New York State P-12 Science Learning Standards

Raise Awareness - Build Capacity
Spring 2017

New York State P-12 Science Learning Standards

In December 2016, the Board of Regents:

- Approved new State science learning standards, with an initial transition beginning with the 2017-2018 school year.

http://www.regents.nysed.gov/common/regents/files/1216p12a1.pdf
http://www.p12.nysed.gov/ciai/mst/sci/documents/p-12-science-learning-standards.pdf

- Proposed the development of a *New York State Comprehensive Science Standards System Implementation Plan* that pinpoints three phases to address a systemic and systematic transition to new science standards.

New York State P-12 Science Learning Standards

New York State Comprehensive Science Standards System Implementation Plan:

Develop a plan that aligns to the mission, vision and six key components of the *Statewide Strategic Plan for Science;*

http://www.p12.nysed.gov/ciai/mst/sci/strplan.html

- Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials & Resource Support, Administration and Community Support

New York State P-12 Science Learning Standards

Proposed Phases of Implementation:

- **Three Phases**
  Phase I - Initial Transition
  Raise Awareness and Build Capacity
  Phase II -Transition and Implementation
  Phase III - Implementation and Sustainability

- Each phase is aligned to specific goals, objectives, and activities included in the six key components areas of the *Statewide Strategic Plan for Science at* three distinct levels; state, regional and local levels.

http://www.p12.nysed.gov/ciai/mst/sci/nyssls.html

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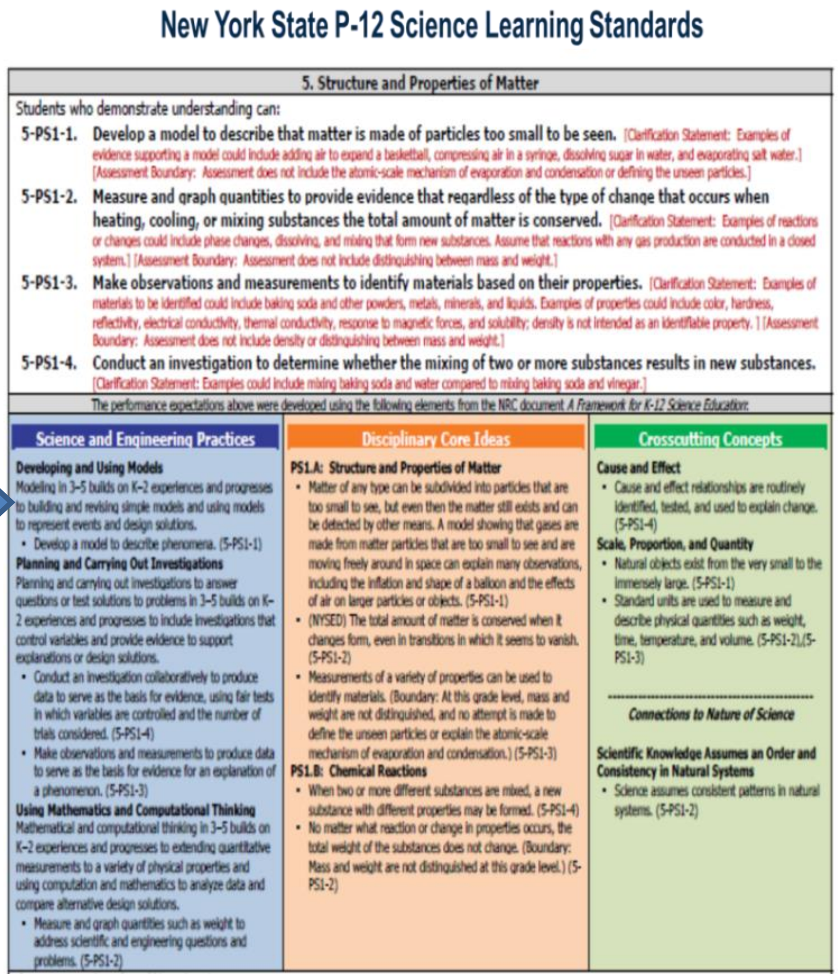
New York State P-12 Science Learning Standards

National Science Education Standards (1996)
&
Benchmarks for Science Literacy (1993)

A Framework for K-12 Science Education (2012)

Next Generation Science Standards (2013)


New York State P-12 Science Learning Standards

5. Structure and Properties of Matter

Students who demonstrate understanding can:

5-PS1-1. **Develop a model to describe that matter is made of particles too small to be seen.** [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

5-PS1-2. **Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances the total amount of matter is conserved.** [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances. Assume that reactions with any gas production are conducted in a closed system.] [Assessment Boundary: Assessment does not include distinguishing between mass and weight.]

5-PS1-3. **Make observations and measurements to identify materials based on their properties.** [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing between mass and weight.]

5-PS1-4. **Conduct an investigation to determine whether the mixing of two or more substances results in new substances.** [Clarification Statement: Examples could include mixing baking soda and water compared to mixing baking soda and vinegar.]

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

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Develop a model to describe phenomena. (5-PS1-1)

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
- Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)
- Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

Using Mathematics and Computational Thinking
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.
- Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)
- (NYSED) The total amount of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
- Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

PS1.B: Chemical Reactions
- When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)
- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

Scale, Proportion, and Quantity
- Natural objects exist from the very small to the immensely large. (5-PS1-1)
- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Science assumes consistent patterns in natural systems. (5-PS1-2)

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Architecture of the Science Standards

- **Title Box** – Indicates grade level for PreK-5, grade band (6-8, 9-12) for middle school and high school and Topic Area.
- **Performance Expectations Box** – Includes each Performance Expectation for that Grade level/Topic Area and Clarification Statement and/or Assessment Boundary, as appropriate.
- **Foundations Boxes** – Include pertinent Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts to further define the Performance Expectations.
- **Connections Boxes** - Include connections to other Disciplinary Core Ideas within the same grade level, articulations of Disciplinary Core Ideas across grade levels, and connections to Common Core State Standards in Mathematics and English Language Arts & Literacy.

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Initial Transition Curriculum & Instruction

- Coherent professional development opportunities are vital.
- Continued collaboration among science education stakeholders will ensure building awareness and capacity of teachers and leaders of science at the local, regional, and state levels.
- Continued focus of science education stakeholders on the critical components of the Statewide Strategic Plan for Science will enhance opportunities for student achievement of the new NYS P-12 Science Learning Standards.

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Assessment System Transition

- New local and State-level assessments will need to be developed to measure the learning expectations included in the new standards.
- New local and State-level assessments should focus on evaluating student achievement of three-dimensional learning – Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas.
- Proposed State Assessments:
  - Grade 5
  - Grade 8
  - High School Regents - four science examinations currently offered

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Timeframe	Phase I - Initial Transition
Spring and Summer 2017	Engage relevant stakeholder groups to outline a more detailed transition strategy for the new NYS P-12 Science Learning Standards in alignment with the Statewide Strategic Plan for Science. Develop a NYS Comprehensive Science Standards Systems Implementation Plan
2017-2018 School Year	Phase I: Raise Awareness, Build Capacity of new NYS P-12 Science Learning Standards; Collaborate with relevant stakeholder groups to build awareness of the new NYS P-12 Science Learning Standards across the State. Develop and propose assessment frameworks for State assessments in science

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MOVING FORWARD

- Continue to collaborate with science education stakeholders during the transition to new NYS P-12 Science Learning Standards to develop the NYS Comprehensive Science Standards Systems Implementation Plan;

- Continue to identify STEM assets and Initiatives across the State to build a Statewide Science Education Ecosystem Network;

- Target specific State and federal funding sources to signal fiscal resources to support statewide, regional and local initiatives, as well as seek possible grant opportunities to support the implementation of the Statewide Strategic Plan for Science;

- Strive to maintain fidelity with the Statewide Strategic Plan for Science throughout the transition period.