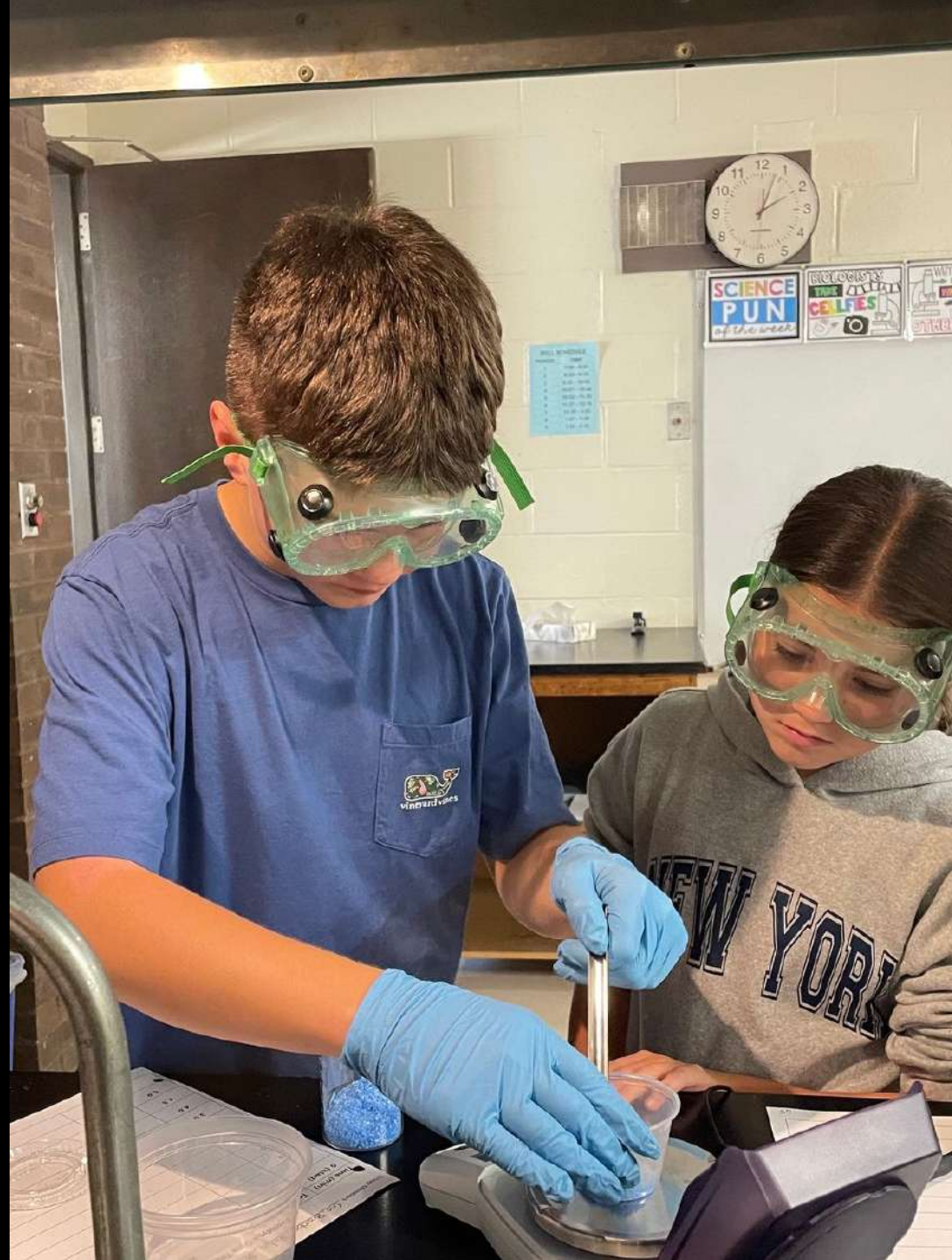
Igniting Curiosity Through Phenomena-Based Instruction

Board of Education Meeting - January 14, 2025

Science Department Update

Dr. Stephanie O'Brien - Science Director, K-12



Phenomena-Based Instruction

A phenomena is an observable event or problem that sparks student curiosity and drives the learning process.

Learner-Centered Approach

Phenomena-based instruction focuses on real-world phenomena and situations, engaging students in active learning and problem-solving.

Inquiry-Based Exploration

Students are encouraged to ask questions, investigate, and discover answers, developing critical thinking and research skills.

Interdisciplinary Learning

By exploring natural phenomena, students can connect concepts to other subject areas.

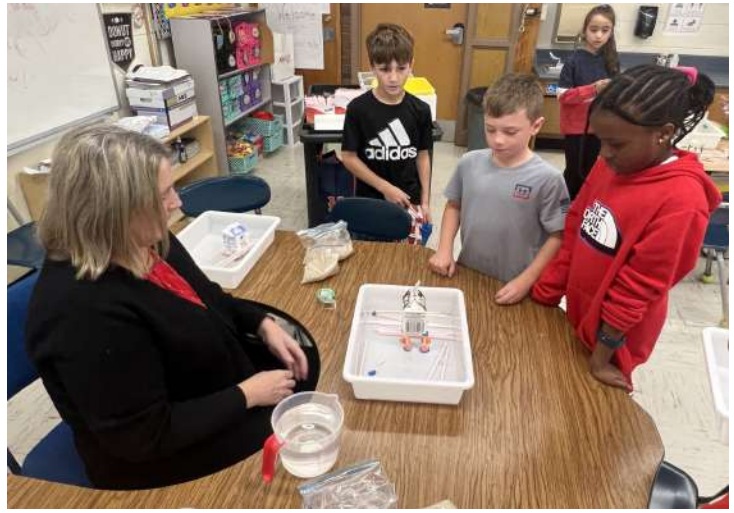
Collaborative Learning

Phenomena-based instruction often involves group work, allowing students to exchange ideas, share perspectives, and learn from one another.

Phenomena-based instruction empowers students to be active participants in their learning, connecting academic content to real-world experiences and fostering a deeper, more meaningful understanding of the world around them.

Bringing Phenomena to Life in Our Classrooms

Elementary School Curriculum	Middle School Program	High School Implementation
Developed a phenomena-based science curriculum for grades K-5, incorporating hands-on investigations and real-world applications through the PLTW curriculum.	Rolled out phenomena-based instruction in 6th-8th grade science classes, focusing on engaging students in the storyline. These coherent set of lessons are driven by student questions that arise from interacting with phenomena.	Transitioning to a phenomena-based approach across all high school science courses. We are currently piloting new curriculum in preparation for the new Regents courses.



Keep the Phenomena Local and Relevant

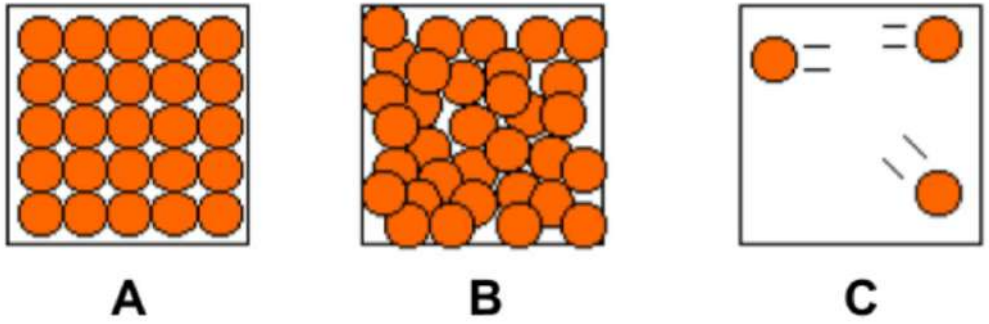
We begin our lessons/units with a captivating, real-world phenomenon that sparks curiosity and engages students. This could be a hands-on demonstration, a video, or an intriguing problem to solve that students discover by reading a book.

Designing Solutions to Address Phenomena

Recycled Christmas Trees	Sand Placement	Bulkheads

Students researched and proposed their own solutions, fostering a sense of ownership and engagement.

Exploring Phenomena in Elementary Science



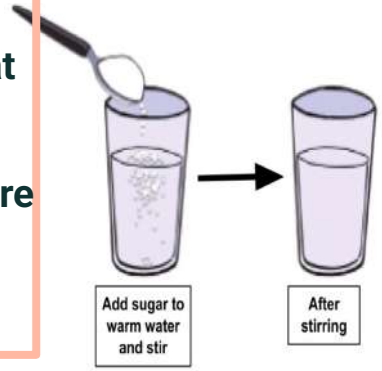
Traditional Instruction: Identify the solid, liquid and gas phases of matter.

Phenomena Based Instruction: Have you ever wondered why onions make your eyes tear up?

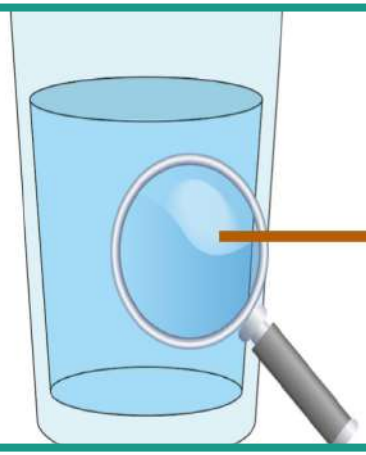
Students come up with their own questions about the onion phenomenon which promotes inquiry and ownership of learning.

Assessment Shifts to Focus on a Phenomena

Students investigated what happens when sugar and water are mixed.

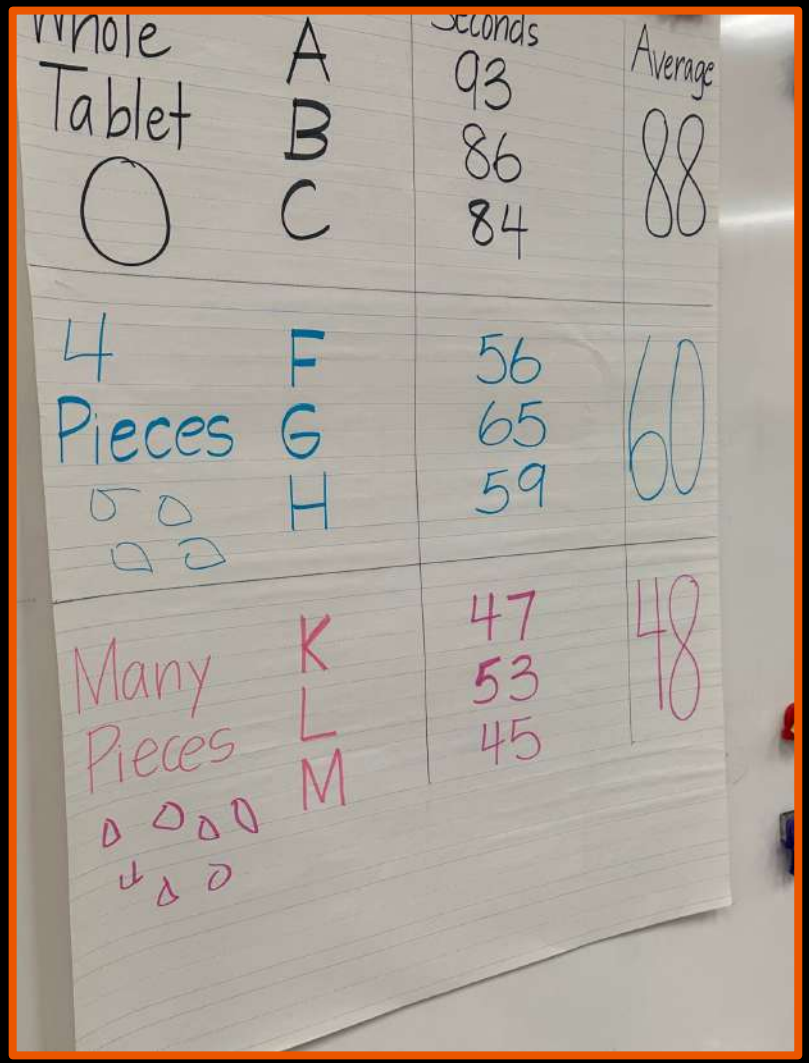


Assessment Phenomena: Why is Hot Water Causing This Candy Rainbow?



Students draw models to show what they are thinking.

Explaining Phenomena for Investigations



Timeline of Assessment Changes

Spring 2024

First administration of new Elementary Grade 5 and Intermediate Grade 8 science tests.

June 2026

Students taking Regents courses in Life Sciences: Biology and Earth and Space Sciences will take the new exams.

These new exams will assess students' understanding of novel phenomena.

June 2025

First administration of the new Regents Exam: Life Science Biology Regents Exam for our current 8th graders in accelerated Biology.

June 2027

Students taking taking Regents courses in Physical Science Chemistry and Physics will take the new Regents Exams.

Looking Forward: Changing Regents Expectations

New Assessment Style

New exams will no longer include rote memorization. All questions will relate to novel phenomena.

Question Format

Test stimuli provide students with an interesting and relatable setting that drives a storyline, which may include reading passages, data tables, graphs, diagrams, and photos.

Clusters

The new exams will be composed of 9-11 question clusters which the total number of questions spanning 45 to 55.

Required Investigations

Roughly 15% of the written test questions will assess content evaluated by the Investigations.

Pedagogical Shifts Required for New Courses

Shift from Content-Driven to Phenomenon-Driven Instruction

Start with real-world phenomena, not just content coverage.

Emphasis on Inquiry-Based Learning

Encourage active investigation, questioning, and hands-on exploration.

Integration of Interdisciplinary Connections

Integrate multiple subjects to explore phenomena from diverse perspectives.

Collaborative and Student-Centered Approach

Pedagogy should facilitate collaborative learning, where students work together to make sense of phenomena.

Flexible and Adaptive Curriculum Design

Design adaptable curriculum to meet diverse needs an based on the emergent nature of phenomena-based learning.

Emphasis on Formative Assessment

Use ongoing assessment to monitor understanding, provide feedback, and guide instruction.

Ongoing Professional Development

Conference Days

Each content area receive training and collaborate on transitioning to a more phenomena, student-driven classroom.

Collegial Circles

- Teachers from each high school content area meet with representatives from other schools on the island to share best practices.
- Within the district, teachers have created collegial circles to create a support system through curricular changes.

Collaborative Planning Time

To prepare for the new exams, teachers are using collaborative planning time to evaluate and integrate storyline curricular options.

Department Meeting Collaboration

Teachers work in content groups to align their curriculum to the standards and design assessments that allow students to demonstrate the transfer of knowledge.

Online Resource Repository

Every course has a district shared Google drive of resources for new curricular materials aligned with the NYSSLS standards.

Conferences

Teachers attend local, state, and national conferences to prepare for the transition in teaching and learning.

Phenomena Based Teaching Prepare Students for the Future

Students are empowered to…

- Think critically and solve problems.
- Collaborate effectively and communicate clearly.
- Adapt to change and become lifelong learners.
- Connect learning to life and apply knowledge.
- Drive innovation and create solutions.

This approach builds a foundation for success in their careers and as engaged citizens.