



CONNECTICUT STATE DEPARTMENT OF EDUCATION

Update on Science Assessments

Mastery Examination Committee

July 20, 2016

Current Status of CMT and CAPT Science

- ❖ Test at Grades 5, 8 and 10
- ❖ Included in school and district accountability
- ❖ Aligned to 2004 CT Science Standards
- ❖ Standard tests and Skills Checklists Science available
- ❖ Standard CMT and CAPT Science:
 - Utilize fixed-forms
 - Mostly selected-response with some constructed-response items
 - Has used mostly paper-and-pencil delivery mode, but will change to all online testing starting in spring 2017



Current Status of CMT and CAPT Science

- The CMT: Technical Report
- The CAPT: Technical Report
 - Both of these documents are posted on the CSDE website. These documents overview many of the important technical documentation including issues like validity and reliability.
 - The documents can be found here:

<http://www.sde.ct.gov/sde/cwp/view.asp?a=2748&q=334754>



Science Assessments Tentative Timeline (2016-2020)

**Next Generation Science Standards (NGSS)
adopted by CSBE on November 4, 2015**

School Year	Alignment to Standards	School and District Accountability
2015-16	2004 CT Science Standards	Results Included
2016-17	2004 CT Science Standards	Results Included
2017-18	2004 CT Science Standards	Results Included
2018-19	NGSS	Results Not Included
2019-20	NGSS	Results Included

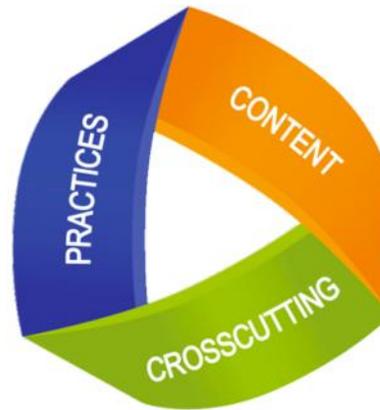
Pilot testing of NGSS-aligned assessment items scheduled to occur in spring 2017 and 2018 (and beyond)



Next Generation Science Standards (NGSS)

A set of learner outcomes designed to engage ALL students in “practicing” science the way real scientists do, and applying their knowledge to explain things in the real world.

Basis is 3-Dimensional
Performance Expectations



Incorporates
Engineering

Opportunity: To improve science education and assessments

Challenge: NGSS are more complex than the 2004 CT Science Standards.



Science Standards Comparison

2004 CT Science Standards Expected Performance (EP)	Next Generation Science Standards Performance Expectation (PE)
Describe the effects of the strengths of pushes and pulls on the motion of objects. (Gr. 4)	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. (Gr. 3)

Number of EPs or PEs at Each Grade Band

Grade Band	2004 CTSS No. of EPs	NGSS No. of PEs
3-5	35	45
6-8	40	57
High School	55*	71

* Grades 9-10



NGSS Standard

Performance Expectation

MS-LS4-1 Biological Evolution: Unity and Diversity		
<p>Students who demonstrate understanding can:</p> <p>MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. [Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.] [Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record.]</p>		
<p>The performance expectation above was developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i>:</p>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and</p>	<p>LS4.A: Evidence of Common Ancestry and Diversity</p> <ul style="list-style-type: none"> The collection of fossils and their placement in chronological order (e.g., 	<p>Patterns</p> <ul style="list-style-type: none"> Graphs, charts, and images can be used to identify patterns in data. <p>-----</p>

Foundation Boxes (3 Dimensions)

Evidence statements (not shown here): provide clear, measurable components for each performance expectation.

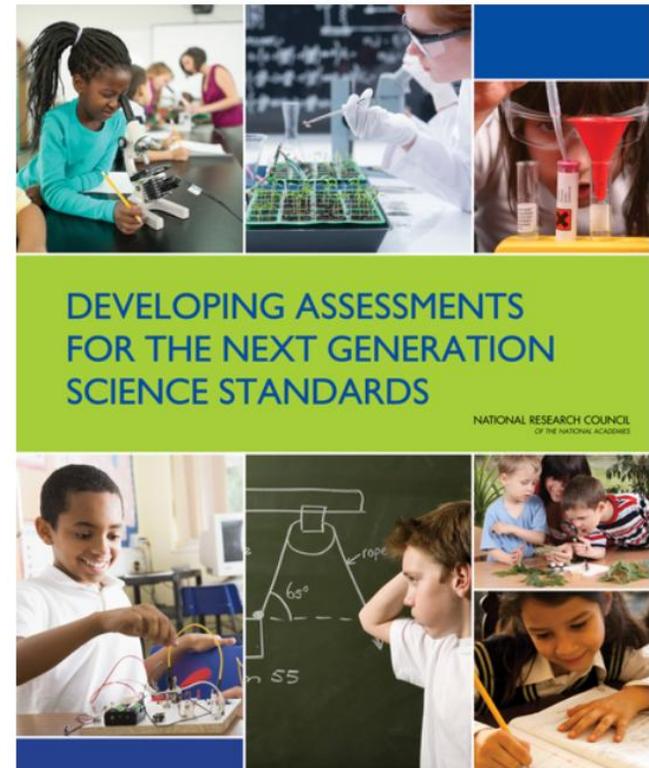


“Developing Assessments for the NGSS” (NRC BOTA REPORT*)

Challenge: NGSS places significant demands on science learning at every grade. It will not be feasible to assess all of the performance expectations for a given grade level with any one assessment.

Opportunity: A system of assessments will be needed to measure the NGSS performance expectations and provide students, teachers, administrators, policy makers, and the public with the information each needs about student learning (Conclusion 6-1).

* National Research Council Board on Testing and Assessment



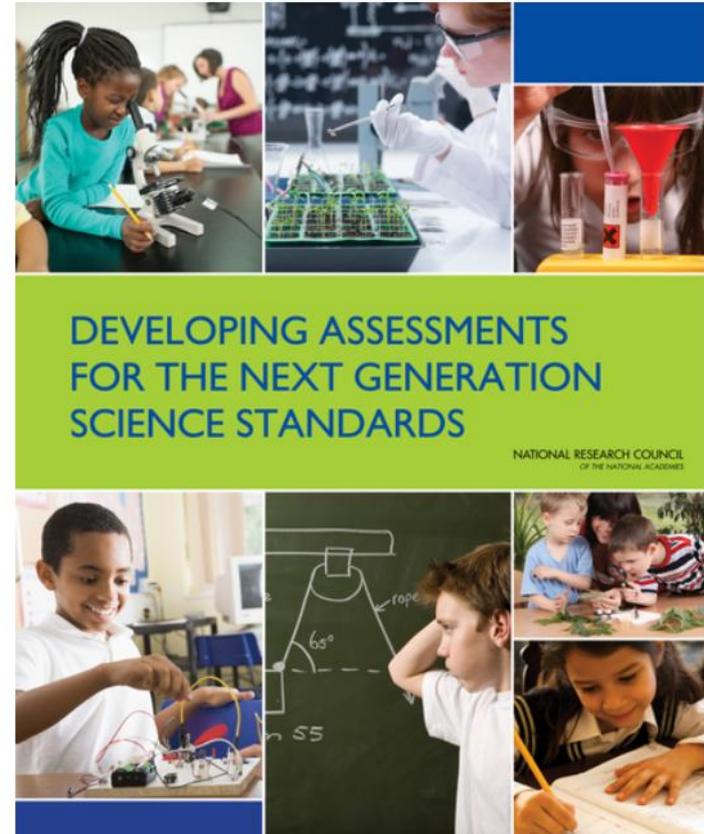
NRC BOTA Report: Additional Recommendations

Construct-centered (evidence-based)
design approach

Summative assessments should have
similar characteristics to classroom
assessments

Online testing and innovative items

Matrix sampling for state assessments



Science Assessment State Collaboratives

CCSSO Science Assessment Item Collaborative (SAIC)

- ❖ Effort to develop and share NGSS assessment resources based on NRC BOTA Report recommendations
- ❖ Phase 1.0 involved about 14 states
- ❖ Developed NGSS Assessment Resources:
 1. **Assessment Framework:** Recommend **Item Clusters** as the basis for NGSS summative assessments.
 2. **Item Specification Guidelines**
 3. **Item Cluster Prototypes** (Grade 5 and High School)

Science Assessment Item Collaborative

Assessment Framework

for the

Next Generation Science Standards

September 2015



Science Assessment Item Collaborative

Item Specifications Guidelines

for the

Next Generation Science Standards

September 2015



NGSS Assessment Item Clusters

Stimuli: Real-world science context or phenomena

May include text, diagrams, pictures, animations, scientific investigations, etc.

Item 1

Item 2

Item 3

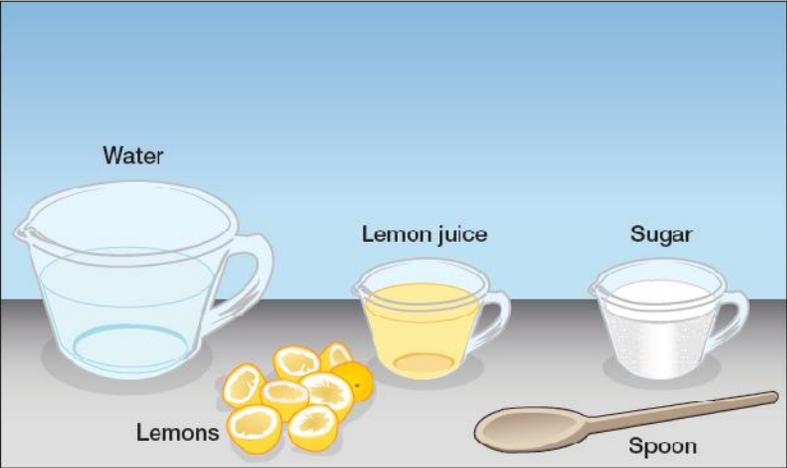
Item types include:

- Selected-response
- Constructed-response
- Technology-enhanced

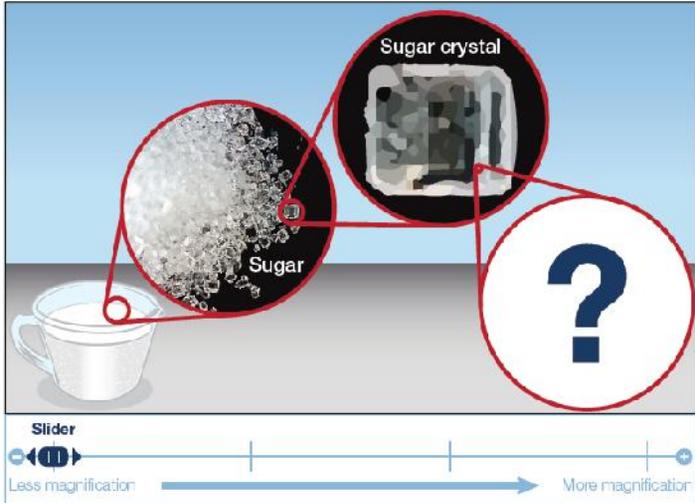
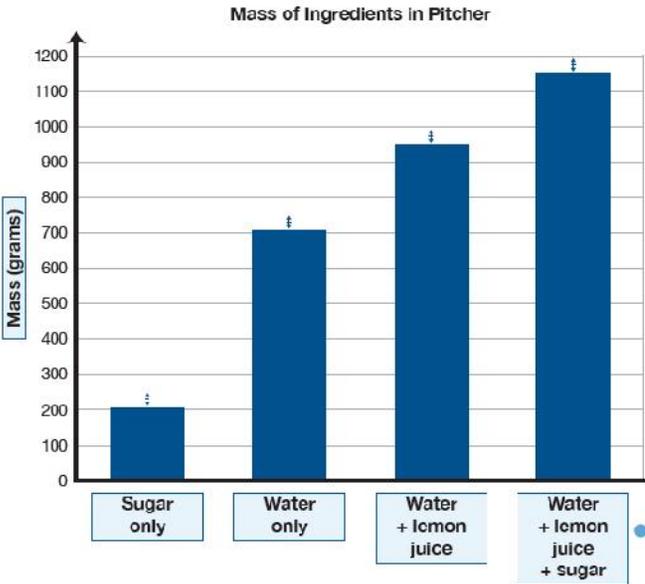
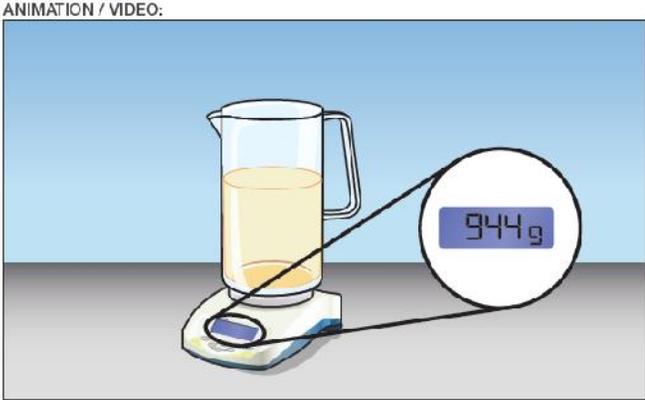


Grade 5 Item Cluster Prototype

Students are making lemonade using three ingredients: water, lemon juice, and sugar. While making the lemonade, the students plan to investigate how the ingredients are affected by a physical change that happens when the ingredients are stirred together. The students measure out how much of each ingredient they need by following a recipe.



Ingredients	Measurement:
	Units:
Sugar only	<input type="text"/>
Water only	<input type="text"/>
Water + lemon juice	<input type="text"/>



Science Assessment State Collaboratives

Multi-Agency Assessment Collaborative (MAAC) for Science

- ❖ Several states (CT, HI, ID, OR, VI, WA, WV) working together informally to share resources and NGSS assessment items
- ❖ Facilitated by American Institutes for Research (AIR)
- ❖ Assessments delivered using AIR's Test Delivery System (TDS, also used for Smarter Balanced)



Committees of CT Educators Advising on Next Generation Science Assessments

District Advisory Council

- Over 100 members representing districts from around the state
- Advise the state on “big picture” issues related to science education policy, curriculum, instruction, professional development and assessments.

State Science Assessment Advisory Committee

- About 45 science educators from around the state
- Advise on science assessment issues and review all items

Fairness and Accessibility Committee

- About 20 educators representing various perspectives
- Advise on fairness and accessibility issues related to science assessments and review all items



2016-17: Key Issues and Activities for Next Generation Science Assessments

- Test Design
- Reporting
- Test and Item Specifications
- Item Development
- Cognitive Labs and Pilot Testing
- Establishing Validity and Reliability



Thoughts and Questions?

