as students build their understanding of the multidimensional NGSS performance expectations. The assessments do not provide a summative or diagnostic measure of a student's proficiency in the NGSS performance expectations or dimensions. The results of the MAP Science for use with NGSS assessments (for grades 3 – 5 and 6 – 8) can be used as growth measures of general student understanding of the NGSS. The assessments provide an overall score, as well as scores in the individual 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 Science for NGSS aligned to the dimensions of NGSS?

All existing science items were rated for their alignment to the three dimensions of a particular jurisdiction's adoption of the NGSS: Disciplinary Core Idea Components (DCIC), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC). These dimensions are outlines in *A Framework for K–12 Science Education* (2012 NRC). The NWEA rubric used to rate the items has 18 levels of alignment. The item pools include the highest-rated existing items; as more NGSS items are calibrated, the overall pool item ratings will increase. This process included writing multidimensional Learning Statements beforehand and aligning items to the NGSS performance expectations.

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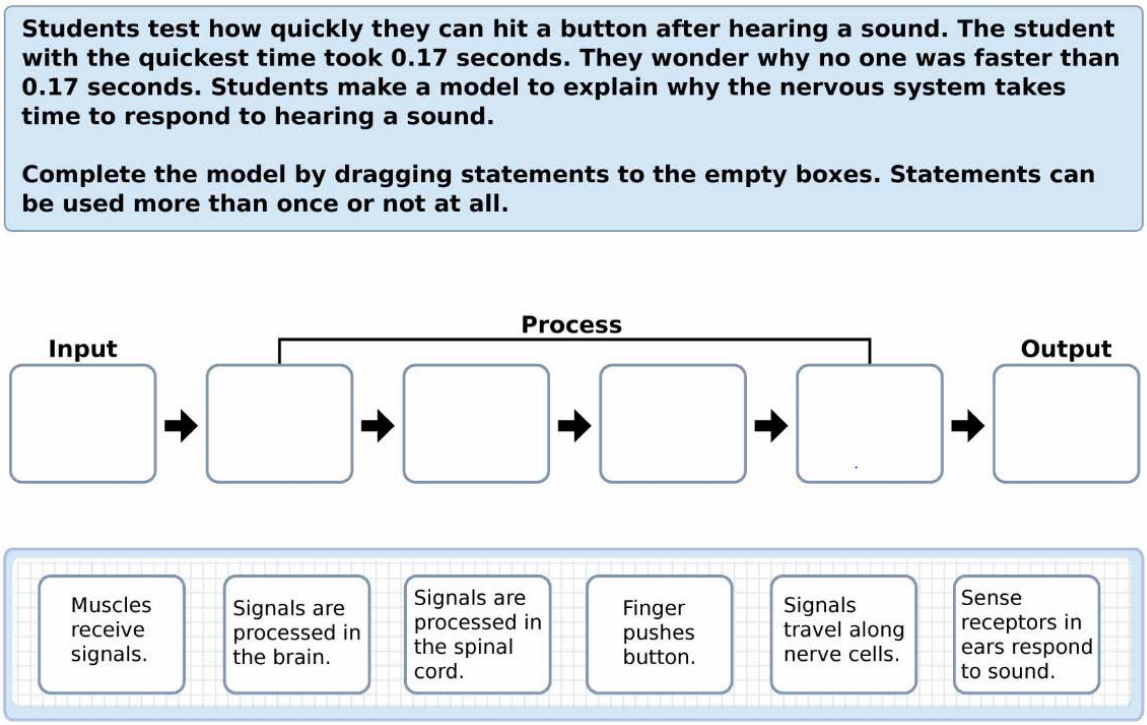
4. How do multidimensional items compare to single dimensional items?

The MAP Science for use with NGSS assessments include multidimensional items that align to the NGSS dimensions. Some items assess all dimensions of appropriate performance expectations, and others assess different combinations of the dimensions. All items provide measures of growth toward a student's understanding of the DCIs, SEPs, and CCCs of the NGSS. Over time, more and more of the items in the assessment pools will be three-dimensional, such as 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.



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5. How are the MAP Science for use with NGSS blueprints different from older MAP for Science blueprints?

Like previous MAP for Science assessment blueprints, the new MAP for use with NGSS assessment blueprints have three goals: life sciences, physical sciences, and earth and space sciences. One difference is that each goal now includes the discipline of engineering design. In addition, the subgoals are the same as the DCIs of the NGSS. However, the number of items in the assessments will be the same as in previous MAP for Science assessments.

MAP for use with NGSS assessments are fine growth measures for all elementary and middle school students in classrooms implementing the NGSS. The assessments have items that provide evidence of growth toward understanding the NGSS PEs for an appropriate range of grades. The assessment for grades 6 – 8 includes items aligned to the NGSS middle school PEs, plus items aligned to grades 3 – 5 and high school PEs to form a content progression. Similarly, the blueprint for the assessment for grades 3 – 5 includes lower- and upper-grade PEs. In this way, the assessments can adapt down and up to establish a student's zone of proximal development.

6. Is MAP Science for use with NGSS for grades 6 – 8 useful for high school students?

You may have already used MAP for Science assessments for your high school students. The new MAP 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. Also, the 6 – 8 MAP Science for use with NGSS includes all the science disciplines, whereas in high school, students are usually in discipline-specific courses. In the future, NWEA is planning to publish NGSS-aligned high school assessments.

7. How will the Learning Continuum reports reflect multidimensional standards?

The 2016–17 MAP for use with NGSS Learning Continuum reports will be populated with the new multidimensional NWEA Learning Statements. These statements give teachers information about how students are performing in the dimensions of the NGSS. 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, below is a sample report for the Physical Sciences goal and Waves topic in typical middle school RIT bands:

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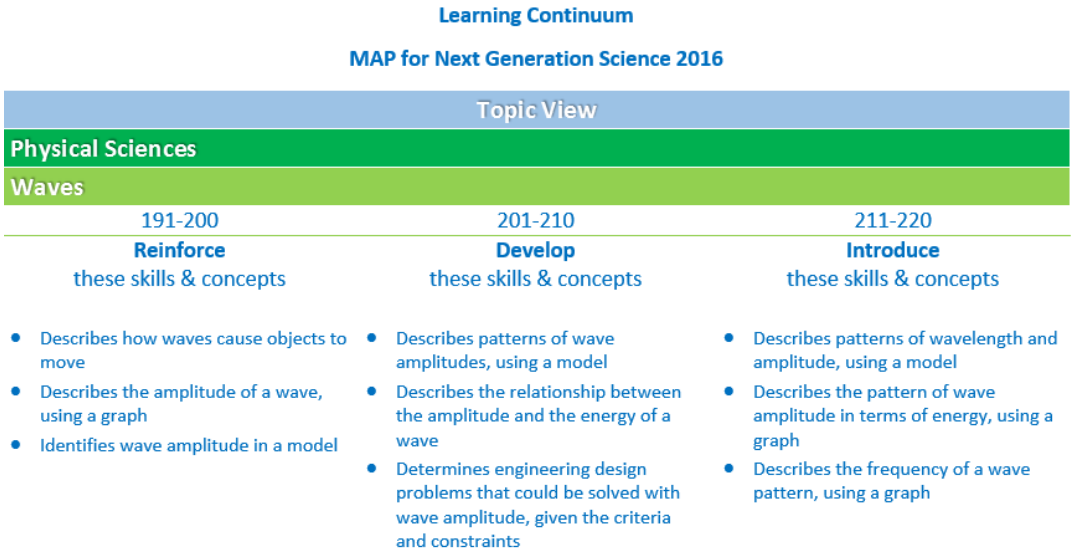

Learning Continuum

MAP for Next Generation Science 2016

Topic View		
Physical Sciences		
Waves		
191-200	201-210	211-220
Reinforce these skills & concepts	**Develop** these skills & concepts	**Introduce** these skills & concepts
• Describes how waves cause objects to move • Describes the amplitude of a wave, using a graph • Identifies wave amplitude in a model	• Describes patterns of wave amplitudes, using a model • Describes the relationship between the amplitude and the energy of a wave • Determines engineering design problems that could be solved with wave amplitude, given the criteria and constraints	• Describes patterns of wavelength and amplitude, using a model • Describes the pattern of wave amplitude in terms of energy, using a graph • Describes the frequency of a wave pattern, using a graph

8. How does the new assessment affect the growth and status norms?

All the items in the NGSS pools have been calibrated on the existing General Science Scale. Therefore, the 2015 norms can be used in a similar manner as in previous MAP for Science assessments. The NWEA research team regularly studies the norms and publishes updates. In the coming years, we will evaluate how norms are affected by the NGSS.

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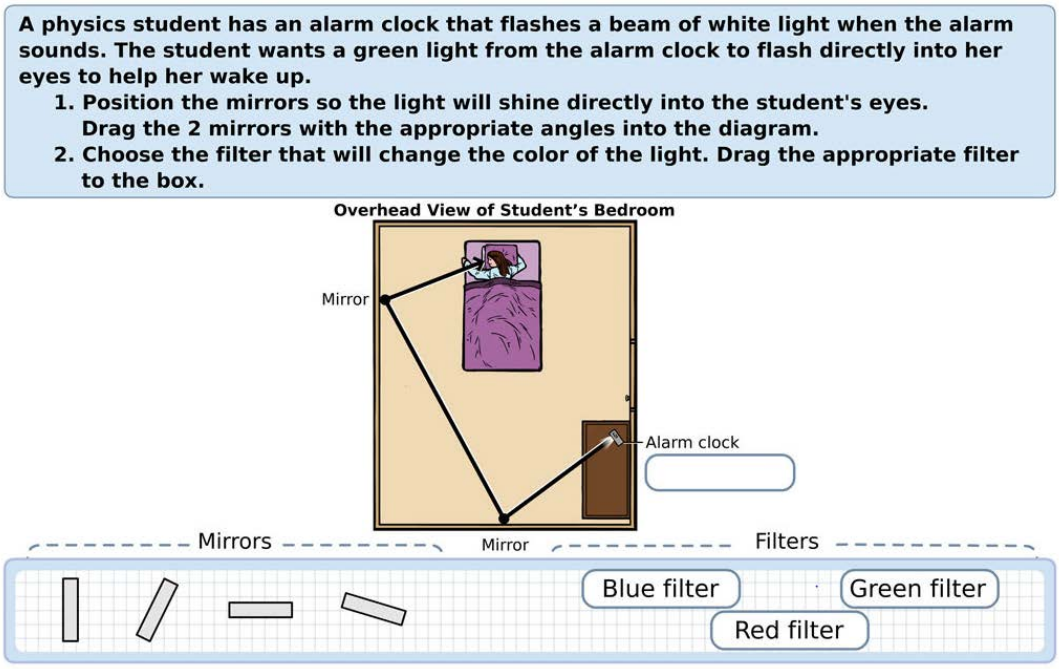
9. What does engineering design look like in the assessments?

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. The sample item below 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.

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. **	**DCI**: • Electromagnetic Radiation • Developing Possible Solutions • Optimizing the Design Solution	**SEP**: Developing and Using Models	**CCC**: Structure and Function
NWEA Learning Statement: Develops design solutions involving the reflection, transmission, or absorption of light, using models **Item RIT**: 213 **Item DOK**: 2	• Electromagnetic Radiation • Developing Possible Solutions	Developing and Using Models	Structure and Function



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

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10. How does NWEA ensure MAP 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 Science for use with NGSS items vary by the number of dimensions assessed, by the item types used including selected response and technologically enhanced items, and by 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) in addition to Bloom's Taxonomy. Science content specialists receive ongoing training on DOK, including trainings with Norm Webb himself. The item pool has items at DOK levels 1, 2, and 3. DOK 1 items involve the recall of information. 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 and 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 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 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.

11. Is the current MAP for Science still available?

Yes, you can continue using your 2015–16 MAP for Science assessments.

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