NGSS Implementation Initiatives & NGSS Summative Assessment Development

Presenter: Ron Michaels
CT State Department of Education

Fall 2018
Supporting Next Generation Science
Connecticut State Department of Education in partnership with The Connecticut Science Center
NOTICE: The Connecticut State Department of Education’s customer service window for educator certification will be closed, effective March 12, 2018. The last day of staffing will be Friday, March 9, 2018. Please Note: The Bureau of Certification will remain open and fully functioning. This change only impacts the street level customer service window. For more information about submitting applications and supporting documentation please review our Cert Alert.

http://www.sde.ct.gov
NOTICE: The Connecticut State Department of Education’s customer service window for educator certification will be closed, effective March 12, 2018. The last day of staffing will be Friday, March 9, 2018. Please Note: The Bureau of Certification will remain open and fully functioning. This change only impacts the street level customer service window. For more information about submitting applications and supporting documentation please review our Cert Alert.
NOTICE: The Connecticut State Department of Education's customer service window for educator certification will be closed, effective March 12, 2018. The last day of staffing will be Friday, March 9, 2018. Please Note: The Bureau of Certification will remain open and fully functioning. This change only impacts the street level customer service window. For more information about submitting applications and supporting documentation please review our Cert Alert.

Science

4 of 4 Results

Connecticut High School Science Safety
Direction, support, and resources for high school science teachers and school administrators to plan exciting and safer laboratory experiences for students based on prudent professional practices and legal safety standards.

Connecticut Middle School Science Safety
Direction, support, and resources for middle school science teachers and school administrators to plan exciting and safer laboratory experiences for students based on prudent professional practices and legal safety standards.

Mathematics and Science Partnership (MSP) Program
The Mathematics and Science Partnership (MSP) program is intended to increase the academic achievement of students in mathematics and science by enhancing the content knowledge and teaching skills of classroom teachers.
** An option for transitioning away from current state standards to teaching NGSS.  
*Districts have flexibility to develop their own transition and implementation plans.*
Professional Learning Opportunities

• **Next Generation Science- CT Short Course**
  • No-cost/Self-paced
  • 11 modules offering 16 to 60 hours of structured professional learning
  • Available to all CT educators since 2016

• **NGSS District Transition Planning Workshop**
  • Start or enhance your district’s multi-year science plan
  • For vertical teams (example: 1 asst. supt., 2 principals, 1 science coordinator, 2 science coaches)
  • Ongoing district support since 2017
• **Next Gen Science Exemplar System (NGSX) Part I**
  • Hands-on, Expert-facilitated, Intro to 3-D learning/teaching
  • 6 module series over 4 ½ days
  • Tuition based (fixed costs)
  • 36 hours of seminar-style instruction/participation
  • Take’s a “deep” dive into NGSS pedagogy

• **Taking it Back to the Classroom (NGSX) Part II**
  • Hands-on, Expert-facilitated
  • Focus on support of 3D learning sequences with instructional materials
  • 24 hours of seminar-style learning (pre-req. Part I)
  • Learn how to connect “storylines” to classroom learning and development of curricular units
• **PLANS - Principals Learn About, Network, and Support 3-Dimensional Science Learning**
  • Awareness PD designed for Administrators/Evaluators
  • Expert facilitated in 1 1/2 days
  • Focus on evaluation “look fors”
  • Several opportunities planned for 2018/2019

• **Curriculum Unit Development Institute (CUDI)**
  • Designed for curriculum writers and teachers
  • Expert facilitated
  • 5 days
  • [Offered through the CT RESC system](#)
More Opportunities/Resources …

- **Why NGSS...?** 2-day NGSS Awareness PD
- **Achieve, Inc.**
  - Evaluating Commercial Instructional Materials
    - Equip Rubric Vers. 3
    - PEEC-Primary Evaluation of Essential Criteria
    - Monthly Science Bulletin
- **National Science Teachers Association**
  - Books and Resources
  - Freebies for Science Teachers
- **NextGenScience.org**
  - NOW Newsletter
- **MSP / TQP grants** CT teachers developing NGSS materials
More Opportunities/Resources ... 

- **Connecticut Science Teachers Association**
  Connecticut Science Educators Conference
  Saturday, November 18, 2018

- **Connecticut Science Supervisors Association**
  Resources and materials

- **Connecticut Science Center**
  Inquiry Institutes/Workshops
  NGSS Curriculum Development Institute
  The Practice of NGSS workshops
CSDE NGSS Resources

• Connecticut NGSS Parent Toolkit is a short document that will guide parents to better understand the shifts in science education demanded by the NGSS. It includes many useful links to resources that will help parents identify the various components of an exemplary science program.

• Connecticut NGSS Toolkit for Local School Boards is a tool that will help guide school board members to better understand the shifts in science education demanded by the NGSS. It includes useful links to resources that will guide school boards to identify the complex components of an exemplary science program.
A New Vision for Science Education

Children are naturally curious about the world. While many adults recall learning science by reading about it in a textbook or listening to a teacher’s explanation, we now know how to engage learners in more meaningful, lasting and exciting science learning.

By dramatically changing the way science is taught and learned, the Next Generation Science Standards (NGSS), adopted by Connecticut in November 2015, are designed to raise interest, participation and achievement for all students. This introductory video explains the design principles and key features of NGSS. This fact sheet summarizes the need for and development of NGSS.

Like learning to ride a bike or play a musical instrument, the experience of doing science is far more important than just reading about it in a book. Based on years of research about how people learn science, the NGSS promote a new way of teaching and learning that allows students to actively do science in a meaningful way, not just learn about it from a textbook or a lecture. For students, next generation science means more “figuring out” and less just “learning about” science ideas. In this way, knowledge is retained and built upon for a lifetime.

Decades of research have led to recommended improvements to science education. Among these is a more authentic approach to scientific inquiry, the discovery process practiced by scientists that is more flexible and iterative than the scientific method traditionally taught in schools. This poster highlights new NGSS approaches that aim to involve all students in figuring out explanations based on critical analysis of evidence. To summa...
A New Vision for Science Education

Children are naturally curious about the world. While many adults recall learning science by reading about it in a textbook or listening to a teacher's explanation, we now know how to engage learners in more meaningful, lasting and exciting science learning.

By dramatically changing the way science is taught and learned, the Next Generation Science Standards (NGSS), adopted by Connecticut in November 2015, are designed to raise interest, participation and achievement for all students. This introductory video explains the design principles and key features of NGSS. This fact sheet summarizes the need for and development of NGSS.

Decades of research have resulted in increased understanding of how to engage diverse learners so that knowledge is retained and built upon for a lifetime. Our nation's leading scientists and science educators were convened by the National Academies of Science in 2012 to synthesize this research and recommend improvements to U.S. science education. These are reported in the Framework for K–12 Science Education (National Research Council, 2012). Among the envisioned improvements is a more authentic approach to scientific inquiry, the discovery process practiced by scientists that is more flexible and iterative than the scientific method taught in schools. This poster highlights new NGSS approaches that aim to involve all students in figuring out explanations based on critical analysis of evidence. To summarize, an NGSS learning approach teaches students to think on their own and in collaboration with others.

NGSS are aligned with contemporary expectations for college-level science courses. Beginning in 2012, the College Board redesigned Advanced Placement exams in STEM subjects (e.g., biology, chemistry, physics, computer science) to emphasize the use of science practices to reason with evidence (see summary of AP STEM advances). To help states and districts reform their science programs to better prepare more students
The Next Generation Science Standards (NGSS) challenge teachers to think deeply about learning and teaching with the goal of developing a clear vision of science education that is coherent, focused, and rigorous. These tools are designed to help professional development leaders work with teachers on curriculum, instruction, and assessment. (American Museum of Natural History in collaboration with BSCS and the K-12 Alliance at WestEd.)

https://www.amnh.org/explore/curriculum-collections/five-tools-and-processes-for-ngss
The NGSS EQuIP Professional Learning Facilitator’s Guide

• A series of 10 modules that were designed to provide guidance on building the capacity of educators and education leaders to use the EQuIP Rubric for Science.
• Completing will provide science educators/leaders with the processes and procedures necessary to use the EQuIP Rubric to review science lessons and units.
• Will provide effective feedback and suggestions for improvement to developers and users of these instructional materials.
• Will identify model or exemplar lessons and units, and to inform the development of new instructional materials.

https://www.nextgenscience.org/resources/equip-professional-learning-facilitator%E2%80%99s-guide-v20
Building Towards NGSS Classroom Series

These Teaching Channel videos, developed in partnership with Achieve, help teachers transition classroom instruction to meet the goals of NGSS. The series includes:

• First Steps Towards Transitioning to the NGSS
• Making Claims From Evidence, Energy & Matter Across Science Disciplines
• Working as a Team

https://www.teachingchannel.org/video/transition-to-ngss-achieve
Tools for Ambitious Science Teaching

This website offers strategies and tools for designing teaching experiences that engage all students in meaningful forms of science learning.

Materials support NGSS instructional strategies.

https://ambitiousscienceteaching.org/
Next Generation Science Standards Video Series covers the concepts contained within the K-12 Science Framework. The 60 videos contain: an NGSS overview, 8 practices, 7 crosscutting concepts, and 44 disciplinary core ideas.

https://www.youtube.com/playlist?list=PLllVwaZQkS2rlZG_L7ho89oFsaYL3kUWq
Talk Science Professional Development

This component of The Inquiry Project (TERC) is designed to increase the effectiveness of discourse in Grades 3 through 5 science classrooms. The focus is on meaning-making and strategies to support productive discussion. Video case studies are included.

https://inquiryproject.terc.edu/prof_dev/pathway/
NGSS Storylines

Next Generation Science Storylines project is dedicated to providing tools that support teachers in developing, adapting, and teaching with strongly aligned NGSS materials in classrooms around the country.

Check out the latest NGSS Storylines at http://www.nextgenstorylines.org
Questions?
For information about **NGSS Standards Implementation, Instruction, Curriculum Resources** in Connecticut contact:

**Ron Michaels**
CT State Department of Education
Academic Office
860 713-6851
Ronald.Michaels@ct.gov

For information about **NGSS Assessments (Standard, Alternate, Interims)** in Connecticut contact:

**Jeff Greig**
CT State Department of Education
Performance Office
860 713-6854
Jeff.Greig@ct.gov
Update on Next Generation Science Assessments

Presenter: Jeff Greig
CT State Department of Education Performance Office
Spring 2019 Science Assessments

First live test administrations. All students in Grades 5, 8 and 11 must participate.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Grades</th>
<th>Testing Window</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGSS Standard Assessment</td>
<td>11</td>
<td>February 4 – June 7, 2019</td>
</tr>
<tr>
<td>NGSS Standard Assessment</td>
<td>5 and 8</td>
<td>March 25 – June 7, 2019</td>
</tr>
<tr>
<td>CT Alternate Science Assessment (CTAS) Online Submission</td>
<td>5, 8 and 11</td>
<td>March 25 – June 7, 2019</td>
</tr>
</tbody>
</table>

**Standards** will be set by committee of CT educators and community leaders following the spring 2019 administration.

**Results** will be reported for students, schools and districts. Participation (target = 95%) and performance results will be included in school and district accountability.

**Proposed System of NGSS Assessments**

The goal is to provide useful information for a variety of purposes and audiences.

<table>
<thead>
<tr>
<th><strong>Formative Assessment Resources</strong>*:</th>
<th>Used every day by teachers to monitor student learning in the classroom and help make ongoing instructional adjustments to better meet student needs. <strong>VOLUNTARY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interim Assessment Resources</strong>*:</td>
<td>Assessments administered at the end of units or grades to evaluate the learning of groups of students to inform curriculum and instruction at the local level. <strong>VOLUNTARY</strong></td>
</tr>
<tr>
<td><strong>State Summative Assessments</strong>:</td>
<td>Assessments given at the end of learning (Grades 5, 8 and 11) to track student performance and inform decisions about curriculum, instruction, professional development, and policy for a variety of stakeholders. <strong>MANDATED BY FEDERAL AND STATE LAW</strong></td>
</tr>
</tbody>
</table>

* Formative and interim assessment resources will likely come from a variety of sources and be shared by states around the country.
Collaborative NGSS Assessment Development

CT is working with several other states and our testing contractor, American Institute for Research (AIR), to develop and share NGSS assessment resources and an item pool. States will have their own science assessments and set their own standards.

<table>
<thead>
<tr>
<th>State</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>West Virginia</td>
</tr>
<tr>
<td>Idaho</td>
<td>Rhode Island</td>
</tr>
<tr>
<td>Utah</td>
<td>Vermont</td>
</tr>
<tr>
<td>Oregon</td>
<td>Wyoming</td>
</tr>
</tbody>
</table>

States and national experts are also sharing information and resources through various projects to improve science assessments, including:

- SCASS Science Collaborative: [https://ccsso.org/science-collaborative](https://ccsso.org/science-collaborative)
- ACESSE 50: [https://docs.google.com/document/d/1aqSeEiqysgc86Oc9O3e3rOl0rZvtyMsH67XebtiqHM/edit](https://docs.google.com/document/d/1aqSeEiqysgc86Oc9O3e3rOl0rZvtyMsH67XebtiqHM/edit)
NGSS Committees of CT Educators

State Science Assessment Advisory Committee (SSAAC)

Advise on the development of the NGSS assessment system. Help develop and review items for the statewide NGSS assessments. Includes approximately 90 science educators representing various districts, grades and content areas.

Science Fairness and Accessibility Committee (FAC)

Advise on fairness and accessibility issues for all students regardless of their background or abilities related to NGSS assessments. Includes approximately 20 educators with a variety of backgrounds and expertise. New members needed.

District Advisory Committee (DAC)

Advise on “big picture” issues related to NGSS implementation, professional development, curriculum and assessment development. Includes science leaders and administrators representing over 100 school districts around the state.

Contact Jeff Greig (Jeff.Greig@ct.gov) if interested in the SSAAC or FAC.

Contact Ron Michaels (Ronald.Michaels@ct.gov) if interested in the DAC.
NGSS Assessment Item Development Process (1-2 Years)

1. Drafting of New Items by Testing Contractor & CT Educators*
2. CSDE Review of Items
3. Content Review of Items by SSAAC
4. Fairness and Accessibility Review of Items
5. Expert Review of Items
6. Pilot/Field Testing of Items (& Cognitive Labs)
7. Rubric Validation & Range-Finding of New Items
8. Scoring of Student Responses to New Items
9. Data Review of Pilot/Field Tested Items
10. Building Operational Tests

Only items deemed acceptable following educator reviews and pilot/field testing are placed on an operational test.

*CT science educators from the State Science Assessment Advisory Committee (SSAAC) and Science Fairness and Accessibility Committee (FAC) help generate phenomena and ideas for assessment items.
**NGSS State Summative Assessments**

**Two main purposes:** provide valid and reliable results at the individual student level and useful feedback to schools, districts and the state.

**Test Design:** Likely matrix design and/or computer adaptive design (in the future).

**Claims and Targets for Reporting:**

- **Content Domain** (Science)
- **Claims** (broad reporting categories)
- **Targets** (specific reporting categories)

**Claims:** Students use science and engineering practices and apply their understanding of disciplinary core ideas and crosscutting concepts in Life, Physical and Earth/Space Sciences to make sense out of real-world phenomena.
NGSS State Summative Assessments

Target-level Reporting: The following may be available for schools and districts:

- Topic Areas or DCI Arrangements + Engineering
- Individual Performance Expectations
- Groupings of Science and Engineering Practices
- Groupings of Cross-Cutting Concepts

Reporting will likely become more detailed over time.

The table below shows the description of each of the assessment targets to be reported.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Target Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Better than performance on the test as a whole</td>
<td>This target is a relative strength. The group of students performed better on items from this target than they did on the rest of the test as a whole.</td>
</tr>
<tr>
<td>=</td>
<td>Similar to performance on the test as a whole</td>
<td>This target is neither a relative strength nor a relative weakness. The group of students performed about as well on items from this target as they did on the rest of the test as a whole.</td>
</tr>
<tr>
<td>-</td>
<td>Worse than performance on the test as a whole</td>
<td>This target is a relative weakness. The group of students did not perform as well on items from this target as they did on the rest of the test as a whole.</td>
</tr>
<tr>
<td>*</td>
<td>Insufficient Information</td>
<td>Not enough information is available to determine whether this target is a relative strength or weakness.</td>
</tr>
</tbody>
</table>

The reporting descriptions shown above are consistent with Smarter Balanced assessments.
NGSS State Summative Assessments

Items assess students’ ability to **make sense of real-world scientific phenomena** using the **three dimensions** in the performance expectations.

The live tests for each student will include **12 stand-alone items and 6 item clusters**. Additional items being field tested are added (1 cluster or 6 stand-alone items).

**The NGSS tests are untimed** - students may have as much time as they need. Tests may be administered on a single day (with a break) or over multiple days. Students may be cycled through rooms with computers.

**Variety of item types** including innovative items such as interactions and simulations.

**Less emphasis** placed on the areas of *Earth’s Place in the Universe* and *Waves and their Applications* at Grade 11 (based on feedback from District Advisory Committee).

**Using guidance from Smarter Balanced** in terms of item formats, style, wording, etc. (modifying and adding to as needed for science) to maintain consistency.

A variety of universal tools, designated support and accommodations are available to make the assessments accessible to all students. See the current version of the **Assessment Guidelines** at the CSDE Web site: [www.ct.gov/sde](http://www.ct.gov/sde).
<table>
<thead>
<tr>
<th>Content Area</th>
<th>DCI Area</th>
<th>Stand-Alone Items</th>
<th>Item Clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td>From Molecules to Organisms</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Ecosystems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heredity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biological Evolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td>Matter and Its Interactions</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Forces and Motion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waves and their Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth/Space Science</td>
<td>Earth’s Place in the Universe</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Earth’s Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earth and Human Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

Each item is aligned to one NGSS Performance Expectation. Items will be matrix sampled across students in a school and district.
Tools, Supports and Accommodations

Universal Tools: **Available to ALL students**

**Embedded**
- Breaks
- Calculator (Math Grades 6-8; Science Grades 5, 8, & 11)
- Digital Notepad
- English Glossary
- Expanded Passages/Stimuli
- Highlighter
- Keyboard Navigation
- Line Reader
- Mark for Review
- Math Tools
- Strikethrough
- Writing Tools
- Zoom

**Non-Embedded**
- Breaks
- Scratch Paper/whiteboard with marker

**NOT available for Science**

**Designated Supports: **Available to ANY student with a need determined by educators**

**Embedded**
- Color Contrast
- Masking
- Mouse Pointer
- Print Size Online
- Streamline
  - Text-to-Speech: Science, Math & ELA Non-Reading Passages
  - Translations-Math (Glossary)
  - Translations-Math (Stacked)
  - Translation Test Directions (Math, Spanish)
  - Turn off any universal accessibility tool

**Non-Embedded**
- American Sign Language (Video)
- Braille Embosser (Math & ELA: Contracted, Uncontracted)
- Braille Transcript (ELA Listening)
- Closed Captioning (ELA Listening)
- Refreshable Braille (ELA: Contracted, Uncontracted)
- Text-to-Speech ELA Reading Passages (Grades 3-8)

**Accommodations: **Available to students with an IEP or 504 Plan

**Embedded**
- 300s Number Table (Grades 4-8)
- Abacus
- Alternate Response Options
- Braille Booklet
- Braille supplemental math booklet online fixed form test
  - # Human Signer for ELA or Math items
  - # Human Signer for ELA Reading Passages (Grades 3-8)
  - Human Signer for Science items
  - Large Print Booklet
  - Multiplication Table (Grades 4-8)
  - Print on Demand
  - # Read Aloud ELA Reading Passages (Grades 3-8)
  - # Scribe
  - Specialist calculator (Math Grades 6-8; Science Grades 5, 8, & 11)
  - Speech-to-Text

**Non-Embedded**
- Requires Trained Educator

**NOT available for Science**

**requires Petition for Approval of Special Documented Accommodations**

*Intended for English Learners (EL) *NOT available for Science
NGSS Item Specifications

• Guide the development and review of assessment items.
• Developed for each performance expectation (Grade 3 - High School).
• Reviewed by national NGSS experts and science educators from various states, including CT.
• Go beyond the published standards to include:
  • Additional content limits and guidance
  • Acceptable and unacceptable vocabulary
  • Sample phenomena
  • Task demands (specific tasks that students might be asked to do in the items, based on the NGSS evidence statements).

Will be made public soon.
NGSS Online Assessments: Item Clusters

Start with stimulus based on real-world phenomena:
- Written text
- Data in tables or graphs
- Diagrams, drawings, maps, etc.
- Animations
- Simulations

Variety of item types including:
- Selected-Response
- Constructed Response
- Multi-Select
- Graphic Response
- Edit Task Inline Choice
- Table Input
- Technology-Enhanced:
  - Interactions
  - Simulations

New item types may be developed over time.

Items clusters present students with stimulus and items using a split screen.
## NGSS Online Assessments: Stand-Alone Items

| Start with short stimulus based on real-world phenomena. |
| Generally 1 or 2 item interactions |

Stand-alone items present students with stimuli on top with item interaction(s) below.
Five NGSS item clusters at each grade band.

Updated NGSS Practice Tests will be available on October 31. Will include item clusters and stand-alone items with all item interaction types.
Sample NGSS Assessment Item: Middle School

Speakers come in a variety of shapes and sizes and can produce sounds with different volumes and tones.

A speaker converts electrical energy into sound through vibrations. A basic speaker consists of three main parts: a permanent magnet, a voice coil, and a speaker cone (outside of speaker). A voice coil is a small column on which a conducting wire is wrapped. When a current flows through the wire, the voice coil interacts with the permanent magnet and moves up and down. This causes the speaker cone to vibrate and produce sound. Figure 1 shows a cross section of a speaker with the internal parts labeled.

**Figure 1. Cross Section of Speaker**

Your Task

As you work through this task, you will design a louder speaker.

**Aligned to MS-PS:** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

---

Part A

Use the simulation to run experiments to determine which components affect the sound volume of the speaker. You may not have to use all 8 trials. If necessary, you can use the trash can icons to delete the data within the rows of the table and generate new data.

**Inputs**
- Voice Coil Diameter (cm)
- Number of Wire Wraps
- Speaker Cone Diameter (cm)

**Trial** | **Voice Coil Diameter (cm)** | **# of Wire Wraps in Voice Coil** | **Speaker Cone Diameter (cm)** | **Sound Volume (dB)**
---|---|---|---|---
1 | 1 | 500 | 5 | 45
2 | 1 | 1000 | 5 | 90
3 | 1 | 500 | 10 | 45

Part B

Based upon the results of the experiment you ran in Part A, identify the components that do or do not affect the sound.

First, select the boxes in Table 1 to identify whether each component affects the sound volume in the speaker. Then select the boxes in Table 2 to identify the simulation trials that provide evidence to support your choice.

**Table 1. Components That Affect Sound Volume**

<table>
<thead>
<tr>
<th>Component</th>
<th>Affects Sound Volume</th>
<th>Does Not Affect Sound Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice Coil Diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Wire Wraps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker Cone Diameter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Trials That Provide Evidence**

<table>
<thead>
<tr>
<th>Trial</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice Coil Diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Wire Wraps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker Cone Diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part F

Click on the blank boxes to select numbers to complete the table showing how to set up a speaker that will produce the loudest sound.

**Setup for Speaker Producing the Loudest Sound**

<table>
<thead>
<tr>
<th>Voice Coil Diameter (cm)</th>
<th>Number of Wire Wraps</th>
<th>Cone Diameter (cm)</th>
</tr>
</thead>
</table>
NGSS Sample Items: Settings and Instructions

Choose Settings:
Review the following test settings. You can change the options, if necessary.

Science Sample Items

Literacy Assistance Tools
- Text to Speech: None
- TTS Tracking: ON

Visual Assistance Tools
- Color Choices: Black on White
- Mouse Pointer: System Default
- Streamlined Mode: OFF
- Zoom: 1X

Concentration Assistance Tools
- Line Reader: OFF
- Masking: OFF

Headphones needed only for Text-to-Speech

Next Step:
To test with these settings, choose Select. To select a different test, choose Go Back.

Text-to-Speech available for all students. Must be set in TIDE.
Desmos calculators used (same as for Smarter Balanced Mathematics). Calculator features are specific to the grade (Grade 5 shown above).

Score Item feature allows for instant feedback to students.

Periodic Table available at Grades 8 and 11. Printable version will also be available.
Spring 2018 NGSS Assessment Field Test

**Purpose:** Try out new NGSS assessment items and gather data/feedback, *not* to assess students, schools or districts.

**Dates:** March 26-May 25, 2018 for Grade 11; April 30-May 25, 2018 for Grades 5 and 8

**Students:** All students in Grades 5, 8 and 11 participated.

**Administration:** Online using AIR’s Test Delivery System (TDS).

**Items:** Each student was given 12 stand-alone and 6 item clusters distributed equally across Life, Physical and Earth/Space Sciences.

**Time:** Estimated 90 minutes plus 10 minutes for directions. Test was untimed. Students could have as much time as they needed.

**Feedback:** Students and teachers were asked to complete optional feedback surveys.

**Results:** No results are reported publicly. Participation rate was used for school and district accountability. Results for individual items was reviewed.
Which of the following best describes the amount of NGSS instruction that students who participated in the field test have had? 431 responses

**Overall Results**

- **Significant amount**: 18.3%
- **Small amount**: 52.9%
- **None**: 14.8%
- **Don’t Know/Other Responses**: 14.0%

<table>
<thead>
<tr>
<th>Grade</th>
<th>Significant Amount</th>
<th>Small Amount</th>
<th>None</th>
<th>Other</th>
<th>No. of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>16.0%</td>
<td>55.5%</td>
<td>22.7%</td>
<td>5.9%</td>
<td>119</td>
</tr>
<tr>
<td>8</td>
<td>32.2%</td>
<td>42.2%</td>
<td>11.1%</td>
<td>14.4%</td>
<td>90</td>
</tr>
<tr>
<td>11</td>
<td>13.5%</td>
<td>60.0%</td>
<td>14.1%</td>
<td>12.4%</td>
<td>185</td>
</tr>
</tbody>
</table>
7. Based on your observations, how would you best describe students’ understanding of how to navigate and respond to the various item types they experienced on the field test?

Overall Results

- 53.2%: Students were easily able to navigate and respond to all item types.
- 17.5%: Students were able to navigate and respond to the item types with some minor challenges.
- 24.9%: Students had significant challenges navigating and/or responding to the variety of item types.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Easy Navigation</th>
<th>Minor Challenges</th>
<th>Significant Challenges</th>
<th>Other</th>
<th>No of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>15.6%</td>
<td>61.5%</td>
<td>17.2%</td>
<td>5.7%</td>
<td>122</td>
</tr>
<tr>
<td>8</td>
<td>22.4%</td>
<td>54.1%</td>
<td>21.4%</td>
<td>2.0%</td>
<td>98</td>
</tr>
<tr>
<td>11</td>
<td>33.2%</td>
<td>46.7%</td>
<td>15.6%</td>
<td>4.3%</td>
<td>211</td>
</tr>
</tbody>
</table>
4. Did you have enough time to finish the science field test?

14,285 responses

Overall Results

- Yes, I had plenty of time: 65%
- Yes, I had just enough time: 25.7%
- No, I needed a little more time: 9.3%

<table>
<thead>
<tr>
<th>Grade</th>
<th>No, I needed a lot more time</th>
<th>No, I needed a little more time</th>
<th>Yes, I had just enough time</th>
<th>Yes, I had plenty of time</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.0%</td>
<td>8.1%</td>
<td>27.4%</td>
<td>64.5%</td>
<td>3,287</td>
</tr>
<tr>
<td>8</td>
<td>0.0%</td>
<td>10.3%</td>
<td>27.2%</td>
<td>62.6%</td>
<td>3,639</td>
</tr>
<tr>
<td>11</td>
<td>0.0%</td>
<td>9.2%</td>
<td>20.8%</td>
<td>70.0%</td>
<td>2,392</td>
</tr>
</tbody>
</table>
6. How would you best describe the level of reading, including vocabulary, on the science field test?

14,269 responses

<table>
<thead>
<tr>
<th>Grade</th>
<th>Easy</th>
<th>About Right</th>
<th>Hard</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>25.0%</td>
<td>61.7%</td>
<td>13.2%</td>
<td>3277</td>
</tr>
<tr>
<td>8</td>
<td>19.5%</td>
<td>62.3%</td>
<td>18.2%</td>
<td>3634</td>
</tr>
<tr>
<td>11</td>
<td>18.1%</td>
<td>55.5%</td>
<td>26.4%</td>
<td>2394</td>
</tr>
</tbody>
</table>
7. Did you have any problems understanding how to answer any of the types of questions on the science field test?

Overall Results

- No, I didn’t have any problems: 63%
- Yes, I had some minor problems: 15.2%
- Yes, I had some major problems: 21.8%

Number of Responses: 14,314 responses

<table>
<thead>
<tr>
<th>Grade</th>
<th>No, no problems</th>
<th>Yes, minor problems</th>
<th>Yes, major problems</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>26.6%</td>
<td>66.6%</td>
<td>6.8%</td>
<td>3,260</td>
</tr>
<tr>
<td>8</td>
<td>18.6%</td>
<td>65.2%</td>
<td>16.2%</td>
<td>3,648</td>
</tr>
<tr>
<td>11</td>
<td>19.7%</td>
<td>55.2%</td>
<td>25.1%</td>
<td>2,403</td>
</tr>
</tbody>
</table>
Spring 2018 NGSS Assessment Field Test

Feedback from CT Student Surveys

8. On a scale from 1 to 5, rate how hard you tried to answer the test questions correctly:

14,324 responses

Overall Results

- 765 (5.3%) I didn’t try much
- 788 (5.5%) I didn’t try much
- 2,525 (17.6%) I did my best
- 5,232 (36.5%) I did my best
- 5,014 (35%) I did my best
Spring 2018 NGSS Assessment Field Test  
Feedback from CT Student Surveys: by Grade  

On a scale from 1 to 5, rate how hard you tried to answer the test questions correctly?

<table>
<thead>
<tr>
<th>Grade</th>
<th>(I didn’t try much) 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>(I did my best) 5</th>
<th>Number of Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.0%</td>
<td>1.5%</td>
<td>9.8%</td>
<td>36.2%</td>
<td>51.5%</td>
<td>3,286</td>
</tr>
<tr>
<td>8</td>
<td>2.9%</td>
<td>3.5%</td>
<td>16.6%</td>
<td>42.6%</td>
<td>34.5%</td>
<td>3,652</td>
</tr>
<tr>
<td>11</td>
<td>14.2%</td>
<td>14.5%</td>
<td>30.4%</td>
<td>27.8%</td>
<td>13.2%</td>
<td>2,403</td>
</tr>
</tbody>
</table>
Spring 2018 NGSS Assessment Field Test

Review of Item Data

NGSS assessment items that were field tested have been reviewed for:

• Item difficulty and correlations

• Performance by various groups of students (i.e., gender, race/ethnicity, EL status, special education status)

• Time for each item to be completed by students

Items reviewed by CSDE, AIR, and committees of science educators.

Only items deemed acceptable will appear on live NGSS assessments.
Percentile80 = amount of time (minutes) for 80% of students to complete the item

Outliers were reviewed

Most item clusters took students 6-12 minutes
Stand-alone (SA) items took students 1-3 minutes

Assertions are scored parts of each item
As intended, the field test showed that the items have a range of difficulties. Items that were very easy (high p-value) or very hard (low p-value) were reviewed by committee of CT science educators and some have been removed the item bank.

P-value = Percent of students getting correct answer
NGSS Interim Assessments

- Will be available starting **October 9, 2018**
- **For optional use** by local school districts
- Administered through AIR’s online Test Delivery System
- Accessed through the assessment web portal at [https://ct.portal.airast.org](https://ct.portal.airast.org)

  - Include “testlets” with two item clusters aligned to two different NGSS performance expectations from various topic areas (e.g., Forces and Motion, Ecosystems, Earth Systems). Should take students 15-20 minutes each.

- All items are machine-scored (no constructed response)
- Additional items will be added over time
- Results available immediately at various levels (i.e., student, class, school, district)
- Training webinar and support resources will be available
### NGSS Interim Assessments

#### Elementary School (Grades 3-5)

<table>
<thead>
<tr>
<th>Interim Assessment</th>
<th>Performance Expectations Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces, Motion and Energy</td>
<td>3-PS2-2</td>
</tr>
<tr>
<td>Matter and Its Interactions</td>
<td>5-PS1-2</td>
</tr>
<tr>
<td>Waves and Their Applications</td>
<td>4-PS4-1</td>
</tr>
<tr>
<td>Biological Evolution and Ecosystems</td>
<td>3-LS4-1</td>
</tr>
<tr>
<td>Inheritance, Structure and Function</td>
<td>3-LS3-1</td>
</tr>
<tr>
<td>Earth’s Systems and Gravitational Forces</td>
<td>5-ESS2-2</td>
</tr>
<tr>
<td>Earth's Systems</td>
<td>3-ESS2-1</td>
</tr>
</tbody>
</table>
## NGSS Interim Assessments

### Middle School (Grades 6-8)

<table>
<thead>
<tr>
<th>Interim Assessment</th>
<th>Performance Expectations Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces, Interactions and Energy</td>
<td>MS-PS2-2</td>
</tr>
<tr>
<td>Matter and Its Interactions</td>
<td>MS-PS1-4</td>
</tr>
<tr>
<td>Waves and Their Applications</td>
<td>MS-PS4-1</td>
</tr>
<tr>
<td>Matter and Energy in Ecosystems</td>
<td>MS-LS1-7</td>
</tr>
<tr>
<td>Structures and Processes in Living Organisms</td>
<td>MS-LS1-3</td>
</tr>
<tr>
<td>Inheritance and Variation of Traits</td>
<td>MS-LS3-1</td>
</tr>
<tr>
<td>Biological Evolution through Natural Selection</td>
<td>MS-LS4-4</td>
</tr>
<tr>
<td>Earth’s Earth and the Solar System</td>
<td>MS-ESS1-1</td>
</tr>
<tr>
<td>Earth's History and Systems</td>
<td>MS-ESS1-4</td>
</tr>
<tr>
<td>Weather and Human Impact on the Environment</td>
<td>MS-ESS2-5</td>
</tr>
</tbody>
</table>
## NGSS Interim Assessments

### High School (Grades 9-12)

<table>
<thead>
<tr>
<th>Interim Assessment</th>
<th>Performance Expectations Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matter and Its Interactions</td>
<td>HS-PS1-1</td>
</tr>
<tr>
<td></td>
<td>HS-PS1-2</td>
</tr>
<tr>
<td>Forces and Interactions</td>
<td>HS-PS2-2</td>
</tr>
<tr>
<td></td>
<td>HS-PS2-5</td>
</tr>
<tr>
<td>Energy and Waves</td>
<td>HS-PS3-1</td>
</tr>
<tr>
<td></td>
<td>HS-PS4-1</td>
</tr>
<tr>
<td>Structures and Processes in Living Organisms</td>
<td>HS-LS1-2</td>
</tr>
<tr>
<td></td>
<td>HS-LS1-3</td>
</tr>
<tr>
<td>Matter, Energy and Interdependent Relationships in Ecosystems</td>
<td>HS-LS1-5</td>
</tr>
<tr>
<td></td>
<td>HS-LS2-2</td>
</tr>
<tr>
<td>Inheritance of Traits and Evolution</td>
<td>HS-LS3-2</td>
</tr>
<tr>
<td></td>
<td>HS-LS4-1</td>
</tr>
<tr>
<td>Space Systems</td>
<td>HS-ESS1-3</td>
</tr>
<tr>
<td></td>
<td>HS-ESS1-4</td>
</tr>
<tr>
<td>Earth's History and Systems</td>
<td>HS-ESS1-6</td>
</tr>
<tr>
<td></td>
<td>HS-ESS2-3</td>
</tr>
<tr>
<td>Changes in Earth's Climate</td>
<td>HS-ESS2-4</td>
</tr>
<tr>
<td></td>
<td>HS-ESS3-5</td>
</tr>
<tr>
<td>Human Sustainability</td>
<td>HS-ESS3-3</td>
</tr>
<tr>
<td></td>
<td>HS-ESS3-4</td>
</tr>
</tbody>
</table>
NGSS Interim Assessments
Sample score reports through AIRWAYS

<table>
<thead>
<tr>
<th>Assessment Name</th>
<th>Test Reason</th>
<th>Student Count</th>
<th>Average Score</th>
<th>Performance Distribution</th>
<th>Date Last Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interim Grade 3 E.LA</td>
<td>Unassigned</td>
<td>1</td>
<td>400</td>
<td></td>
<td>06/07/2018</td>
</tr>
<tr>
<td>Interim - Science Grade 11 - Structure Properties</td>
<td>Unassigned</td>
<td>1</td>
<td>5/18</td>
<td></td>
<td>06/05/2018</td>
</tr>
<tr>
<td>Interim - Science Grade 8 - History of Earth</td>
<td>Unassigned</td>
<td>3</td>
<td>5/23</td>
<td></td>
<td>05/10/2018</td>
</tr>
<tr>
<td>Interim Grade 7 E.LA</td>
<td>Unassigned</td>
<td>2</td>
<td>5/10</td>
<td></td>
<td>12/25/2017</td>
</tr>
</tbody>
</table>

Raw scores only reported (no performance levels)
NGSS Assessment Resources

NGSS Assessment Resources:


STEM Teaching Tools Assessment Practice Briefs: http://stemteachingtools.org/tgs/Assessment


NSTA Conducting Assessments Resources: https://ngss.nsta.org/conducting-assessments.aspx

Stanford NGSS Assessment Project: https://snapgse.stanford.edu/

NGSS Assessment Items and Tasks:

Next Generation Science Assessment: https://ngss-assessment.portal.concord.org/

New Jersey Samples Items: http://measinc-nj-science.com/

Washington Sample items: https://wa.portal.airast.org/


Kentucky Through-Course Tasks: https://education.ky.gov/curriculum/conpro/science/Pages/tct.aspx

Wisconsin Classroom Science Assessment Examples: https://dpi.wi.gov/science/assessment/examples

Sample Classroom Science Assessment Tasks: http://www.nextgenscience.org/classroom-sample-assessment-tasks
Questions?

For information about **NGSS Standards Implementation, Instruction, Curriculum Resources** in Connecticut contact:

**Ron Michaels**  
CT State Department of Education  
Academic Office  
860 713-6851  
Ronald.Michaels@ct.gov

For information about **NGSS Assessments (Standard, Alternate, Interims)** in Connecticut contact:

**Jeff Greig**  
CT State Department of Education  
Performance Office  
860 713-6854  
Jeff.Greig@ct.gov