

Science and Engineering: Standards and Curriculum

**An Update for the
Lincoln School Committee
April 17, 2014**

Massachusetts Plan: New Standards in Science and Engineering

2009: Decision to revise 2001 Standards

2013: Release of National Next Generation Science
Standards (NGSS)

2014: Current State Draft Ready for Comment

2016: Multi-year Implementation, Including MCAS Revision

New Standards: Key Shifts

- From teaching facts to explaining phenomena
- More coherence, with content and inquiry practices building a storyline through the grades
- Moving from standards by grade span (K-2, 3-5, 6-8, 9-12), to specific standards for each grade
- Greater inclusion of engineering in grades 1-8
- Explicit links to math and ELA standards
- Central role for set of 8 science and engineering inquiry practices

Science & Engineering in the Lincoln Public Schools

Direction: Hands-on Science:

Every Domain, Every Year

2008: Gr. K-5 elementary science curriculum revised

Engineering integrated through enrichment program

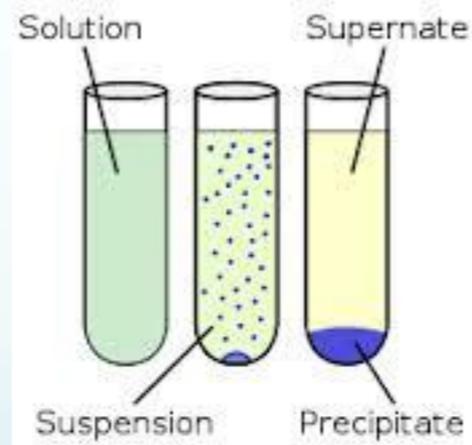
2010-11: Gr. 6-8 secondary science program revised

Engineering incorporated grades 6-8

Next Steps to Prepare for Re-alignment of Standards

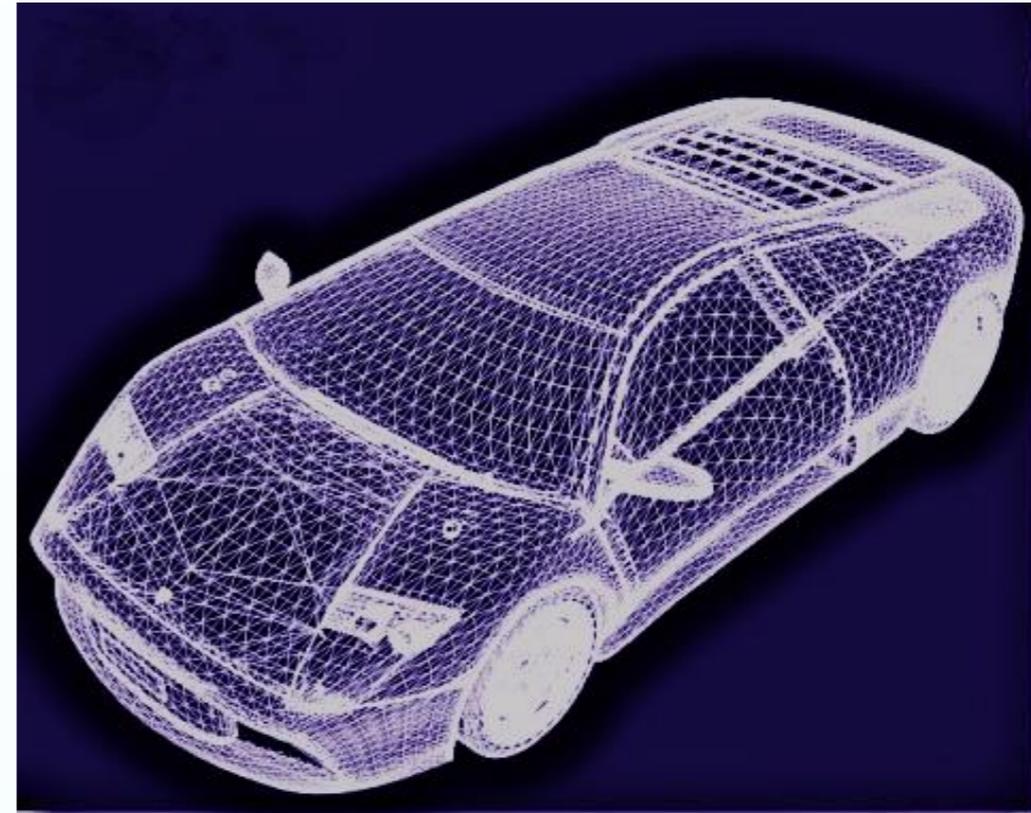
- Examine the intersection between current Lincoln standards and the new draft STE standards
- Develop teacher understanding of the new inquiry practices in science/engineering
- Identify opportunities to link key ELA and math standards to science learning
- Integrate the “Engineering is Elementary” (EiE) kits

Science and Engineering Inquiry Practices in the NGSS

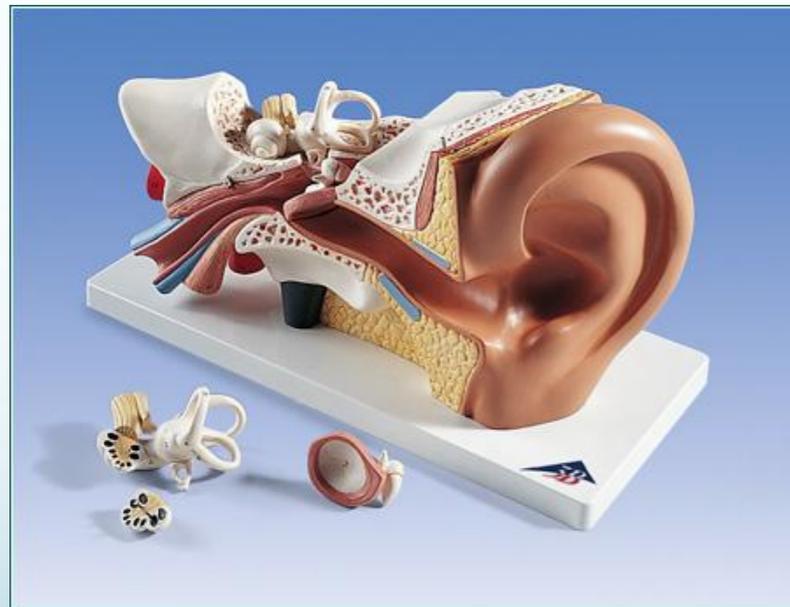


1. Asking questions (for science) and defining problems (for engineering)
- 2. Developing and using models**
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

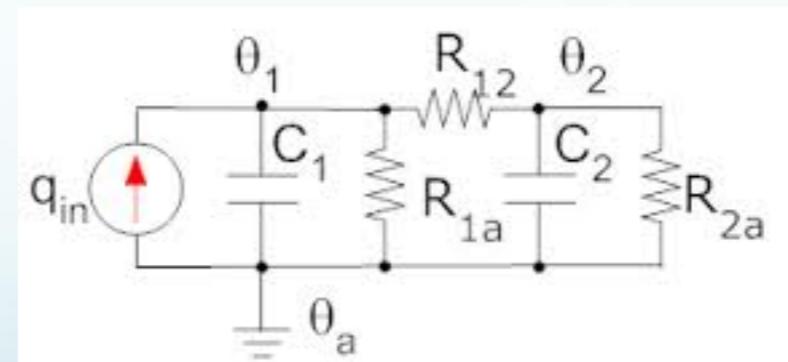
2. Developing and using models



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2. Developing and using models



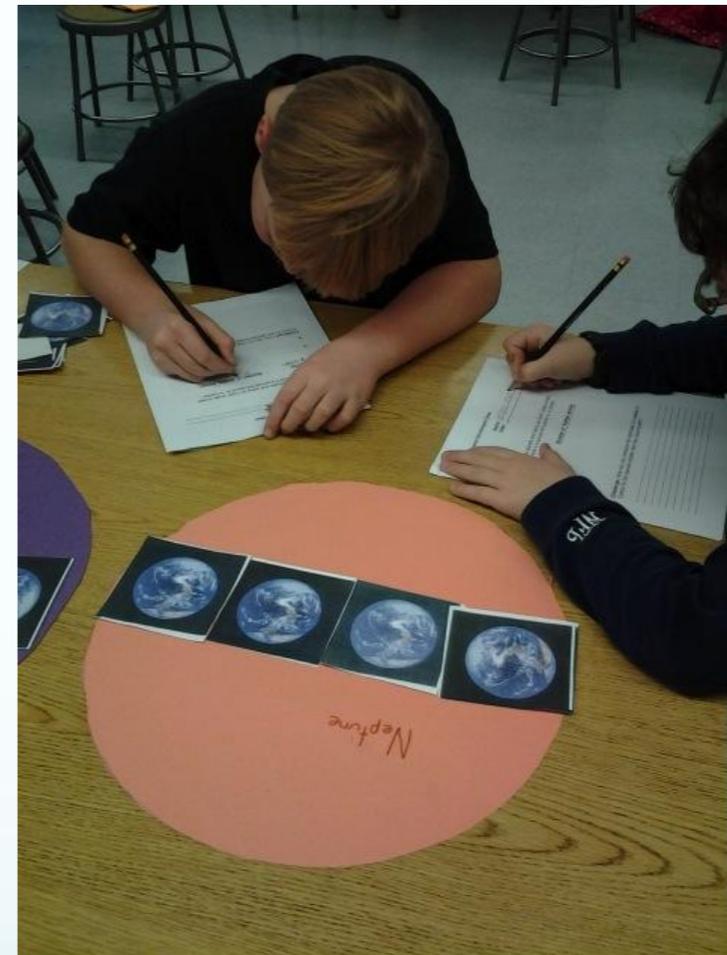
4th graders using Lego blocks to model photosynthesis

2. Developing and using models



Gr.3 Plastic baggie models of the water-cycle

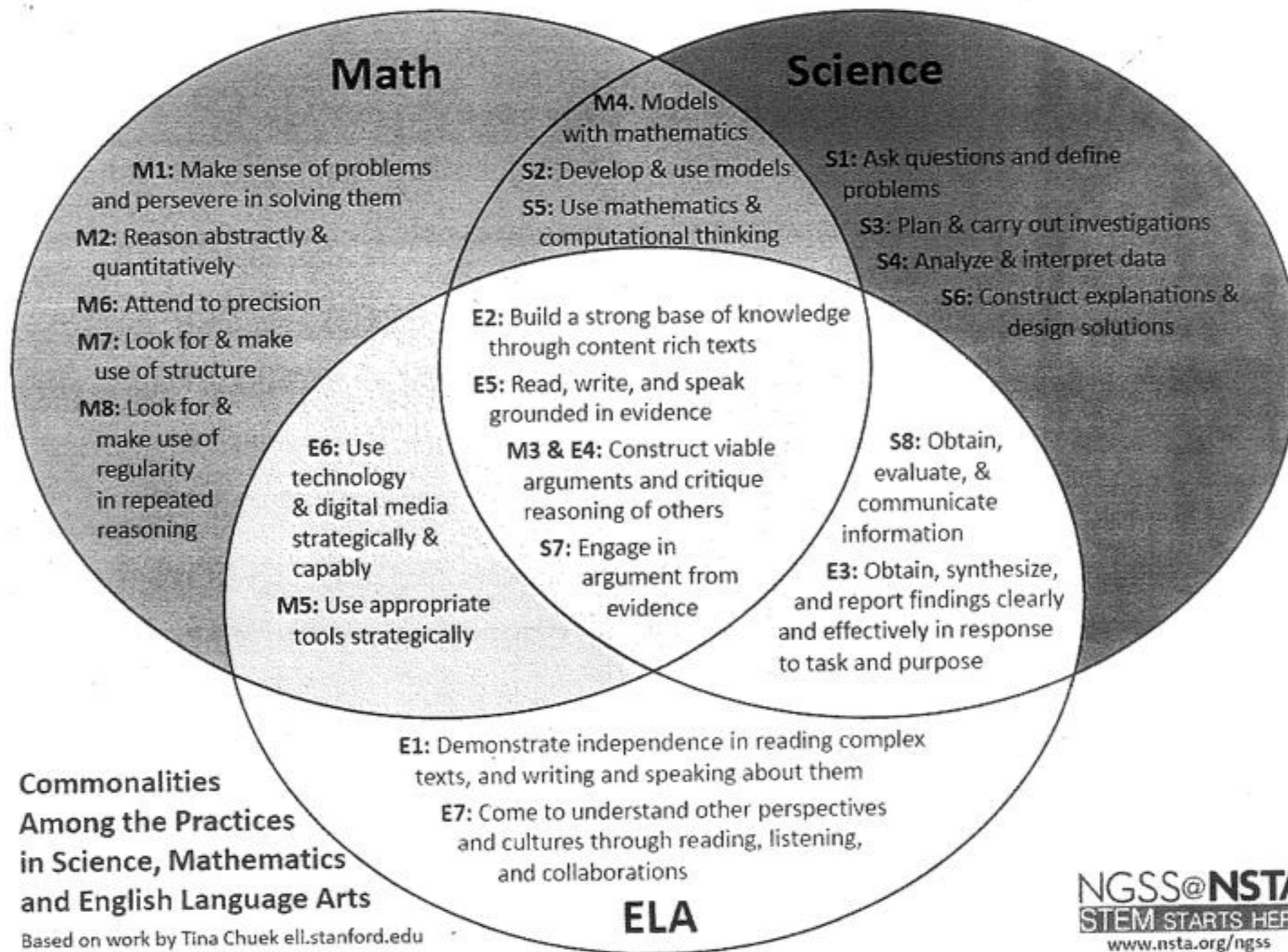
2. Developing and using models



4th graders using `earth units' to model the relative sizes of planets.

Teachers learning about the NGSS Practices: Boston Museum of Science, 'Engineering is Elementary' (EiE) workshop, LPS Dec. 2013





Inquiry Science in Action

Content: Physical Science PS1-A
Matter and Its interactions

Inquiry Practice: Developing and using models

A strand that moves through the grades: a practice that supports thinking

`Marshmallow Fluff` Upper Elementary Version



- **What state of matter is a marshmallow?**
- **What happens to the marshmallow when you put your finger over the end of the syringe and pull back the plunger?**
- **What happens if you pull the plunger almost to the top of the syringe, seal the end of your syringe with your finger and then push the plunger down?**
- **What explanation can you come up with to explain the phenomena you observed?**

Boyle's Law

(The High School Connection)

When temperature is held constant, the *volume* (the amount of space taken up by matter) of a gas is inversely proportional to its *pressure* (the force per unit area).

$$p * V = C$$

The Path Ahead

- Continue our strong, hands-on science and engineering program
- Leverage new state standards to deepen learning through inquiry practices
- Stay active in the evolution of the new state standards; plan thoughtfully for change in our program