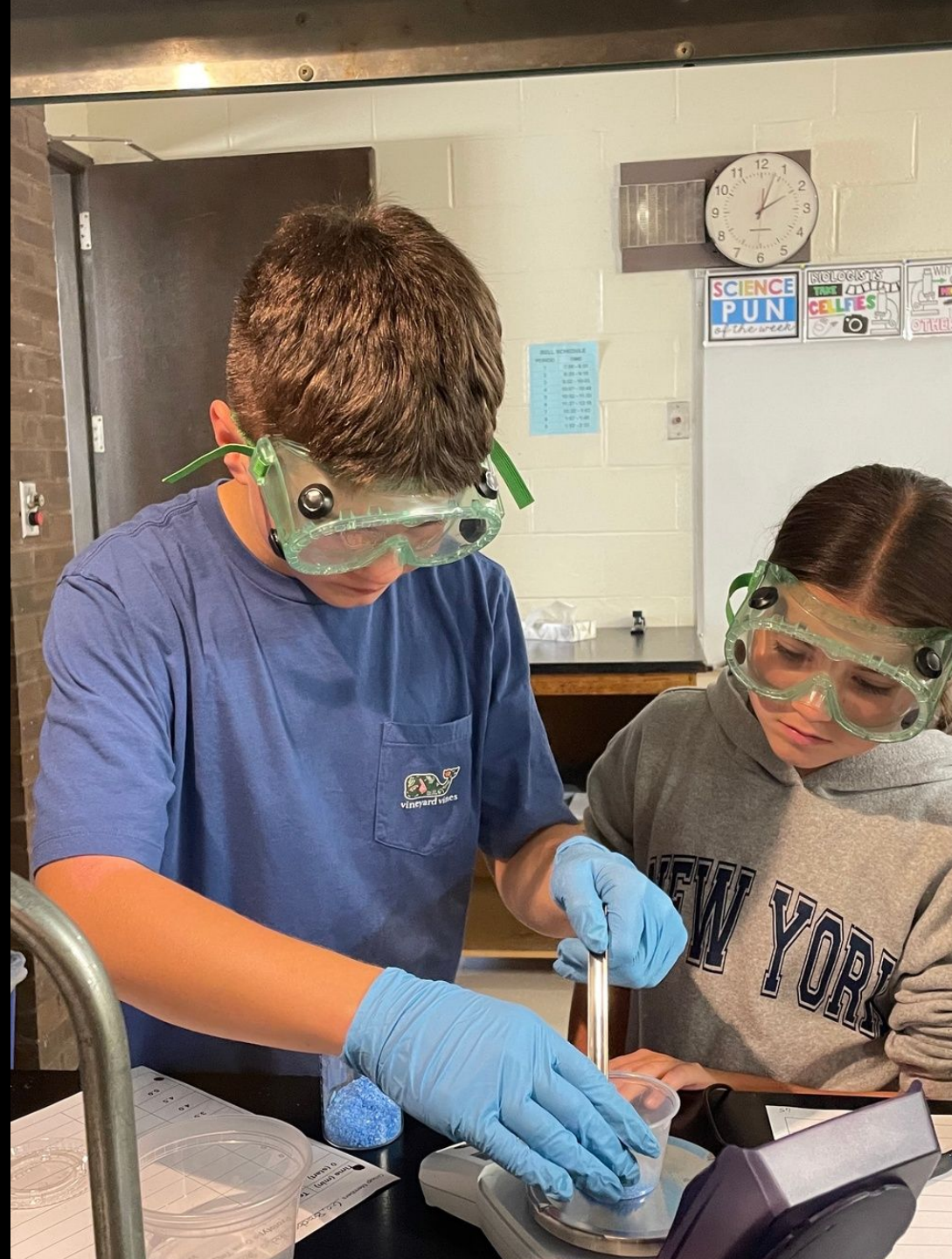


# Igniting Curiosity Through Phenomena-Based Instruction

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

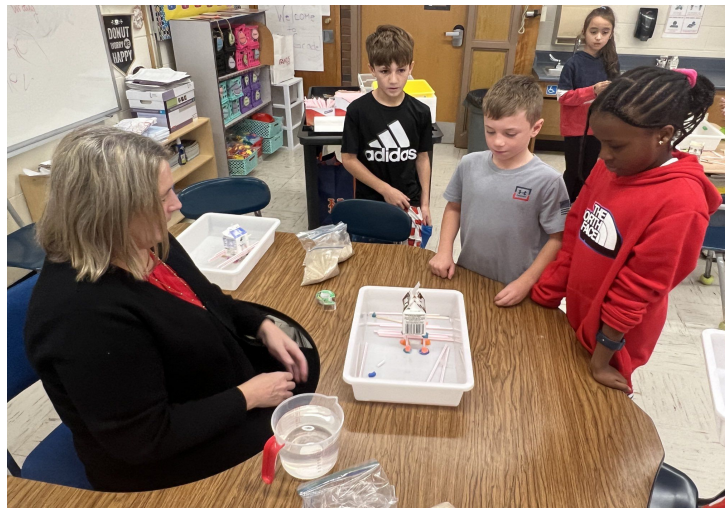
Phenomena-based instruction often involves group work, allowing students to exchange ideas, share perspectives, and learn from one another.

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
<p>Developed a phenomena-based science curriculum for grades K-5, incorporating hands-on investigations and real-world applications through the PLTW curriculum.</p>	<p>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.</p>	<p>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.</p>



# 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**

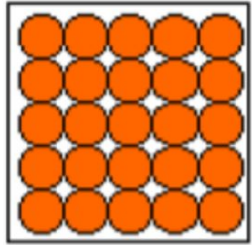


**Bulkheads**

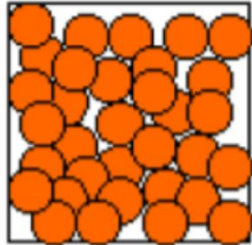


Students researched and proposed their own solutions, fostering a sense of ownership and engagement.

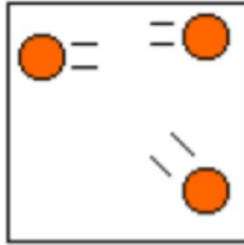
# Exploring Phenomena in Elementary Science



A



B



C



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

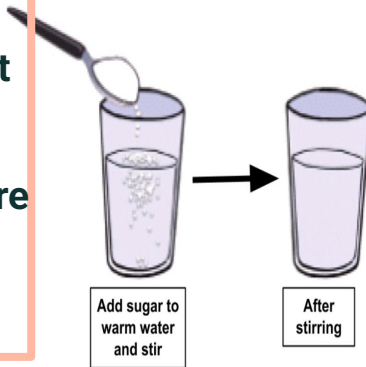
**Phenomena Based Instruction:** Have you ever wondered why onions make your eyes tear up?

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

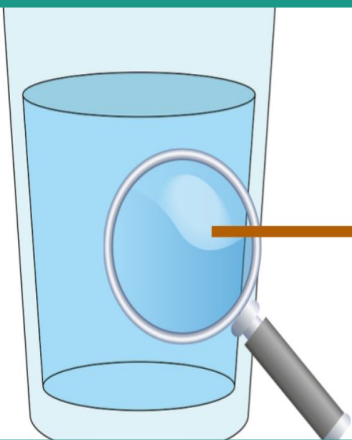


# Assessment Shifts to Focus on a Phenomena

Students investigated what happens when sugar and water are mixed.

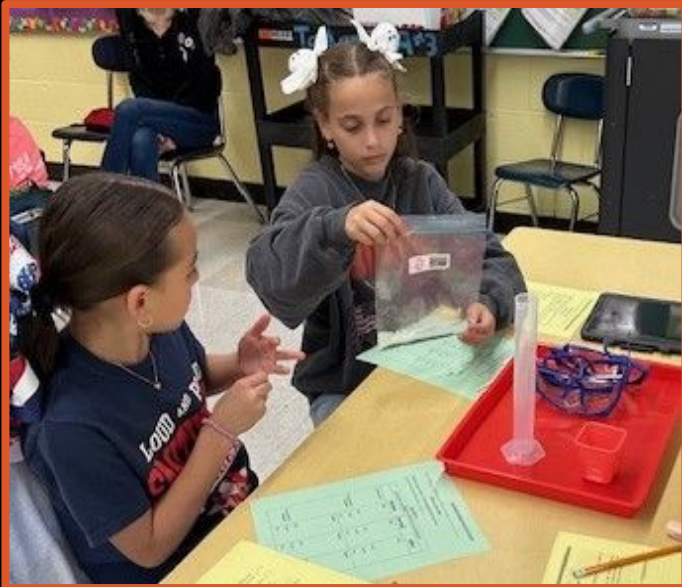


Students draw models to show what they are thinking.



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

# Explaining Phenomena for Investigations



Whole Tablet	A	seconds	Average
	B	93	
	C	86	88
		84	
4 Pieces	F	56	
	G	65	60
	H	59	
Many Pieces	K	47	
	L	53	48
	M	45	



# 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 and 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.**