CONNECTICUT STATE DEPARTMENT OF EDUCATION

Next Generation Science Standards in Connecticut

CAS Webinar
November 17, 2015

Presenter: Liz Buttner, Science Education Consultant
Elizabeth.buttner@ct.gov

Connecticut State Board of Education Adopts NEXT GENERATION SCIENCE STANDARDS

November 4, 2015

A Next Step for Connecticut Science Education

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.

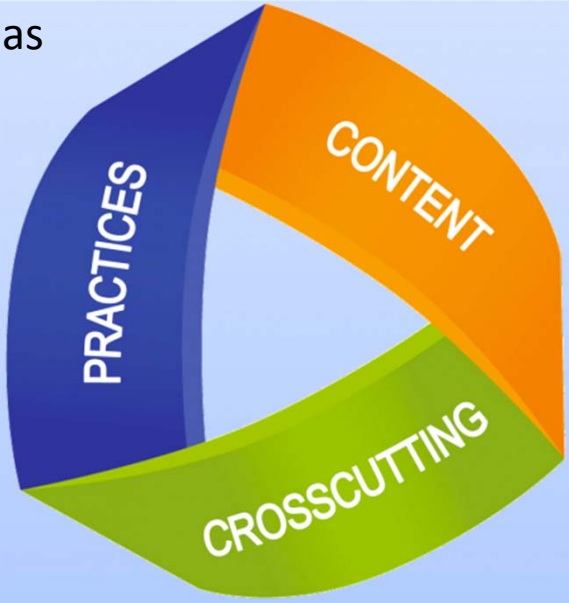
Why Update CT Science Education?

- Next step for CT's 11-year old science standards
- Recent research on how students best learn science
- Captivate diverse students; close gaps
- Consistent with CT Core Standards and College Board AP emphasis on thinking, reasoning and communication skills needed for life, college and workforce
- Bring clarity to "STEM" education

Advances in HOW Science is Learned

Students' Discussing & Critiquing Ideas

Curriculum that Builds Knowledge in Real-World Contexts



Science Applied to Engineering Design

Applying Science to Explain Real-World Phenomena

Students Reasoning with Evidence

Coherent Learning Progression Focused on BIG ideas

Students Integrating 3 Dimensions to Construct (not repeat) Explanations & Design Solutions

What to Look For in a Next Generation Science Classroom

- Asking questions and defining problems
- Developing and using explanatory models
- Planning and carrying out investigations
- Analyzing and interpreting data

- Using mathematics and computational thinking
- Developing explanations and designing solutions
- Using data/evidence to support a conclusion
- Obtaining, evaluating, and communicating information

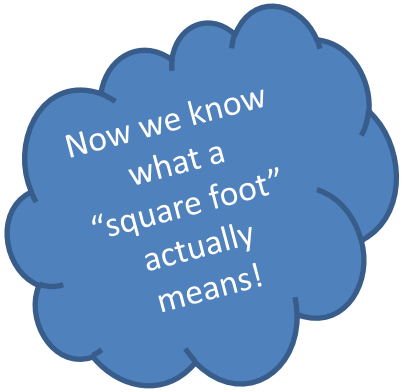
Students Using Science & Engineering Practices to Construct Understanding

3-Dimensional Teaching and Learning:
What Counts as Evidence of Science Understanding?

Current Connecticut Standards	Next Generation Standards
Describe the effects of the strengths of pushes and pulls on the motion of objects.	**Plan and conduct an investigation to provide evidence** of the **effects** of balanced and unbalanced forces on the motion of an object.
Describe the basic structures of an animal cell, including the nucleus, cytoplasm, mitochondria and cell membrane, and how they function to support life.	**Develop and use a model** to describe the function of a cell as a whole and ways parts of cells contribute to the function.
Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.	**Use mathematical representations to support explanations of how** natural selection **may lead to** increases and decreases of specific traits in populations over time.

Integrating Science , Math, ELA and Engineering to Understand Real-World Phenomena

Design a School Butterfly Garden:
Conduct tests for soil nutrients and water retention. Record hours of sunlight and average wind speed. Measure and mark a square foot grid to calculate the perimeter and area of the garden. Research butterfly life cycle and plant needs. Present information. Select plants adapted for site conditions…



Integrating Science , Math, ELA & Engineering to Solve Real-World Challenges

Design, Construct and Model a Working Bridge:
Applying an understanding of forces to the working structure of bridges.
Using Engineering practices to test structural strength and expose design weaknesses.

Learning by doing

CCS-ELA and CCS-M Support Science

Science Supports CCS-ELA and CCS-M

NGSS 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction..

CCS-ELA W4.1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

CCS-M 4.G.A.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

5-LS1 From Molecules to Organisms: Structures and Processes

How to read the standards »
Go back to search results
Related Content »

Views: Disable Popups / Black and white / Practices and Core Ideas / Practices and Crosscutting Concepts / PDF

Students who demonstrate understanding can:

5-LS1-1. **Support an argument that plants get the materials they need for growth chiefly from air and water.** [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model. (5-LS1-1)	**LS1.C: Organization for Matter and Energy Flow in Organisms** • Plants acquire their material for growth chiefly from air and water. (5-LS1-1)	**Energy and Matter** • Matter is transported into, out of, and within systems. (5-LS1-1)

Connections to other DCIs in fifth grade:
5.PS1.A (5-LS1-1)

Articulation of DCIs across grade-levels:
K.LS1.C (5-LS1-1); **2.LS2.A** (5-LS1-1); **MS.LS1.C** (5-LS1-1)

Common Core State Standards Connections:

ELA/Literacy -

RI.5.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. *(5-LS1-1)*
RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)
W.5.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)

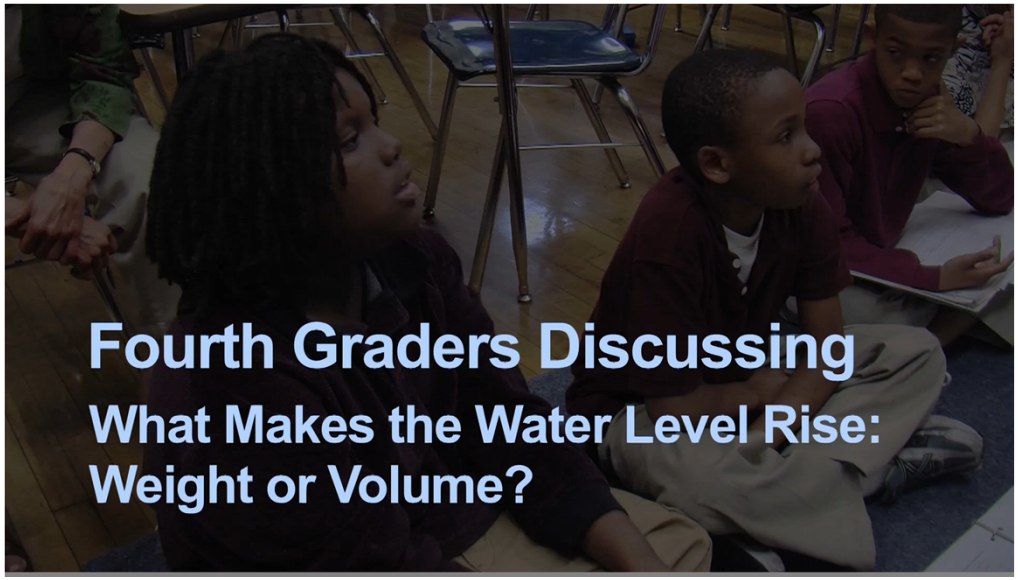
Mathematics -

MP.2	Reason abstractly and quantitatively. *(5-LS1-1)*
MP.4	Model with mathematics. *(5-LS1-1)*
MP.5	Use appropriate tools strategically. *(5-LS1-1)*
5.MD.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. *(5-LS1-1)*

* The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

What to Listen For in a Next Generation Science Classroom

- Students talk to each other; not just answer teacher questions
- Build on and challenge each others' explanations
- Develop language skills, social skills and team mindset

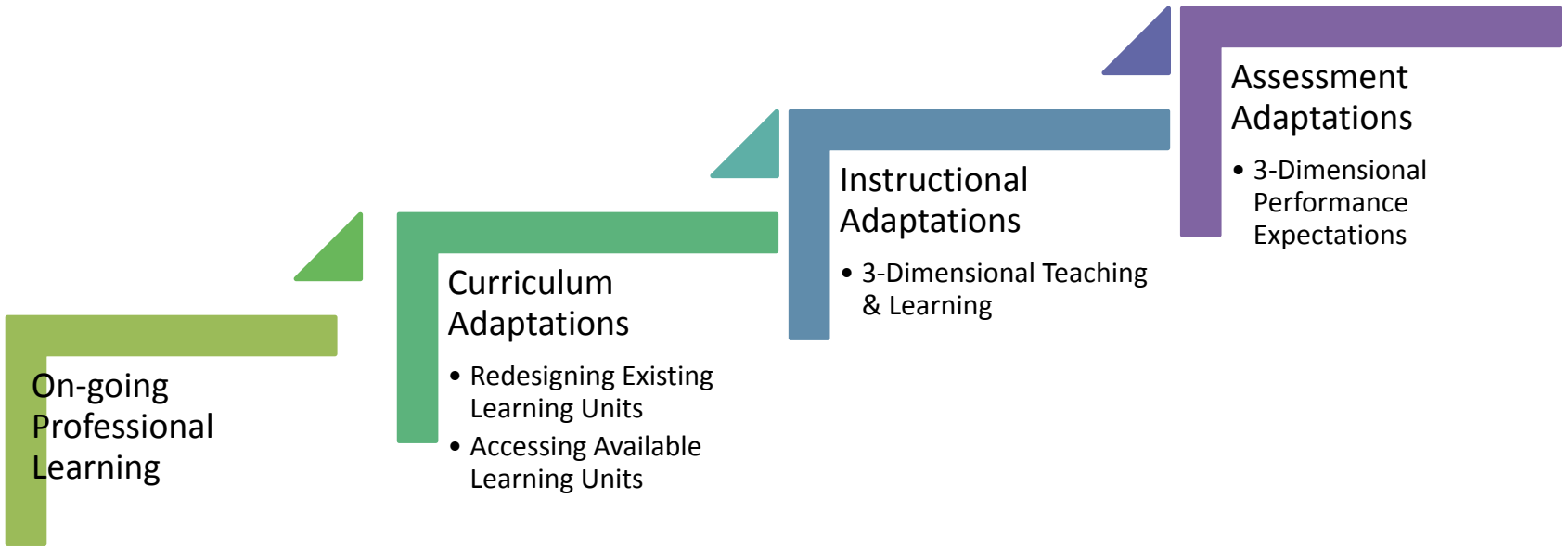


Discussing and Critiquing Ideas and Evidence

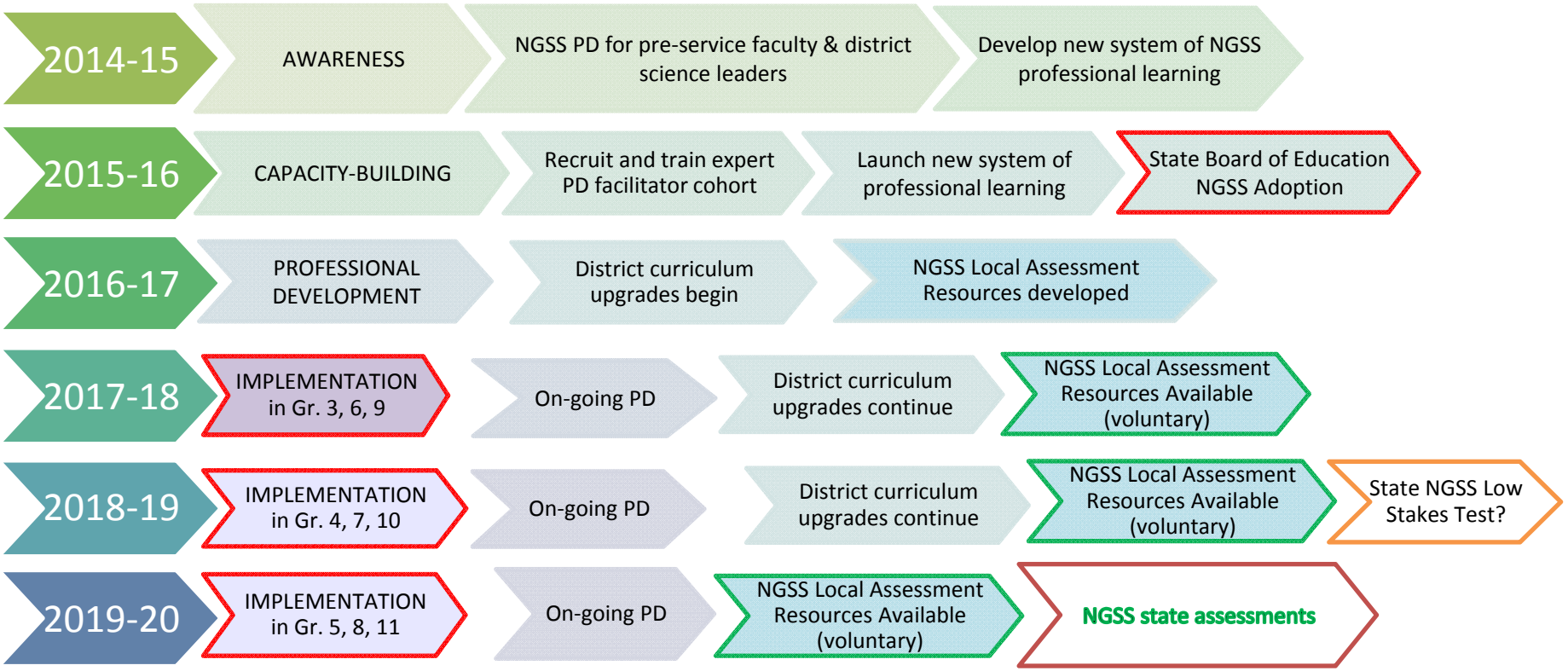
Questions About the NGSS Vision?

Time and Support for Systemic Change

Supporting Systemic Change to Next Generation Science Over Time

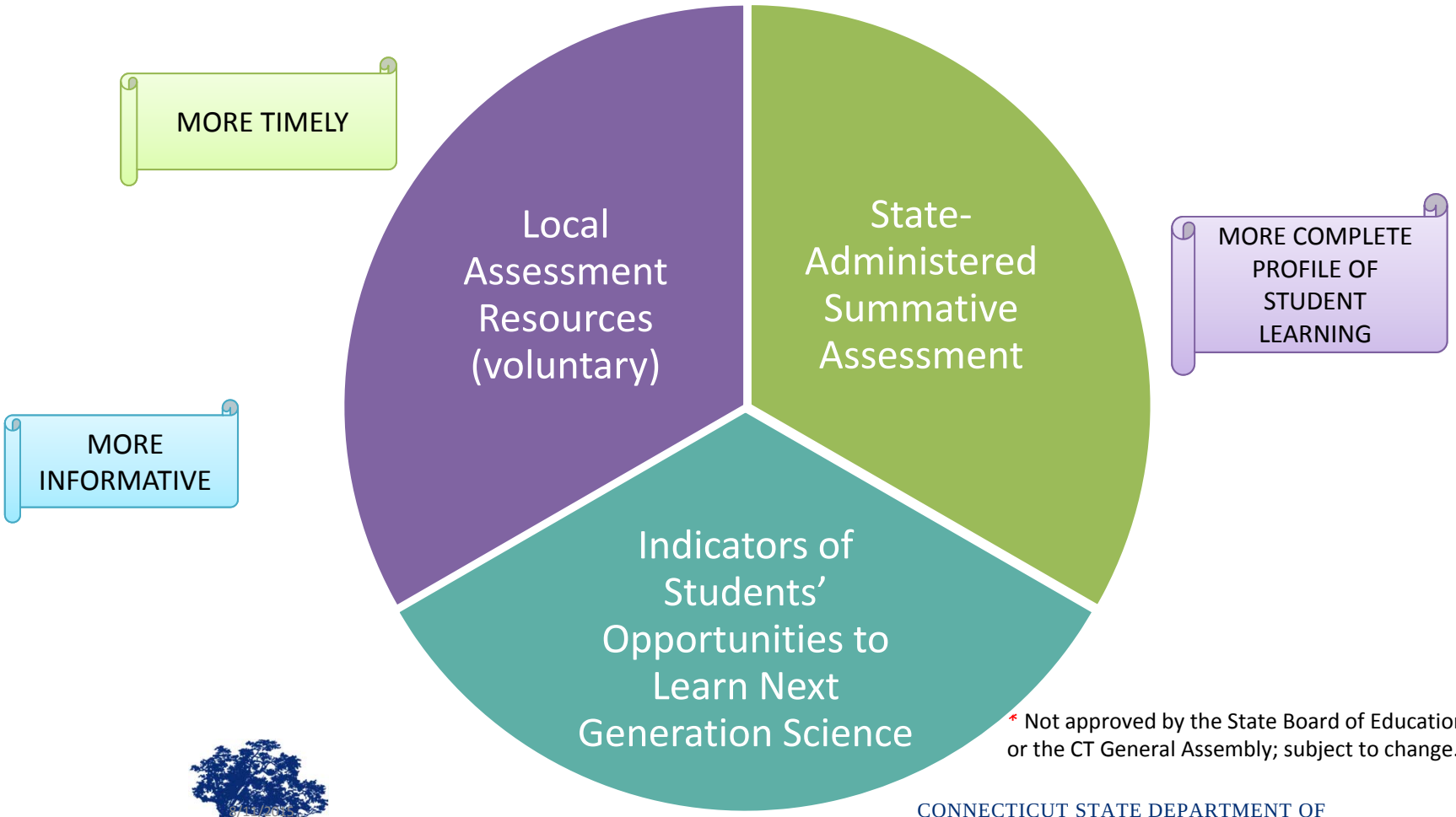


DRAFT* 5-Year Implementation Timeline



* Subject to change pending changes to federal law and state policies

Building a New System of Science Assessments*



* Not approved by the State Board of Education or the CT General Assembly; subject to change.

Contrast Traditional and NGSS Assessment Questions

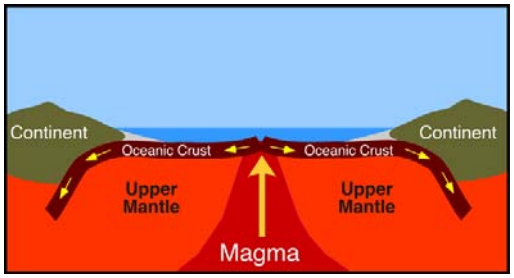
Source: *Developing Assessments for the Next Generation Science Standards (Pellegrino, et al)*
http://tinyurl.com/qxsms89

Traditional

The major movement of the plates and description of plate boundaries of the Earth are...

A. Convergent
B. Divergent
C. Transform
D. All of the Above

NGSS-style



A. Draw on the picture to show what is happening in the mantle that causes the plates to move apart.

B. What is happening in the mantle that helps to explain why the two plates are moving apart?

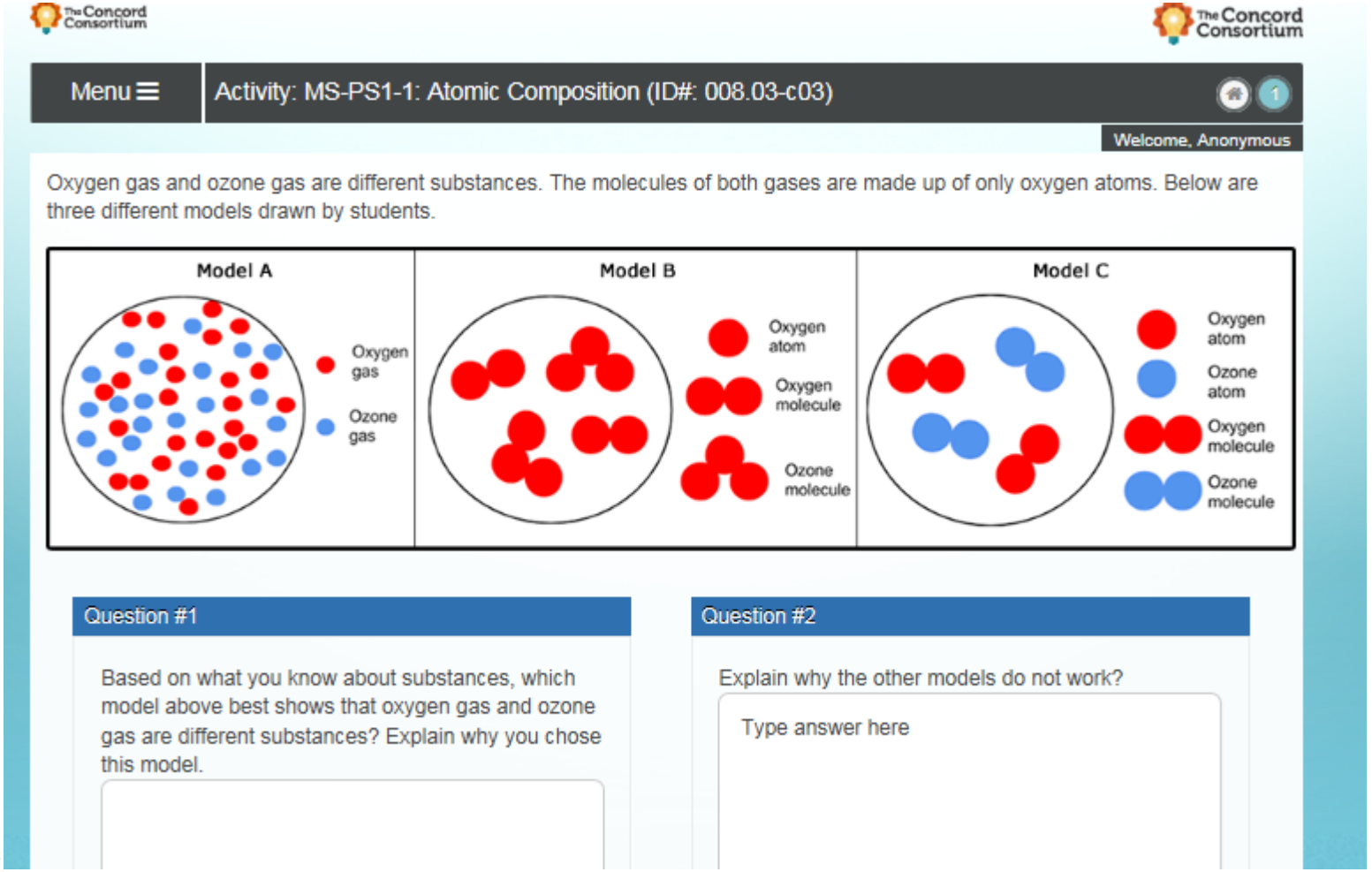
C. Put an X on the places in the picture above where the oldest rock can be found in the crust.

D. Explain your answer.

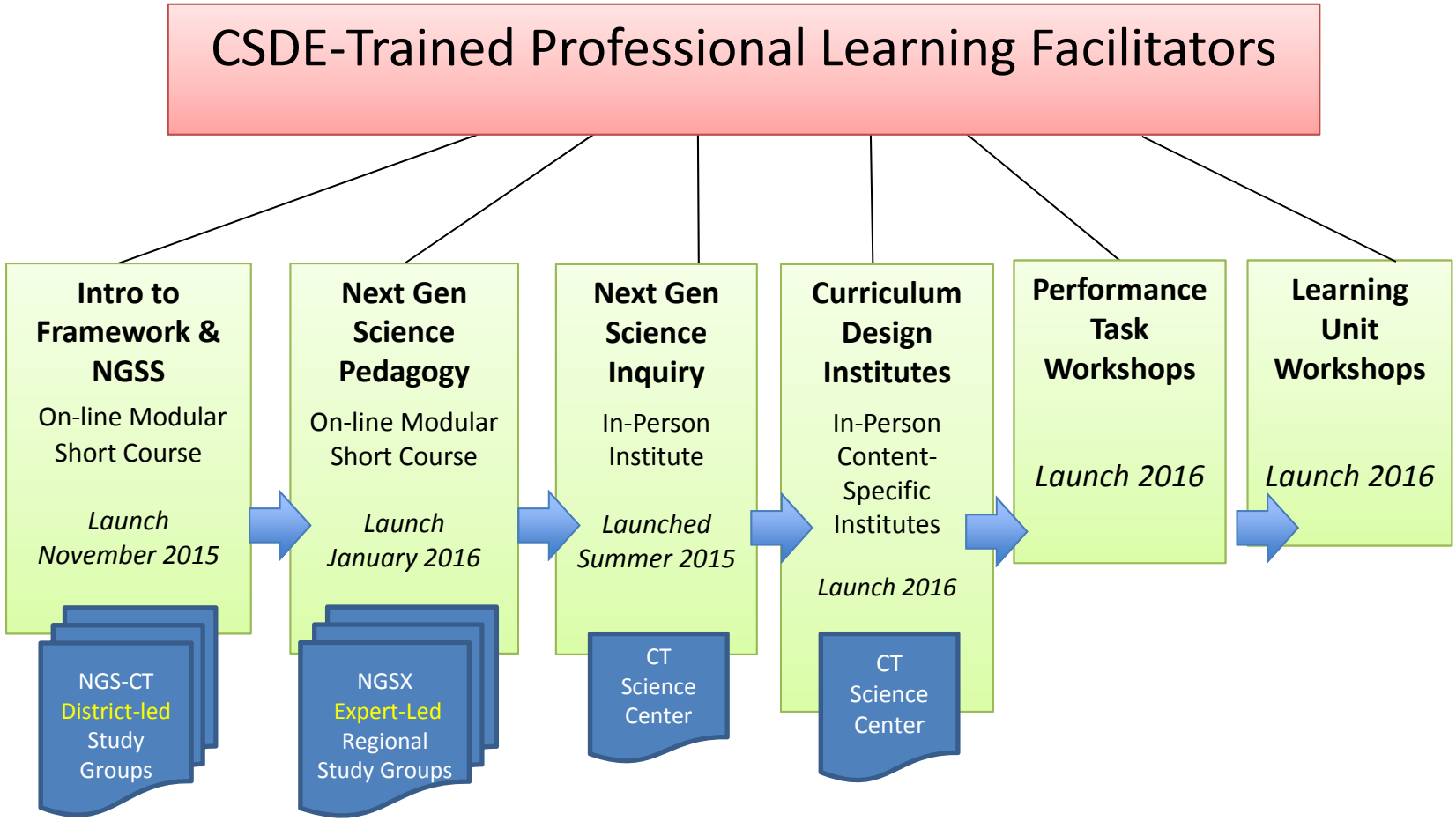
Sample NGSS Assessment Task to Elicit Evidence of Understanding

Source: http://ngss-assessment.portal.concord.org/

Performance Expectation MS-PS1-1: *Develop models to describe the atomic composition of simple molecules and extended structures.*



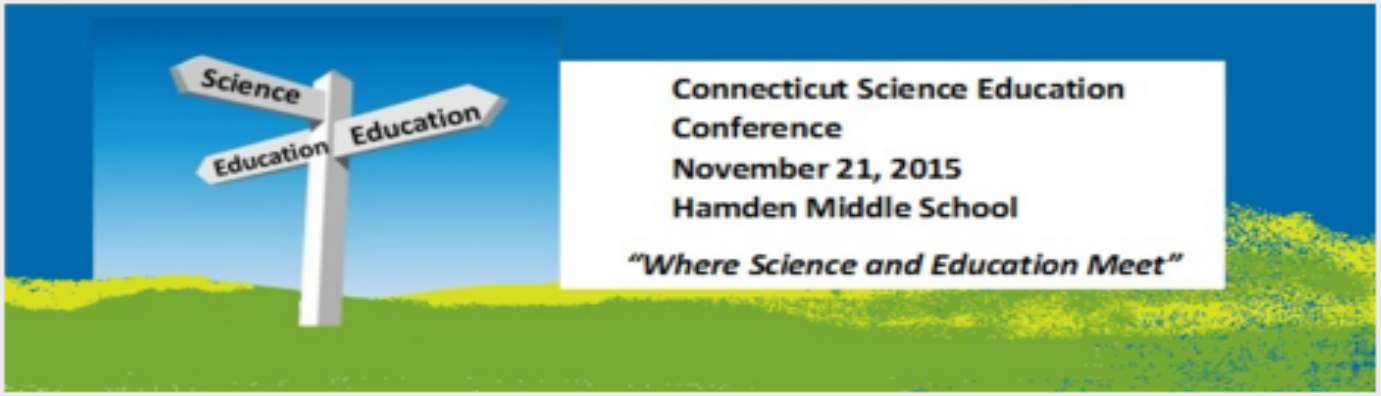
System of Professional Learning



Connecticut Science Educators Professional Development Day

Date: Saturday, November 21, 2015 Time: 8:00 AM - 4:00 PM

Hamden Middle School, Hamden, CT.



The 2015 Connecticut Science Educators' Professional Development Day will be held on Saturday November 21 at Hamden Middle School, Hamden, CT. This annual event attracts hundreds of science educators from across the state and throughout New England for workshops, seminars, speakers and commercial exhibitors.

Come for our Special NGSS track--renowned and national presenters and speakers, all to help you get ready for great science teaching. With a decision on Next Generation Science expected from the CT State Board of Education this fall, science is on everyone's minds!

NGSS Special Strand

Session A	A1 NGSS @ NSTA Hub with Ted Willard
Session A	A2 NGSX: the Next Generation Science Exemplar System
Key Note Speaker	Dr. Mary Gromko, NSTA President-elect 2015-2016
Session B	B1 NGSS @ NSTA Hub with Ted Willard
Session B (Special Long Session)	B2 EQuIP: What does three-dimensional learning look like? Special 1.5 hr. session
Session C (Special Long Session)	C1 EQuIP: What does three-dimensional learning look like? Special 1.5 hr. session
Session D	D1 Next-Gen Science CT: An Online Short Course for NGSS

Next-Gen Science CT Online course

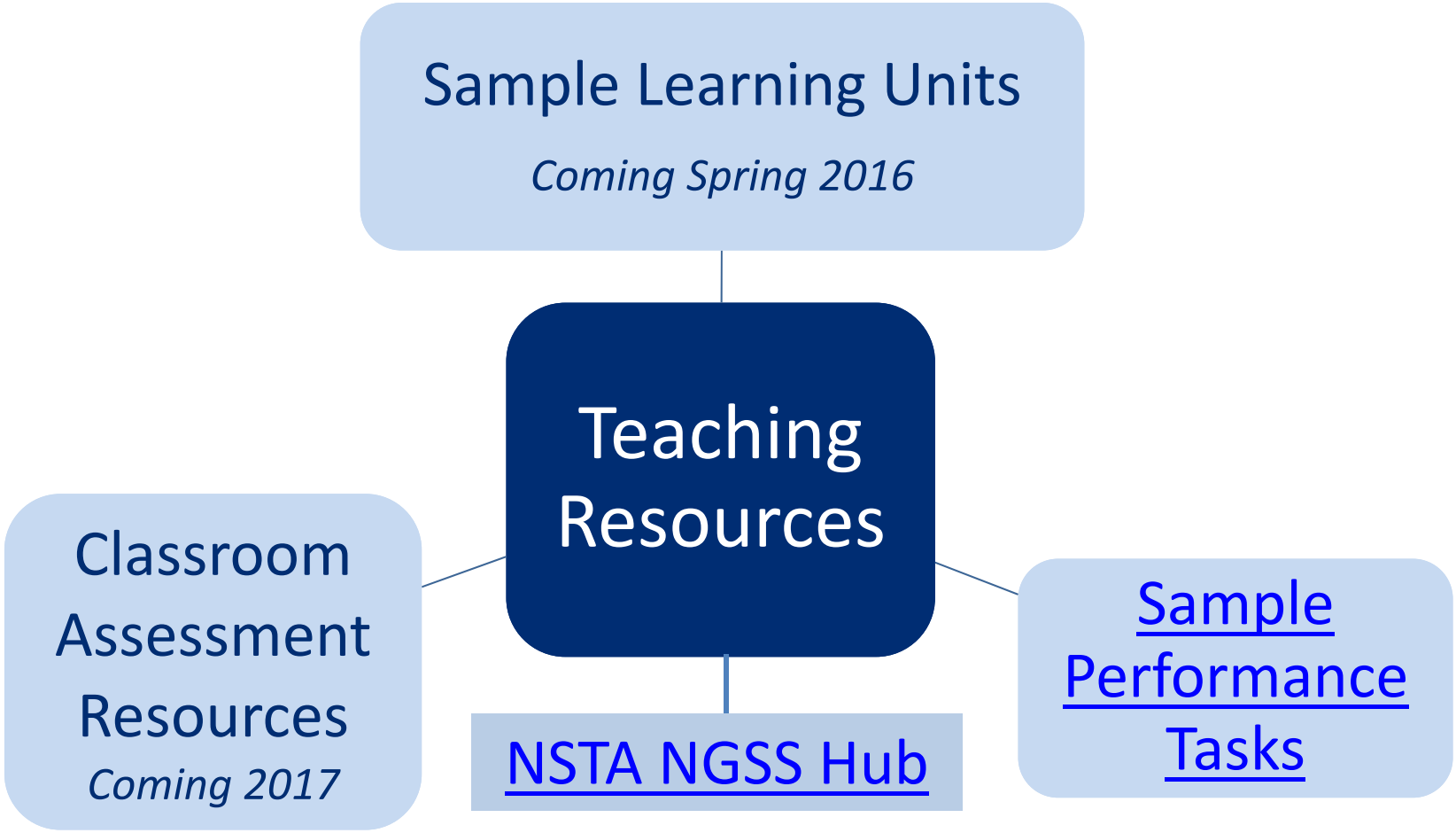
- Broad introduction; no prior NGSS knowledge required
- Designed with and for CT educators
- No-cost
- Designed for PLCs; works best with an effective facilitator of discussion; or
- Join an on-line discussion
- Modules 1-3 available now; 4-15 to be released over the coming months
- Can earn emailed certificate & badge

1	Introduction
2	Overview of Next-Gen Science
3	Next-Gen Practices Overview
4	New/High Priority Practices
5	Disciplinary Core Ideas Overview
6	Crosscutting Concepts Overview
7	Nature of Science Overview
8	Engineering
9	Equity & Diversity Overview
10	NGSS Architecture
11	Assessment Overview
12	Curriculum Overview
13	Putting It All Together
14	Transition Planning
15	Wrap-Up

- Learn about Next Gen Science directly from authors of the standards and with CT's certified learning facilitators
- Focus on modeling, argument with evidence and scientific explanation of real world phenomena
- Registration opens Nov. 19 for winter, spring and summer sessions (15 options) in all parts of the state
- To get a sense of the NGSX learning experience, go to:

  http://www.ngsx.org/index.php/public/home

Supports for Teachers



Questions and Discussion

Getting Involved and Staying Informed

- CSDE Science mailing list – Elizabeth.buttner@ct.gov
- District Advisory Council – contact Liz Buttner
- State Science Assessments – contact Jeff Greig at jeff.Greig@ct.gov
- Science Performance Tasks – contact Ron Michaels at Ronald.Michaels@ct.gov