

# K - 12 Science Instructional Program

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Presented by:

**Marlix Hernandez**

*Grade 3 Dual Language & STEM Teacher*

**Richard MacLeish**

*Grade 8 Science & AHHS Sci Department Chair*

**Keturah Proctor**

*Director of Curriculum & Instruction*





# EUFSO Instructional Commitments:

- **Consistency** in instructional expectations
- **Accountability** and **transparency** in pedagogical practices
- Horizontal and vertical **curriculum alignment**
- **Hands-on, phenomenon-based** instructional experiences
- **Civic engagement** opportunities
- **Culturally rich** and **authentic** learning experiences
- **Dynamic classroom spaces** that are reflective of students' **culture** and **identity**
- **Student Achievement Data** to inform instructional decisions (intervention and enrichment)



Our Science Instructional Goals are to:

- Create a sense of **wonder** in students.
- Cultivate **scientific literacy** in students.
- Provide students with the tools to **understand the world** around them.

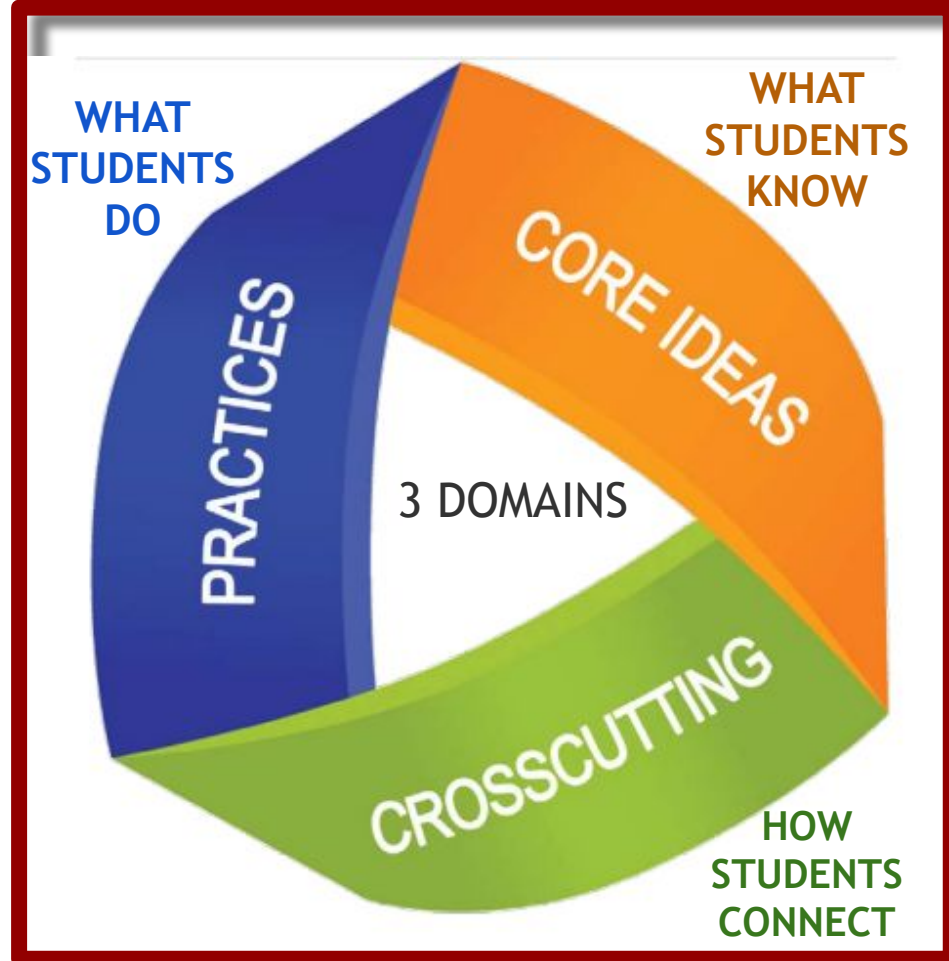
*“The...curriculum challenges the students to make their own discoveries through investigations, modeling, and collaboration. It has transformed my science teaching, and the students are learning in an inquiry-based method that works!”*

Eugene Donepp, 6th Grade Science





# NYS Standards Alignment (NYSSLS)



## **NYS P-12 Science LEARNING STANDARDS**

### New York State P-12 Science Learning Standards Quick Guide

#### **What are the New York State P-12 Science Learning Standards (NYSP12SLS)?**

Adapted from the Next Generation Science Standards in 2016, the NYSP12SLS are a series of performance expectations that define what students should understand and be able to do because of their study of science. The NYSP12SLS are based on the Framework for K–12 Science Education developed by the National Research Council and the Next Generation Science Standards as well as guiding documents grounded in the most current research in science and scientific learning. These standards reflect the importance of every student's engagement with natural scientific phenomenon at the nexus of three dimensions of learning: Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

#### **What are the three dimensions of the New York State P-12 Science Learning Standards?**

Below is a quick introduction to the **Science and Engineering Practices**, **Disciplinary Core Ideas**, and **Crosscutting Concepts**.

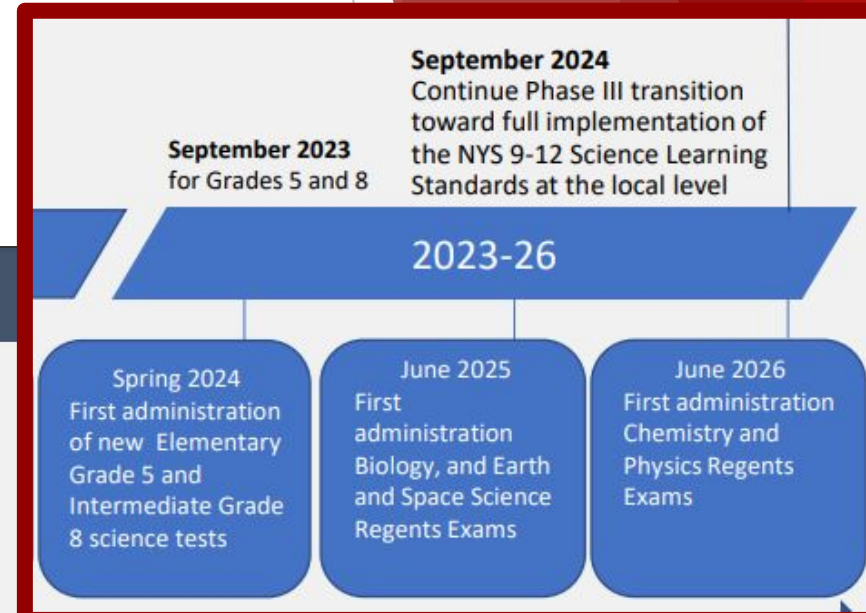
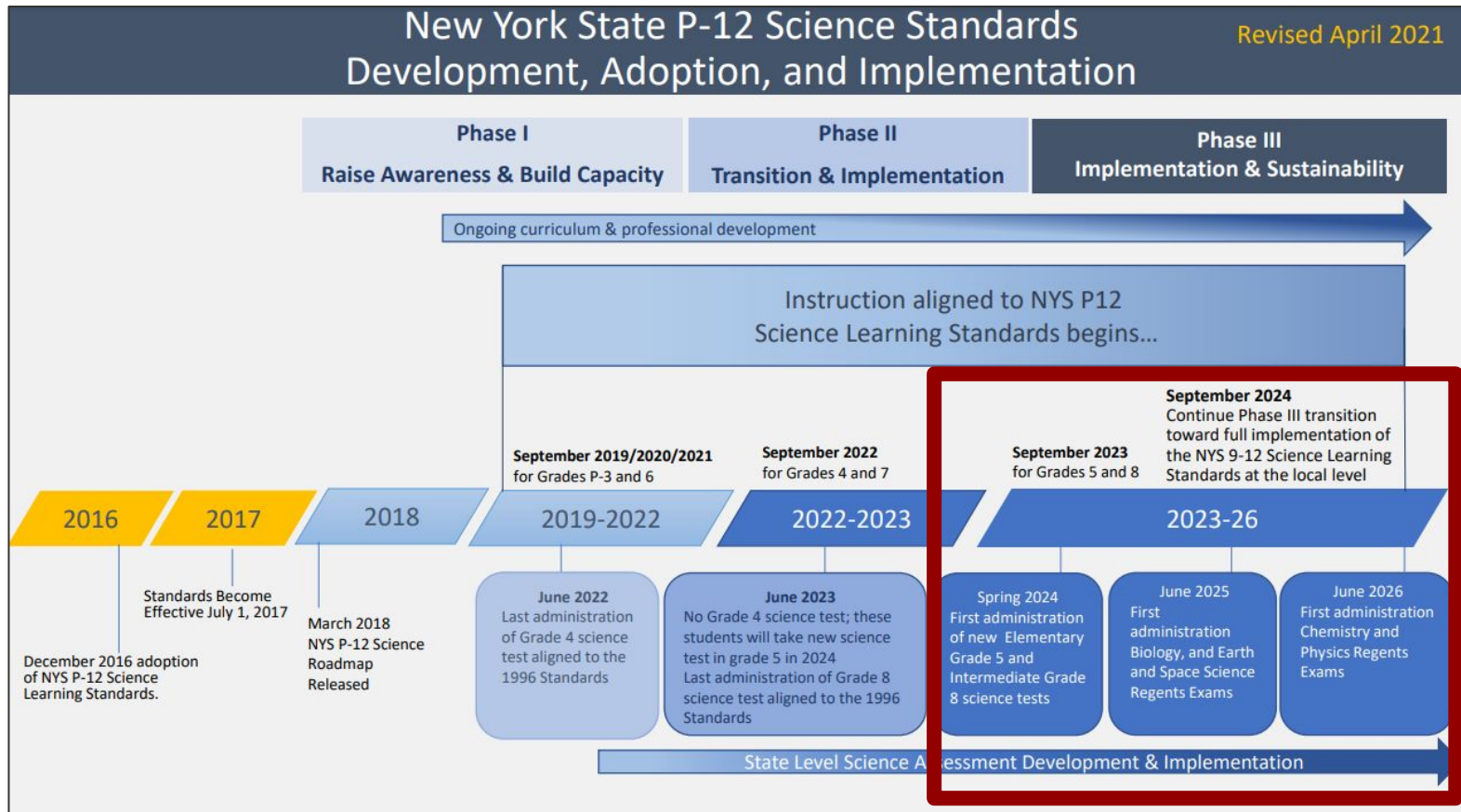
For more information, please visit the Introduction to the [New York State P-12 Science Learning Standards](http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/nysscienceintro.pdf) at <http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/nysscienceintro.pdf>.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>⇒ Science and Engineering Practices describes (a) the major practices that scientists employ as they investigate and build models and theories about the world and (b) a key set of engineering practices that engineers use as they design and build systems.</p> <p>⇒ Listed below are the eight Science and Engineering practices from the Framework:</p> <ol style="list-style-type: none"><li>1. Asking questions and defining problems</li><li>2. Developing and using models</li><li>3. Planning and carrying out investigations</li><li>4. Analyzing and interpreting data</li><li>5. Using mathematics and computational thinking</li><li>6. Constructing explanations and designing solutions</li><li>7. Engaging in argument from evidence</li><li>8. Obtaining, evaluating, and communicating information</li></ol>	<p>⇒ Disciplinary Core Ideas are built on the notion of learning as a developmental progression. They are designed to help children continually build on and revise their knowledge and abilities, starting from their curiosity about what they see around them and their initial conceptions about how the world works.</p> <p>⇒ The goal is to guide their knowledge toward a more scientifically based and coherent view of the natural sciences and engineering, as well as of the ways in which they are pursued and their results can be used.</p>	<p>⇒ Crosscutting Concepts are meant to give students an organizational structure to understand the world and help students make sense of and connect Core Ideas across disciplines and grade bands.</p> <p>⇒ Listed below are the seven Crosscutting Concepts from the Framework:</p> <ol style="list-style-type: none"><li>1. Patterns</li><li>2. Cause and Effect</li><li>3. Scale, Proportion, and Quantity</li><li>4. Systems and System Models</li><li>5. Energy and Matter in Systems</li><li>6. Structure and Function</li><li>7. Stability and Change of Systems</li></ol>

Phenomenon Based  
Emphasis on the 'Doing Science'  
Sense-making

# NYS Standards Alignment (NYSSLS)

- Instructional Programming
- Scheduling
- Resource Allocation (Science Curriculum & Supplies)
- Professional Development
- NYS ELS & ILS Investigations & Assessments (Gr 5 & Gr 8)





# NYS Standards Alignment (NYSSLS)

Fall 2022

## Review & Analysis of K -12 Science Instruction

- Elementary and Middle School Science Assessments
- Staffing/Current Assignments/Certification Areas
- Instructional Programming (Resources, Alignment, etc)
- Resource Allocation (Science)

Sp 2023

## Professional Learning & Scheduling

- Science ELS/ILS Investigations - Implementation/Data Collection
- K & 1 / 2 - 5 Sci 21 PNW BOCES w/ Dr. David Jacob
- Science 8 -Fall 2023 (Course development/Staffing / Curriculum Implementation)
- Review & Update Building Schedules

Fall 2023

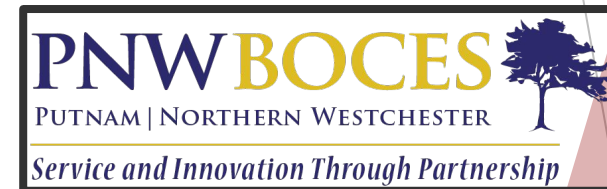
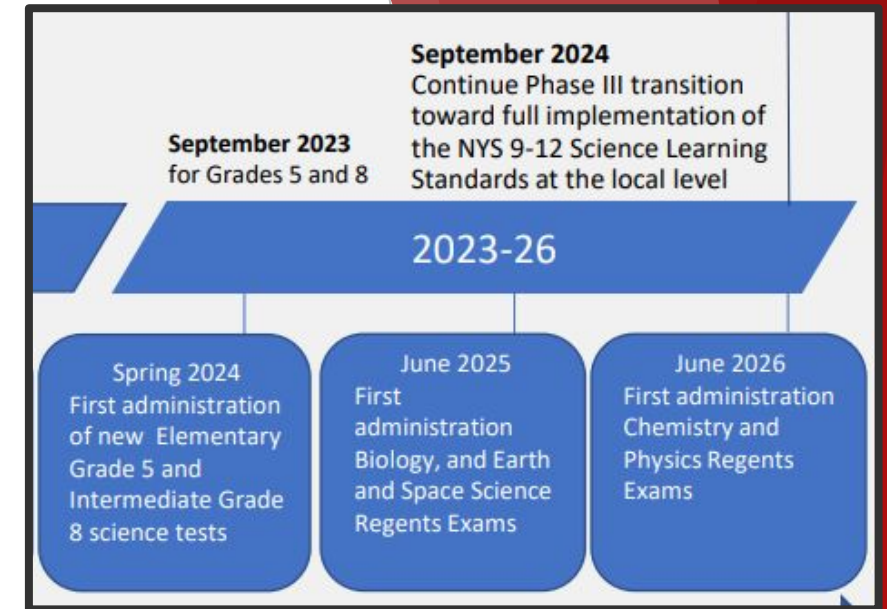
## Resource Adoption & Professional Learning

- Science ELS/ILS Investigations-Implementation/Data Collection
- K & 1 / 2 - 5 Sci 21 PNW BOCES w/ Dr. David Jacob (continued)
- Science 8 -Fall 2023
- Primary Science Scheduling - Daily

Sp 2024

## ELS/ILS Assessments, Ongoing Instructional Programming

- Required Investigations
- ELS/ILS Assessments (Computer Based) April 2024
- Continued Professional Learning
- HS Science Course Offerings & Mapping
- Course Review & Development



# Kindergarten: Exploring 'Trend Data'

- Rich Vocabulary
- Rigorous Expectations
- Critical Thinking

## LESSON 11: Wow! Look at the Changes!

Grade K Unit 1

Unit Driving Question: How does the weather affect me?

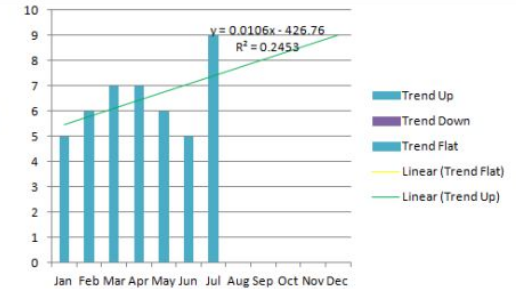
### Teacher Background:

#### Lesson Overview:

Students will determine whether graphs are trending up, down, or steady, and create trending lines.

In a trend line, you are looking for the average in a set of data. The teacher can show students graphs where data is going up, down, or remains steady (sometimes referred to as flat). As shown in the chart to the right, the trend line does not "connect the dots." Some of the bars do not touch the line. Some of the bars are above the line. The general trend is up.

The teacher can use the three types of lines to show up, down, or steady and explain these are referred to as "trend lines." Using example graphs, the students will match the proper trend line with the graph. Lastly, using the data that has been collected regarding temperature each day. Students should be able to describe what the trend lines would be to describe the temperature change. They will record a trend line for the week in their journal.



### Potential Misconceptions:

Data must involve numbers. (In fact, we can use data that measures information other than numbers, i.e., *qualitative data*.)

Data can only be seen with our eyes. (In fact, we can measure data we *can't see* using special instruments or tools.)

### Lesson Goals:

Objective: Students will be able to observe and describe temperature trends.

Learning Target: I can read a bar graph and explain what the data shows.

### Standard Information

Performance Expectation K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.

### Science and Engineering Practices

#### Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Record information (observations, thoughts, and ideas).
- Analyze data from tests of an object or tool to determine if it works as intended.

### Disciplinary Core Ideas

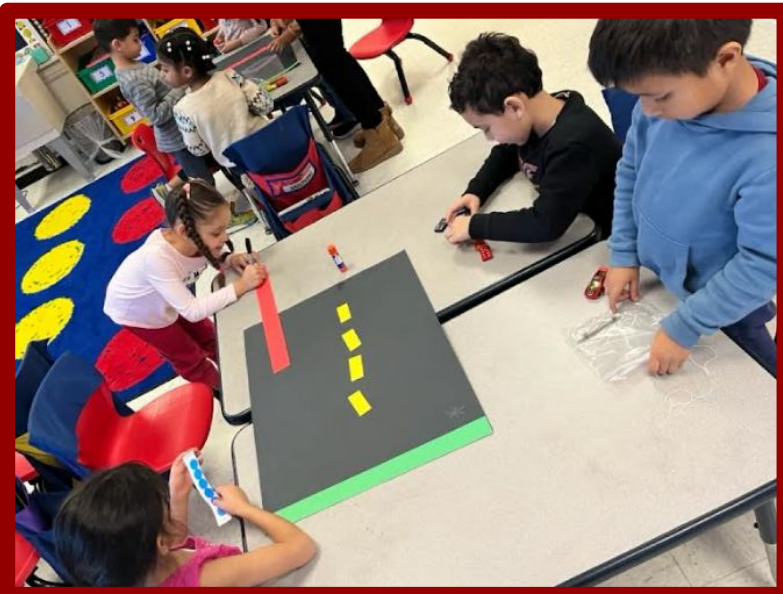
#### ESS2.D: Weather and Climate

Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.

### Crosscutting Concepts

#### Patterns

Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.



***'Use and share observations of local weather conditions to describe patterns over time.'***



# Primary & Elementary Science (Gr K-5)

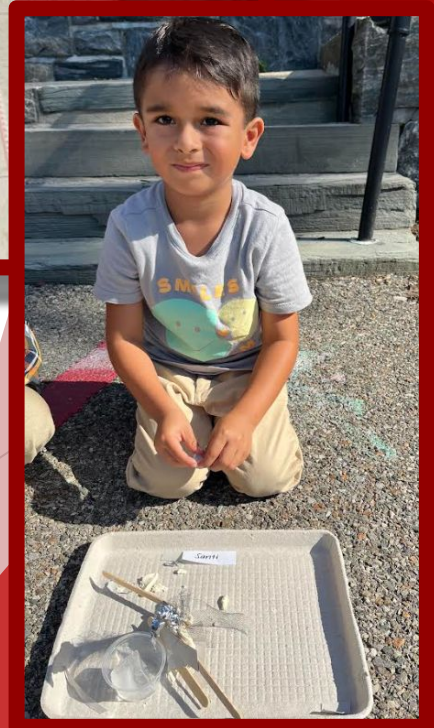
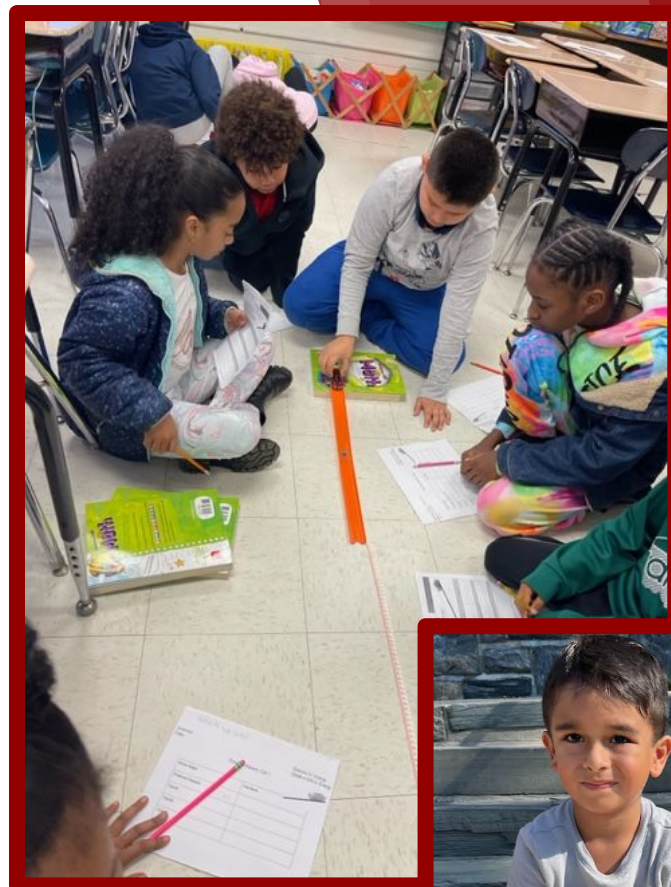
An integral program that addresses New York State P-12 **Science Learning Standards** (NYSSLs)

A carefully developed sequence of instruction with both **horizontal and vertical articulation** of conceptual development from unit to unit and grade to grade.

The balance between **Science Practices, Core Ideas, and Crosscutting Concepts**.

Balance among Physical, Life, Earth/Space & Science topics and Engineering.

Science 21 continuous **Professional Learning**







# Primary & Elementary Science (Gr K -5)

## Required Investigations

- Synthesis
- Data Collection & Analysis
- Process
- Collaboration



# Middle School Science (Gr 6 -8)

## Progress So Far:

- Introduction of the **OpenSciEd Curriculum**.
  - A nation-wide teacher created program
- Materials and Support by Carolina Science
  - Purchase and usage of the material needed for OpenSciED
- Implementation of the **NY State Required Investigations**

## Goals for Next Year:

- Continue fine tuning the OpenSciEd Unit Plan
- Distribute the NYS Investigations throughout grades 6-8





## ANCHORING PHENOMENON ROUTINE

We share an experience.



## NAVIGATION ROUTINE

We figure out where we are and where we need to go next.



## INVESTIGATION ROUTINE

We develop evidence from investigations to explain parts of the phenomena.



## PUTTING THE PIECES TOGETHER ROUTINE

We come to a consensus on what we've figured out, and have a more complete explanation of the phenomenon.



## QUESTIONS ANSWERED

We've answered many of the questions from our Driving Question Board and are ready to explain some new phenomena.



## DRIVING QUESTION BOARD

We develop questions for the Driving Question Board.



## PUTTING THE PIECES TOGETHER ROUTINE

We come to a consensus on what we've figured out so far.



## PROBLEMATIZING ROUTINE

But new questions emerge through evidence we find.



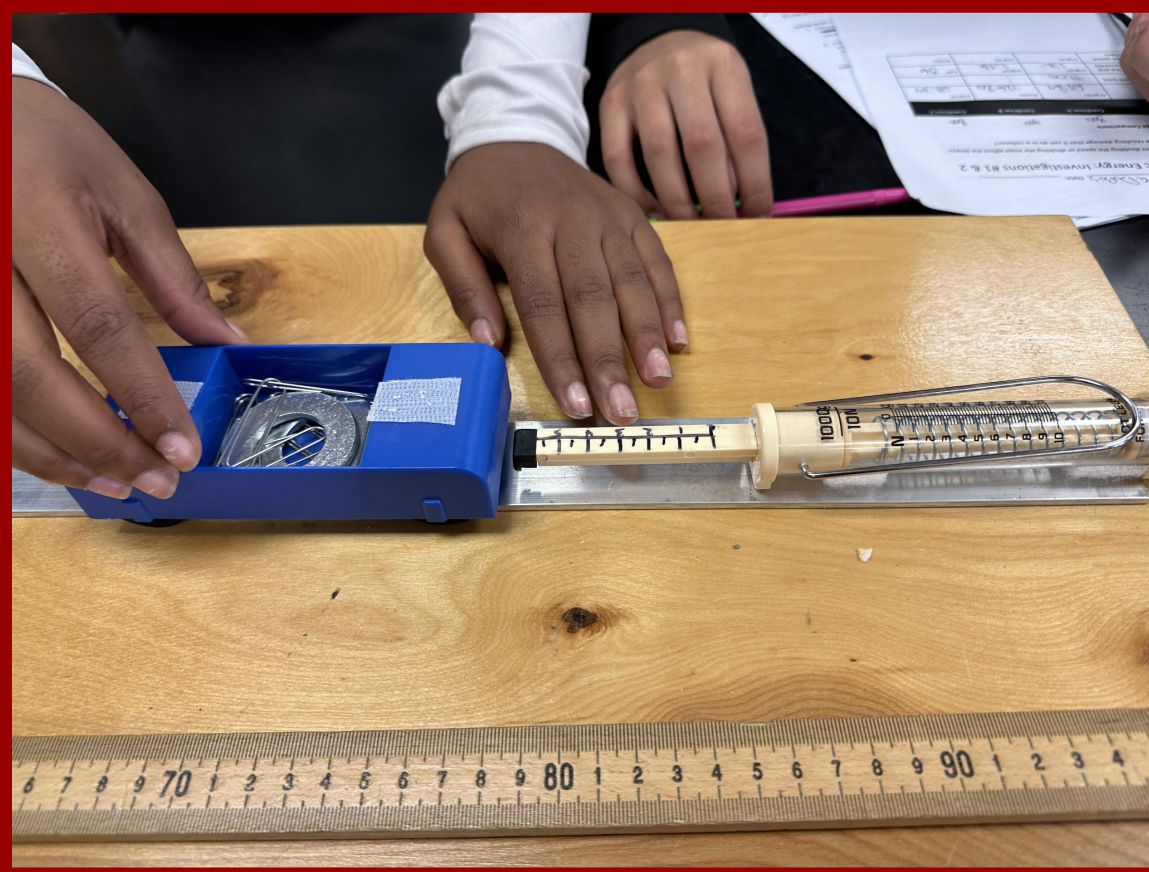
## INVESTIGATION ROUTINE

We develop evidence from investigations to explain parts of the phenomena.



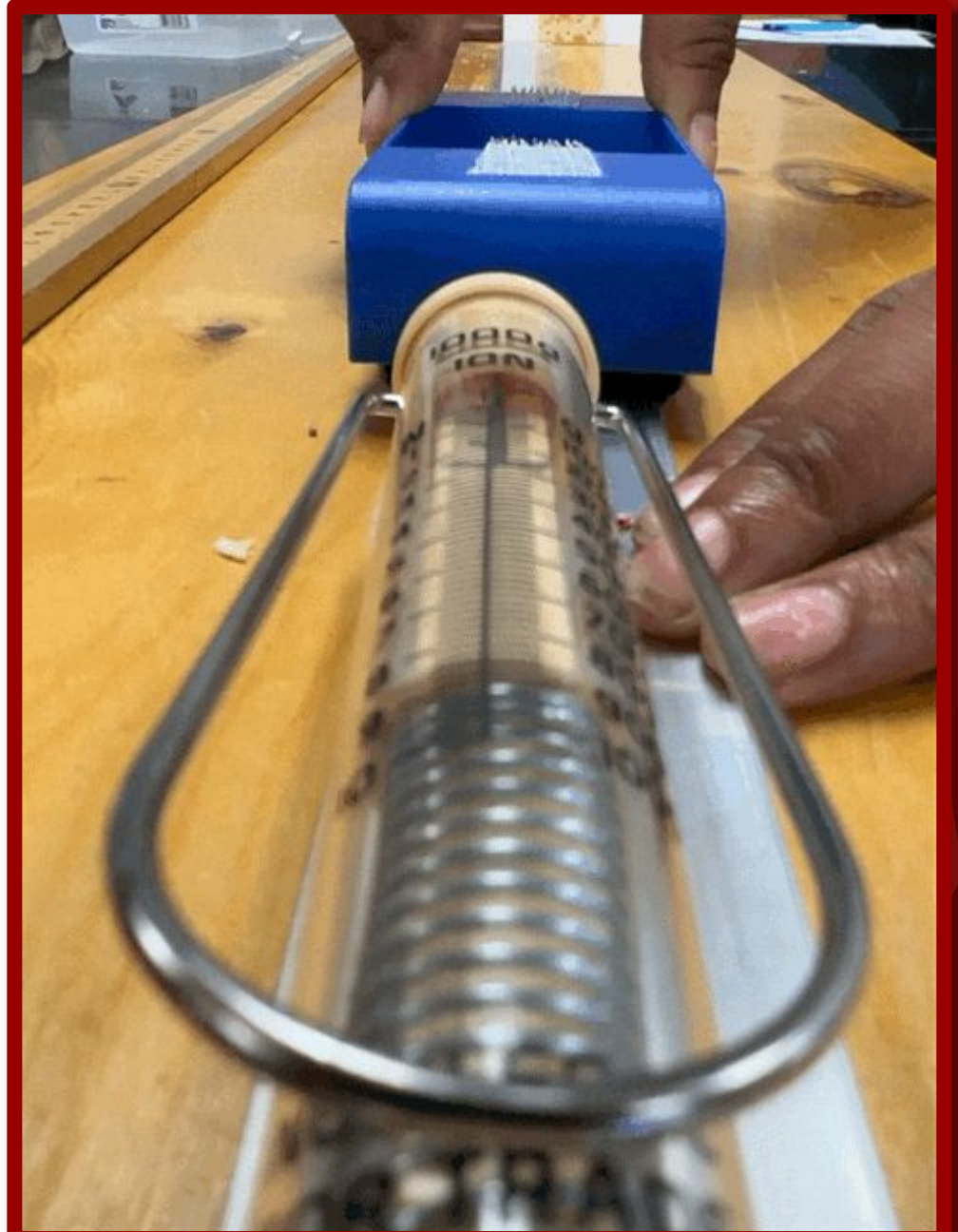


# Middle School Science (Gr 6 -8)



Students use spring scales to investigate forces and motion.

Part of the Carolina Materials package for OpenSciEd





# Middle School Science (Gr 6 -8)

Preparing for the  
**Egg Drop** activity.

Students  
developed different  
parachute designs

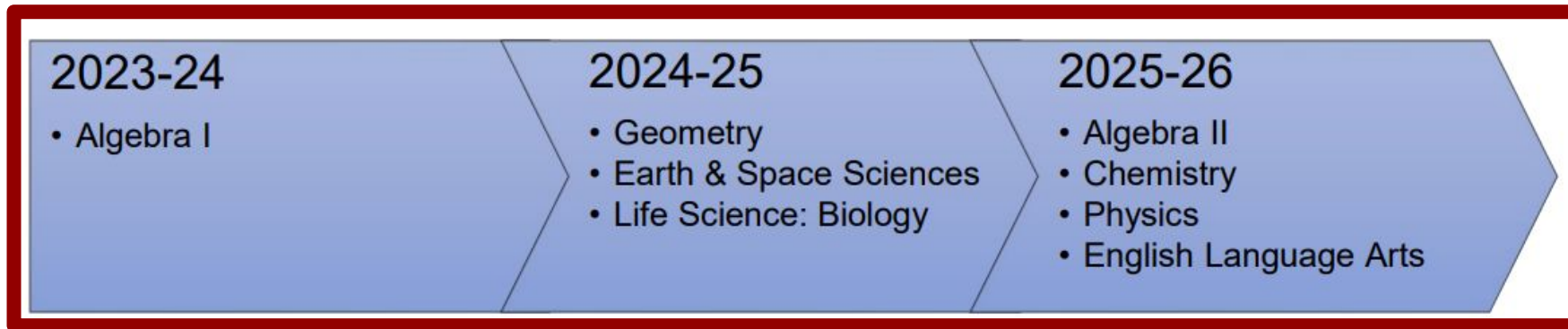


# High School Science (Gr 9-12)



New York State  
EDUCATION DEPARTMENT  
Knowledge > Skill > Opportunity

**Update January 2023:** For science, there will be an overlap period of the current and new exams for four administrations. This will ensure that students can complete the exam that matches the instruction they received. For more information, see the [Implementation Schedule for New Regents Examinations in Mathematics, Science, and English Language Arts Memo](#).



- Professional Learning - HS Science Department
- Course Development/Curriculum Revision
  - Instructional Resource Adoption/Implementation
  - Scheduling
- Science Course Offerings
  - Multiple Pathways/Acceleration
  - Advanced Designations at Graduation



This evolution of the  
Science program is less  
about changing teaching  
to meet new Standards  
and more about  
***the Standards finally  
changing to meet good  
teaching.***

*R. MacLeish, 2024*



# Resources for Parents

## Guía para padres sobre los estándares de aprendizaje de las ciencias de P-12 del estado de Nueva York

¿Cuáles son los estándares de aprendizaje de las ciencias de P-12 del estado de Nueva York?

*Los estándares de aprendizaje de las ciencias p-12 del estado de Nueva York son las metas educativas en ciencias para todos los estudiantes del estado de Nueva York desde prekindergarten hasta 12.º grado.*

¿Qué es la ciencia y por qué es importante para mi hijo?

*La ciencia es el enfoque científico para comprender el mundo natural. Entre estos están la exigencia de explicaciones respaldadas por afirmaciones y pruebas que sean comprobables. Las ramas de la educación científica de P-12 incluyen: ciencias de la vida, ciencias físicas, y ciencias de la Tierra y del espacio.*

*Durante las últimas décadas, una serie de estudios de investigación, informes, políticas y publicaciones documentaron los beneficios de la educación científica de los estudiantes para prepararlos mejor para la fuerza de trabajo y las trayectorias universitarias. Las carreras de Ciencia, Tecnología, Ingeniería y Matemáticas (STEM) no harán más que crecer en la próxima década, por lo que es esencial la accesibilidad a oportunidades de aprendizaje equitativas para que todos los estudiantes puedan sobresalir.*



Escanee el código QR para acceder a este folleto en el sitio web del NYSED para obtener enlaces en directo.



### Recursos para padres

Ayopando el aprendizaje en casa

- ⇒ [Recursos de implementación de los estándares científicos del estado de Nueva York](#)
- ⇒ [Recursos para padres de la Asociación de padres y maestros \(PTA\) del estado de Nueva](#)

## A Parent's Guide to the New York State P-12 Science Learning Standards

What are the New York State P-12 Science Learning Standards?

*The NYS P-12 Science Learning Standards are the educational goals for all of New York State's students from prekindergarten through Grade 12 in Science.*

What is Science and why is it important for my child?

*Science is the scientific approach to understanding the natural world. Among these are a demand for explanations supported by claims and evidence that are testable. Branches of P-12 science education include: life science, physical science, as well as Earth and space sciences.*

*Over the past several decades, streams of research studies, reports, policies, and publications have documented the benefits of students' science education to better prepare them for the workforce and college pathways. Careers in Science, Technology, Engineering, and Mathematics (STEM) will only grow in the next decade, making it essential for accessibility to equitable learning opportunities for all students to excel.*



Scan the QR code to access this flyer on the NYSED web site for live links.



### Parent Resources

Supporting Learning at Home

- ⇒ [New York State Science Standards Implementation Resources](#)
- ⇒ [New York State Parent Teacher Association \(PTA\) Parent Resources](#)



# Thank you

