Oyster Bay-East Norwich

Science and Technology
2019 Instructional Update
Janna Ostroff

New York State Science Standards

2013 Next Generation Science Standards Published

2016 New York State Officially Adopted Standards

2018 Assessment “White Paper” Submitted to the Board of Regents

?

2020-21 Transitional Exams for Grades 5, 8, Earth Science (ES) and Living Environment (LE)

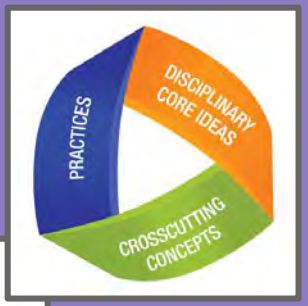
2021-22 New Exam Grades 5 & 8, Transitional Exams ES, LE, Chemistry and Physics

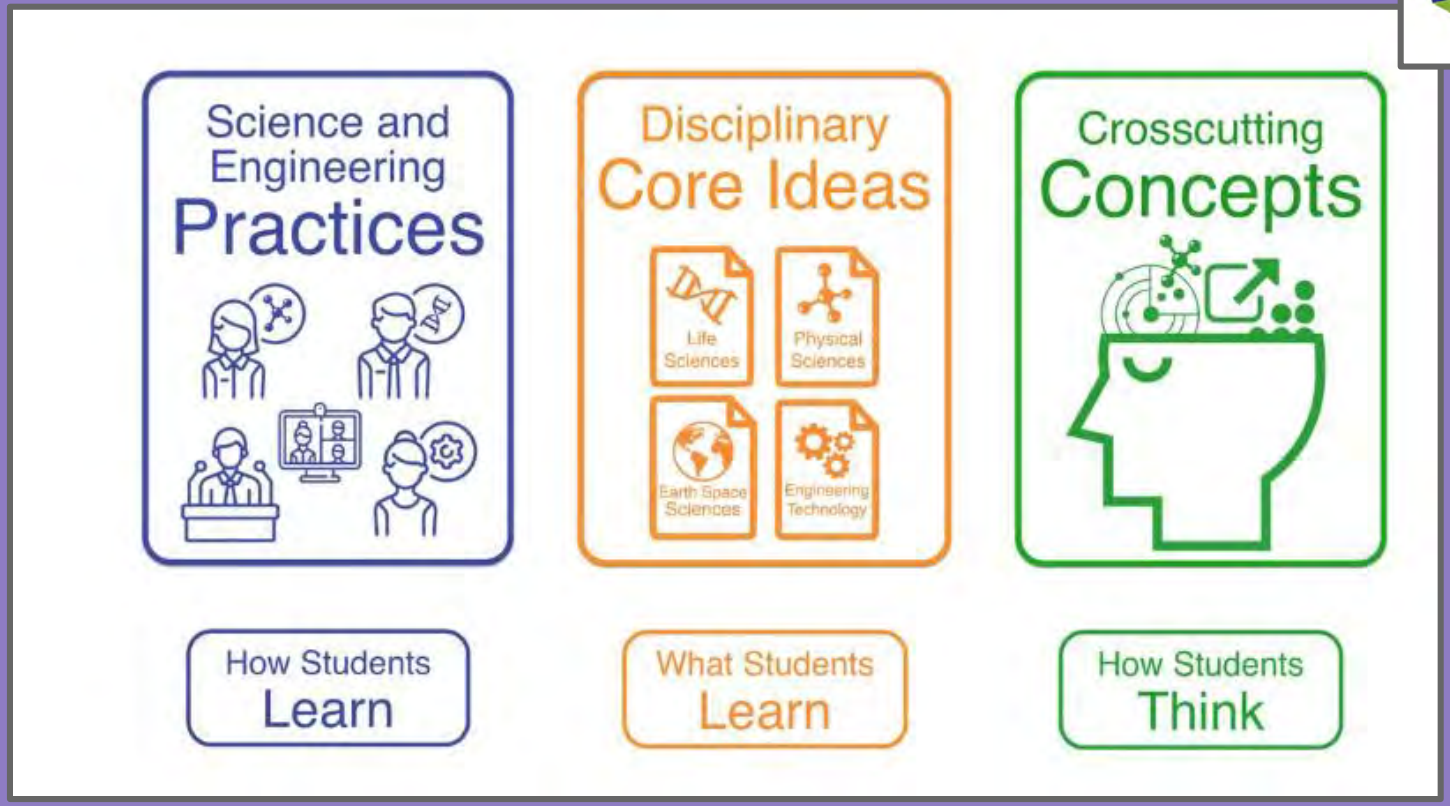
2022-23 Transitional Exams for Chemistry and Physics

2020 LAST GRADE 4 EXAM ADMINISTRATION

2021 LAST ADMINISTRATION OF 1996 VERSION GRADE 8

"3-Dimensional Learning"





Science and Engineering Practices (8)	Disciplinary Core Ideas (44 Total)	Cross-Cutting Concepts (7)
1. Asking questions and defining problems 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 and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating and communicating information	Earth and Space Science Life Science Physical Science Engineering, Technology, and Applications of Science	1. Patterns 2. Cause and Effect 3. Scale, Proportion and Quantity 4. Systems and System Models 5. Energy and Matter: Flows, Cycles, & Conservation 6. Structure and Function 7. Stability and Change

Aligned Practices

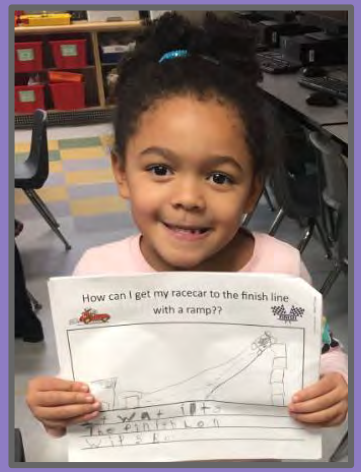
Approach to Prior Science Standards	Approach to New Science Standards

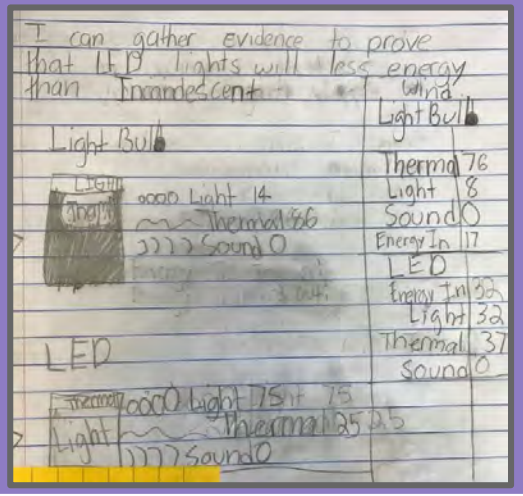
Student-centered inquiry and experiment-based learning:

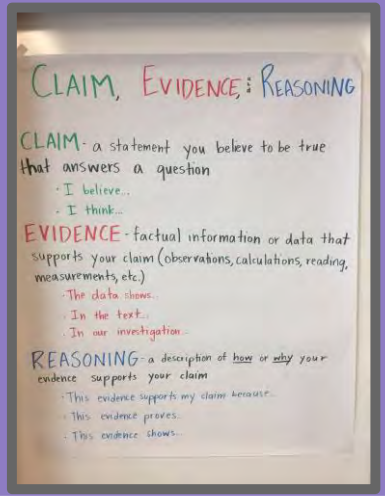
Aligned Practices

Approach to Prior Science Standards	Approach to New Science Standards

Using “claim, evidence, and reasoning” to form conclusions (Common Core ELA):



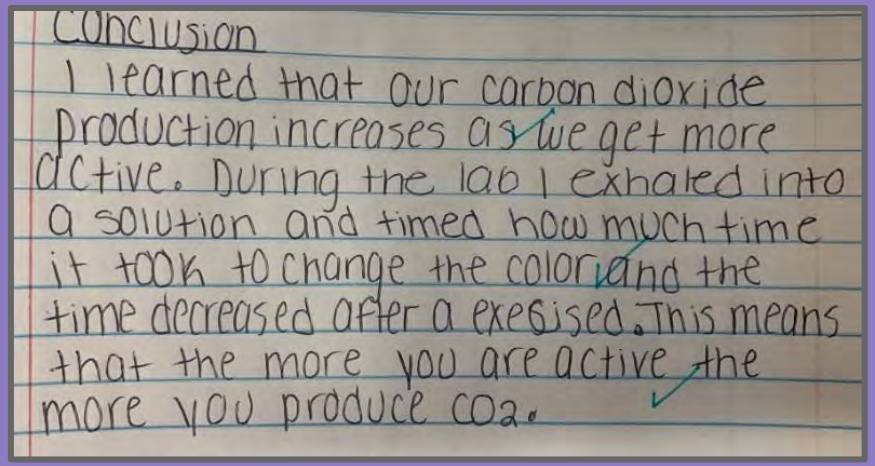




Aligned Practices

Approach to Prior Science Standards	Approach to New Science Standards

Using “claim, evidence, and reasoning” to form conclusions (Common Core ELA):



Conclusion

I learned that our carbon dioxide production increases as we get more active. During the lab I exhaled into a solution and timed how much time it took to change the color and the time decreased after a exercised. This means that the more you are active the more you produce CO_2.

Lab Title: Enzymes and reaction rates

Score: 5 ... overall, a very nice job

CONCLUSION

(1pt) Name one thing that you learned from this lab. **This is your CLAIM.**
The higher the temperature, the lower the reaction rate :)

(1pt) What is the observation that **YOU** had or **DATA** that **YOU** collected or a **TEST RESULT** that **YOU** got during the lab that proves what you learned is true? **BE SPECIFIC. This is your EVIDENCE.**
What i learned is true because after leaving the test tubes to sit in the correct temperature, we added 1 ML of hydrogen peroxide and saw that the test tube with the coldest temperature (0 c) had the most and fastest bubbles (meaning the fastest rate). While the hottest temperature(100 c) had no bubbles at all (meaning slowest rate) and the temperature of 37 c was in the middle of the two. 0 c was a 3, 37 c was a 2, and 100 c was a 0. :) nice statement of data

(1pt) What is the science that EXPLAINS your data or observation or test result- OR what you learned?
What is the SCIENTIFIC explanation? **This is your REASONING.** This is true because the potatoes contained enzymes, which speed up chemical reactions. When enzymes are heated, they become denatured, meaning enzymes are almost “ broken” and will not be able to function properly, if at all. :) perfect

Aligned Practices

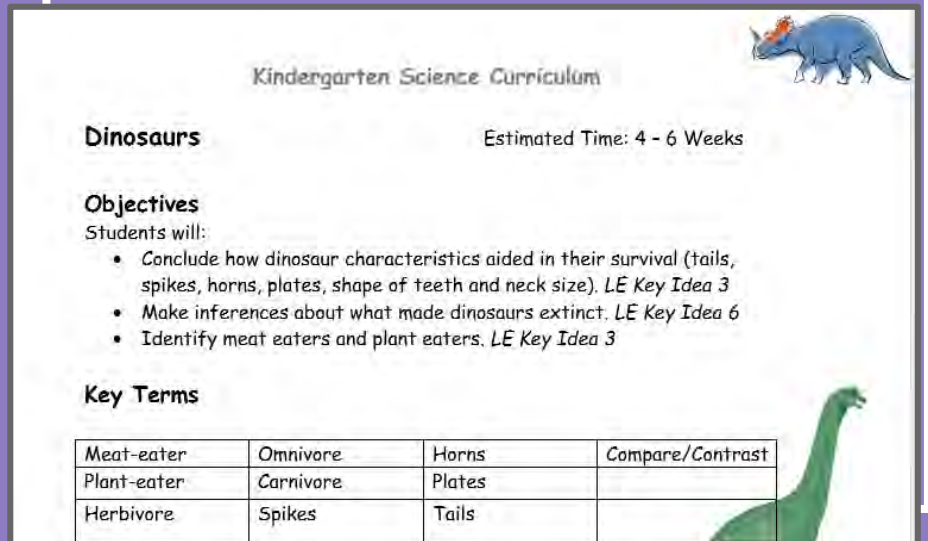
Approach to Prior Science Standards	Approach to New Science Standards

Engineering solutions to problems:

Instructional Shifts: Student Centered Discovery

Approach to Prior Science Standards

Distinct teacher-designed learning objectives throughout a unit



Kindergarten Science Curriculum

Dinosaurs Estimated Time: 4 - 6 Weeks

Objectives

Students will:

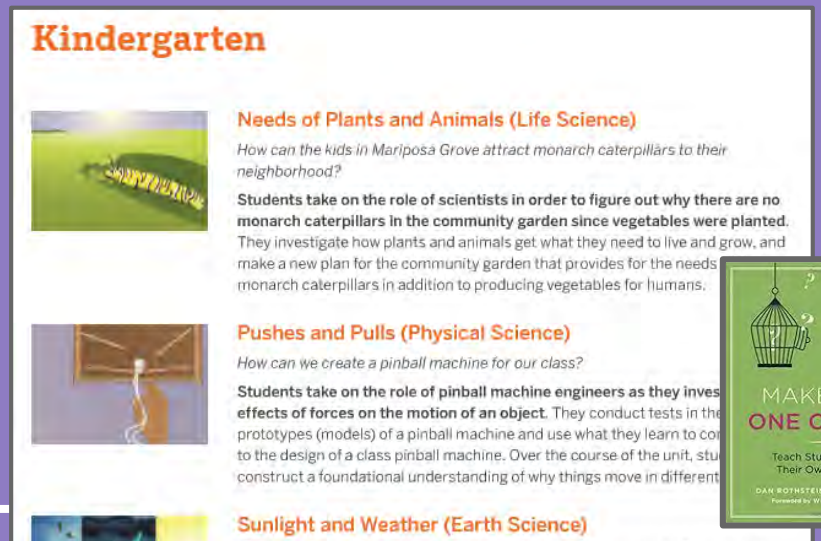
- Conclude how dinosaur characteristics aided in their survival (tails, spikes, horns, plates, shape of teeth and neck size). *LE Key Idea 3*
- Make inferences about what made dinosaurs extinct. *LE Key Idea 6*
- Identify meat eaters and plant eaters. *LE Key Idea 3*

Key Terms

Meat-eater	Omnivore	Horns	Compare/Contrast
Plant-eater	Carnivore	Plates	
Herbivore	Spikes	Tails	

Approach to New Science Standards

Cohesive phenomena-based units around which students pose questions



Kindergarten

Needs of Plants and Animals (Life Science)

How can the kids in Mariposa Grove attract monarch caterpillars to their neighborhood?

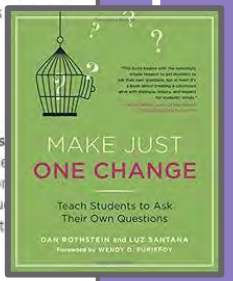
Students take on the role of scientists in order to figure out why there are no monarch caterpillars in the community garden since vegetables were planted. They investigate how plants and animals get what they need to live and grow, and make a new plan for the community garden that provides for the needs monarch caterpillars in addition to producing vegetables for humans.

Pushes and Pulls (Physical Science)

How can we create a pinball machine for our class?

Students take on the role of pinball machine engineers as they inves effects of forces on the motion of an object. They conduct tests in the prototypes (models) of a pinball machine and use what they learn to co to the design of a class pinball machine. Over the course of the unit, stu construct a foundational understanding of why things move in different

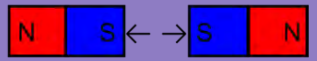
Sunlight and Weather (Earth Science)



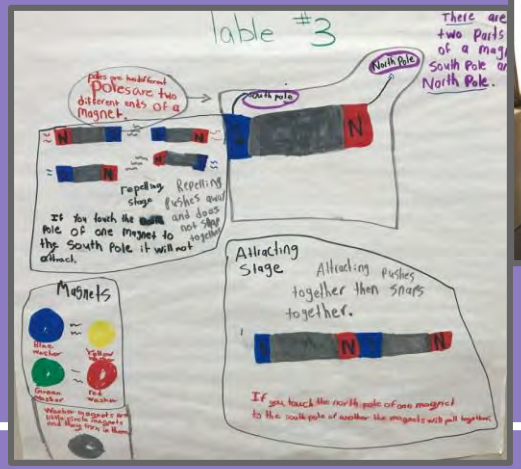
Instructional Shifts: Student Centered Discovery

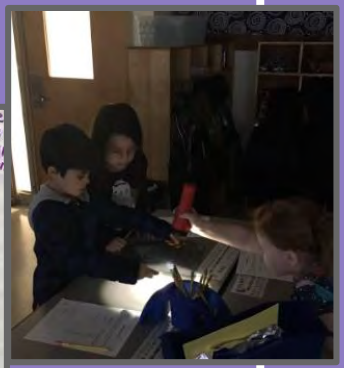
Approach to Prior Science Standards	Approach to New Science Standards
Direct instruction of concepts and vocabulary	Uncovering of concepts and vocabulary to name observations

Opposite poles **attract**



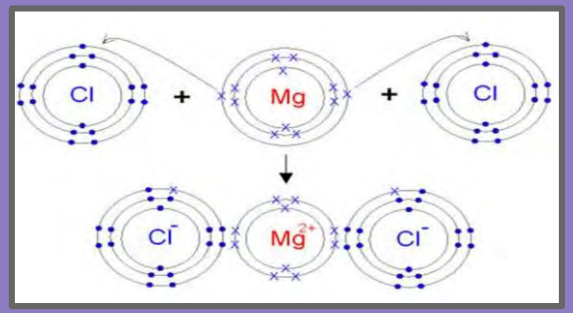
Same poles **repel**

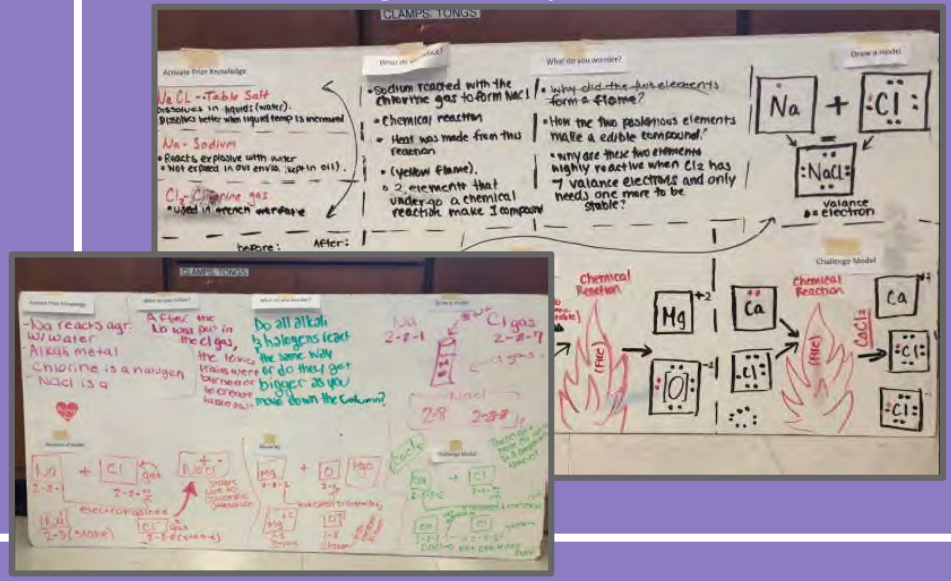




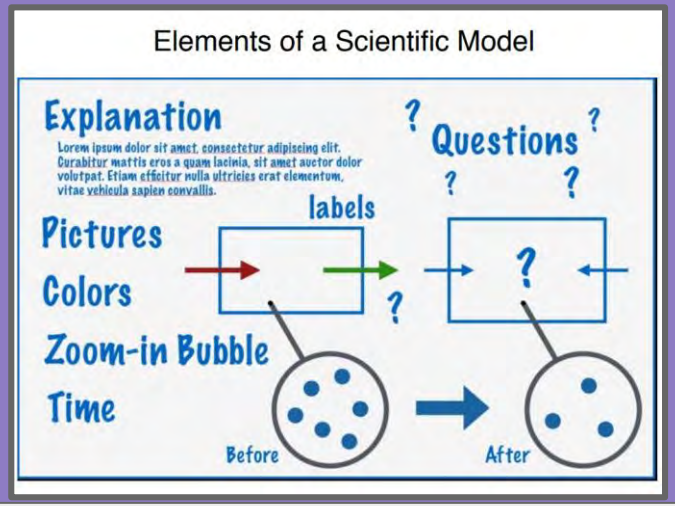
Instructional Shifts: Student Centered Discovery

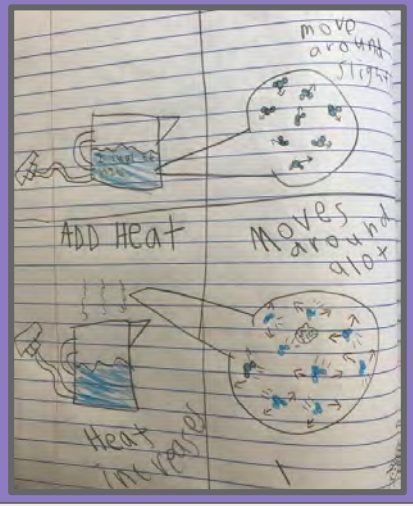
Approach to Prior Science Standards	Approach to New Science Standards
Teacher-provided models and concept maps	Student modelling of concepts to connect ideas

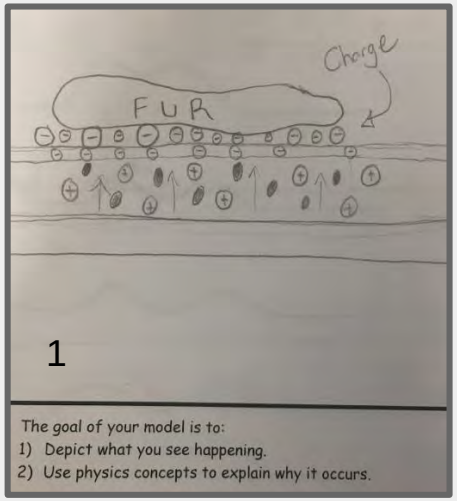


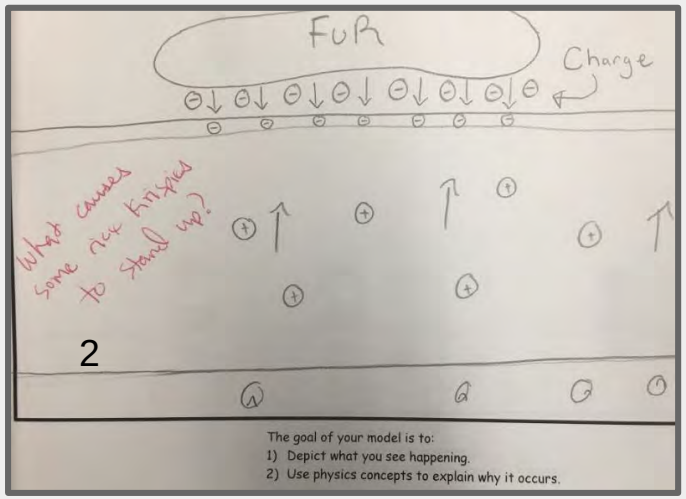


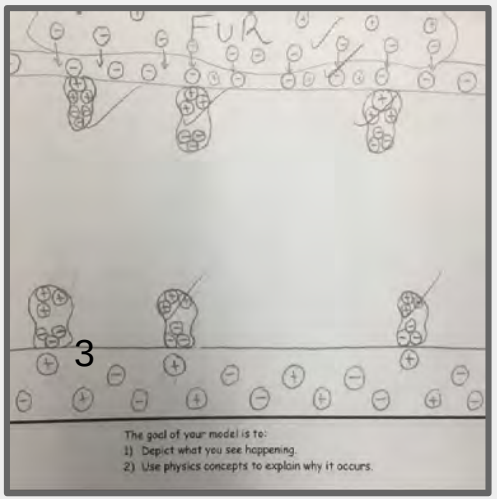
Modelling


Elements of a Scientific Model
Explanation
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur mattis eros a quam lacinia, sit amet auctor dolor volutpat. Etiam efficitur nulla ultricies erat elementum, vitae vehicula sapien convallis.
Questions
labels
Pictures
Colors
Zoom-in Bubble
Time
Before
After


move around
ADD Heat
moves around alot
Heat increases


Charge
FUR
1
The goal of your model is to:
1) Depict what you see happening.
2) Use physics concepts to explain why it occurs.

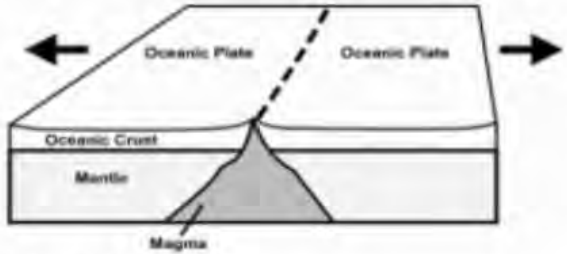

FUR
Charge
What causes some ice to stand up?
2
The goal of your model is to:
1) Depict what you see happening.
2) Use physics concepts to explain why it occurs.


FUR
3
The goal of your model is to:
1) Depict what you see happening.
2) Use physics concepts to explain why it occurs.

How May Regents Examinations Change?

Current Assessment

The picture below shows a place on the ocean floor where two plates are moving apart. At this plate boundary (shown at the dotted line), rock material is rising to the surface.

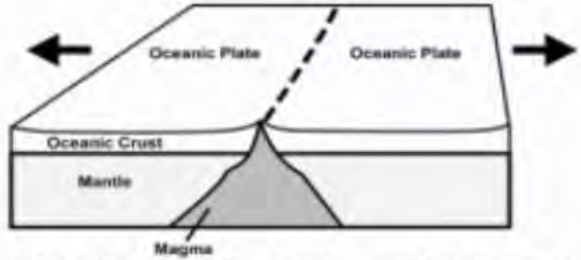


This is an example of a:

a) Convergent plate boundary
b) Divergent plate boundary
c) Transform plate boundary
d) None of the above

Anticipated Assessment Item

The picture below shows a place on the ocean floor where two plates are moving apart. At this plate boundary (shown at the dotted line), rock material is rising to the surface.



1. Complete the model by drawing on the picture to show what is happening in the mantle that causes the plates to move apart.
2. Based on the model you completed, explain what is happening in the mantle to cause the two place to move apart.
3. On the model, put an X on the places where the oldest rock can be found in the crust.
4. Describe how the oldest rock got to that location.

K-12 Science Curriculum Revision Timeline

Prior Work

Engineering, Resource Evaluation, Performance-Based Assessment Focus

- Elementary (K-5)
  2014-16 Incorporation of Engineering Standards
  2017-18 Alignment of 1 Unit using Science Dimensions in grades 3 and 5 and 3 Units in grade 2
- Middle Level (6-8)
  2014 Grade 7 Content Alignment
  2015 Grade 8 Content Alignment
  2017-18 Grade 6-8 Articulation, and Grade 6 Content Alignment iQuest

Work in Progress

Question Formulation Technique and Modelling

- Elementary (K-5)
  2018-19 Alignment of 1 Unit using Amplify in grades K, 1, 3, 4, and 5. Grade 2 Amplify Exploration of Plant and Animal Relationships
- Middle Level (6-8)
  2018-19 Grade 6 Alignment and Enhancement via Science Dimensions, iQuest and Amplify
  2019-20 Grade 7 and 8 Modification of Amplify Resources

Future Work

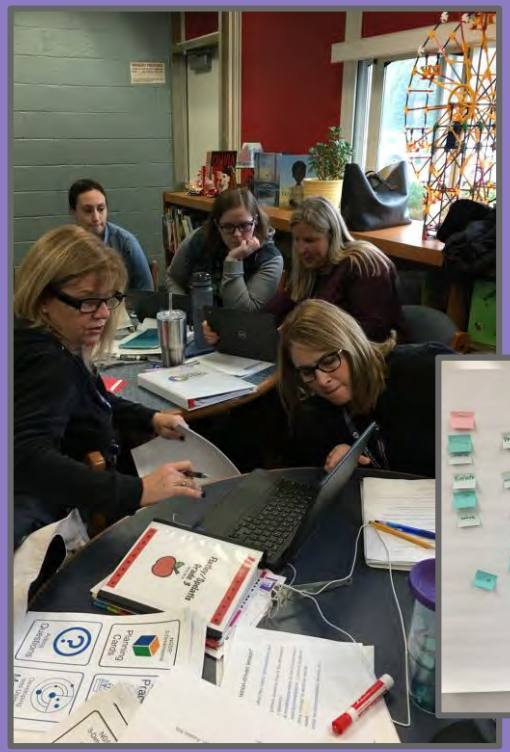
Full Curricular Alignment, Modification of Resources, Cross-Cutting Concepts

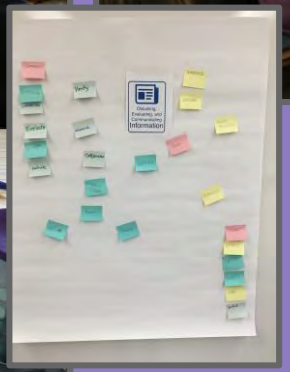
- Elementary (K-5)
  2019-20 2 Amplify Units taught per grade
  2020-21 Full alignment
- Middle Level (6-8)
  2019-20 Grade 6, 7, 8 Articulation and Gap-Analysis
  2020-21 Full alignment

K-12 Science Curriculum Revision Timeline

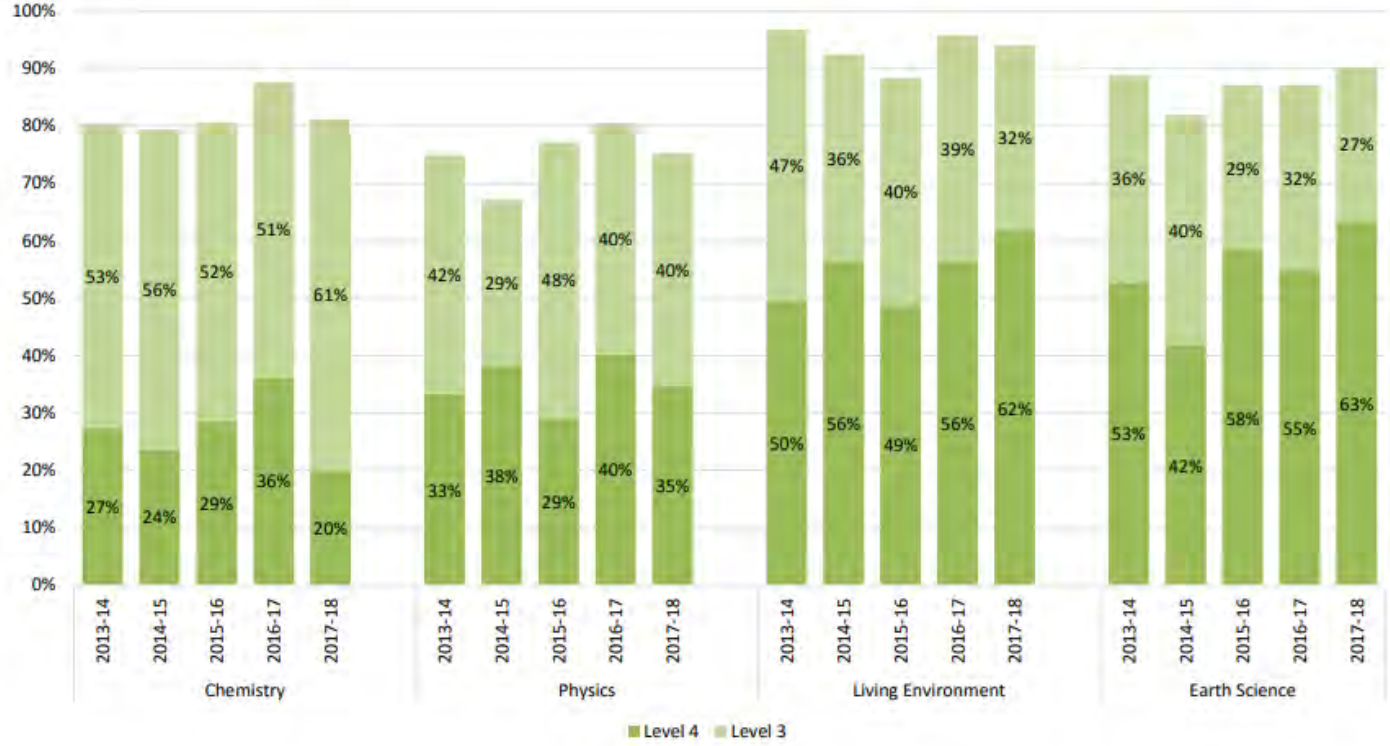
Prior Work	Work in Progress	Future Work
Engineering, Resource Evaluation, Performance-Based Assessment	Question Formulation Technique and Modelling	Full Curricular Alignment, Modification of Resources, Cross-Cutting Concepts
• High School **2013-2015** Integration of engineering into curricula and course offerings **2015-2017** Development of Performance-Based Assessment Projects and Rubrics Informal examination of published resources from Houghton Mifflin Harcourt, Pearson, NGSS NSTA **2017-2018** Unit share and peer-review	• High School **2018-19** “Make Just One Change” Question Formulation Technique Implementation **2018-19** Science and Engineering Practices Training and Gap Analysis **2018-19** Shift to Phenomena-Based Instruction	• High School **2019-20** Identify and Evaluate New Resources Align 1 Unit **2020-21** Align Remaining Curricula **2021-22** Modify and Refine based on assessment results

Professional Development

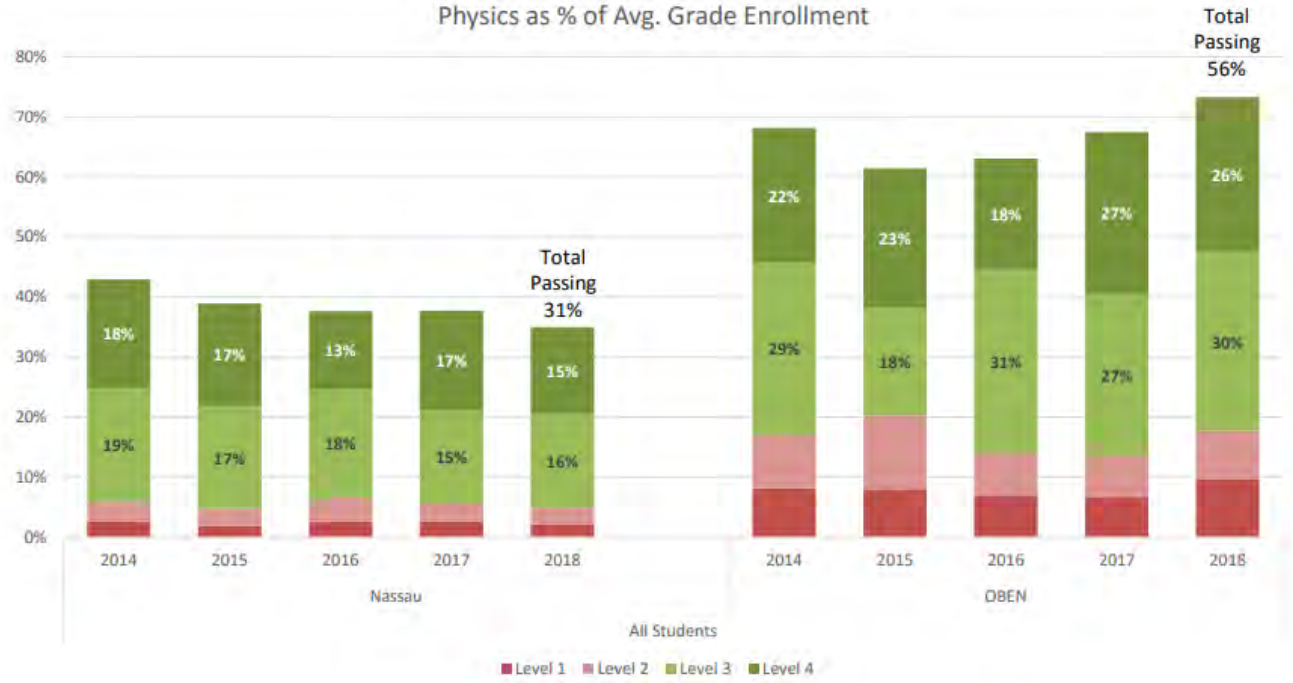




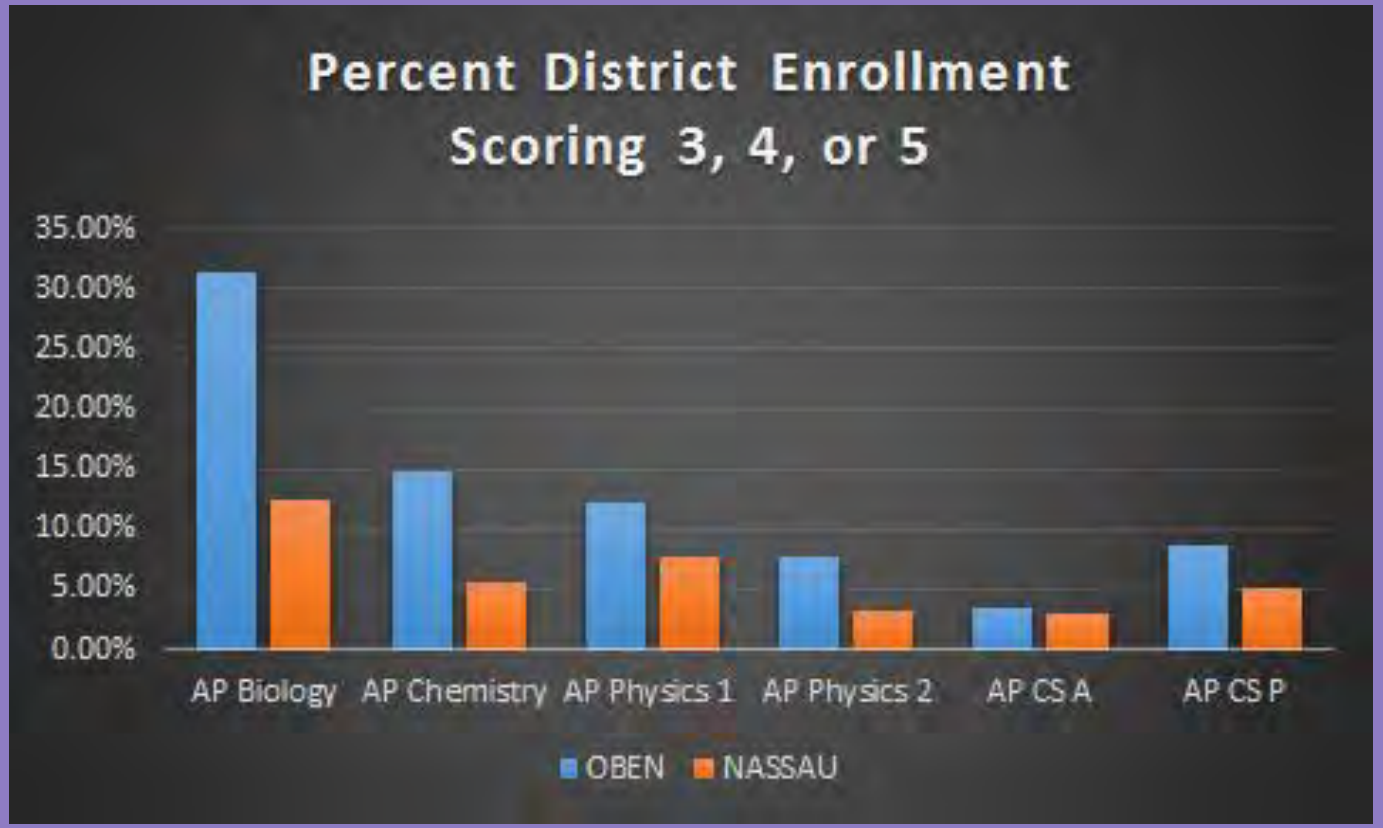
Regents Exams- Sciences



Science “Deep Dive”

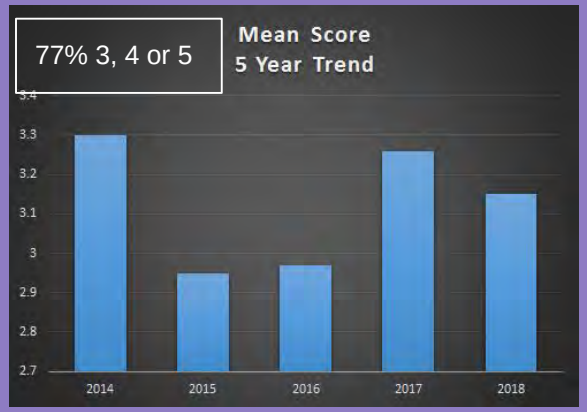


AP Science Participation and Achievement

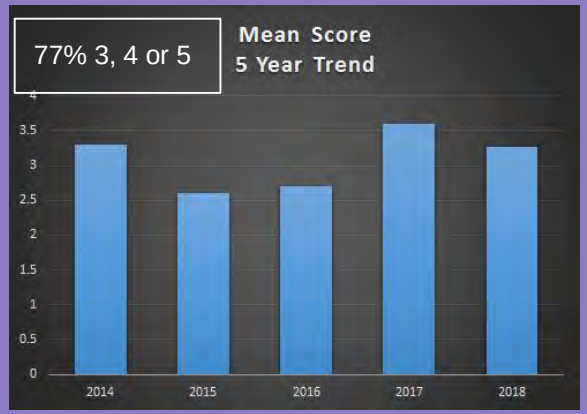


AP Science Data

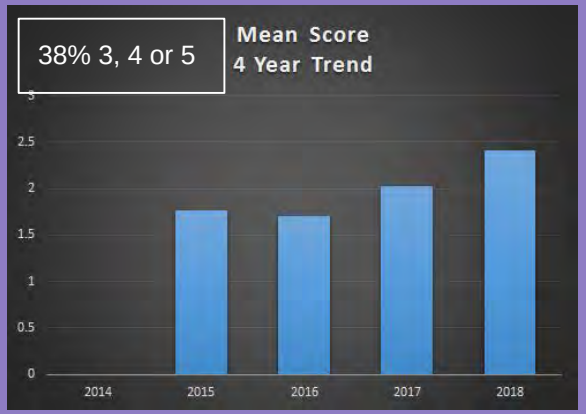
AP Biology (47 students 2018)



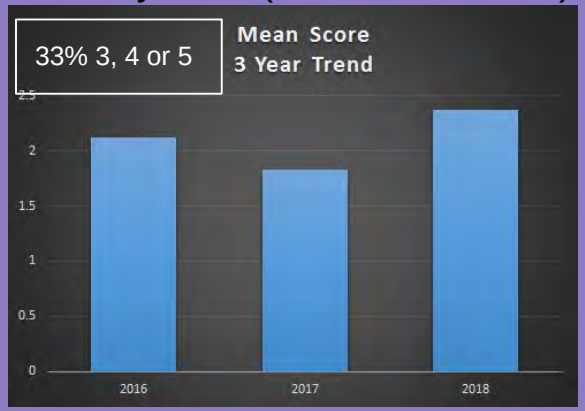
AP Chemistry (22 students 2018)



AP Physics 1 (37 students 2018)



AP Physics 2 (27 students 2018)



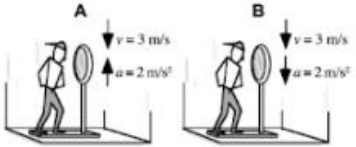
AP Computer Science A
5 Students 2017
80% 3, 4 or 5 (Mean Score 3.8)

AP Computer Science Principles
14 Students 2018
71% 3, 4 or 5 (Mean Score 3.2)

Increase of over 25% in 2 years!

AP Physics Instructional Interventions

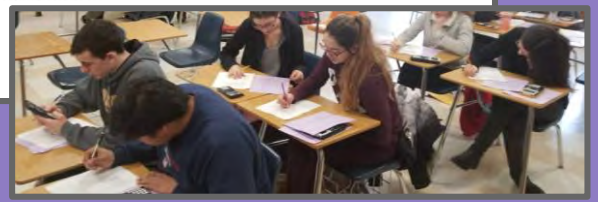
2. In the two cases shown below, a person is standing on a scale in an elevator. The elevators are identical, and the person weighs 500 N. In both cases the elevator is moving downward, but in Case A it is accelerating upward and in Case B it is accelerating downward.



Will the scale reading in Case A be *greater than, less than,* or *the same as* the scale reading in Case B?

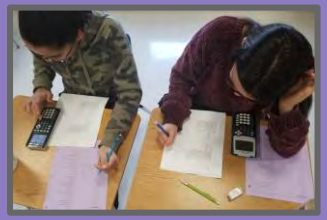
Explain. A strong response will include:

- A free body diagram for both Case A and Case B.
- Reference to the sum of forces from the free body diagram.
- Reference to Newton's Second Law of Motion.
- A description of how the scale reading relates to the forces in the free body diagram.



2014-2018

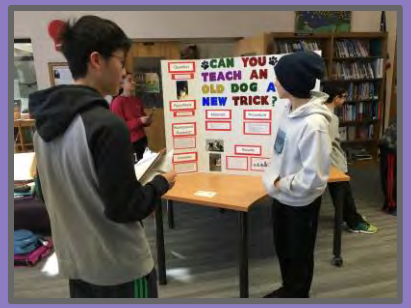
- AP workshops, training
- Inclusion of released items
- Pre-lab, test corrections, probeware
- Calendar more time for review/additional classes
- Clarify recommendation criteria
- More frequent ranking tasks



2018-2019

- Criteria for success for explanations and paragraph responses (AP Physics 1)
- Flipping instruction using text and video
- Availability and purchase of review books
- Free body diagram/drawings (AP Physics 2)

Science Research



2013-2014 7th Grade Science Fair

2016-2017 Barcode Long Island

2017-2018 26 Students Enrolled in Science Research

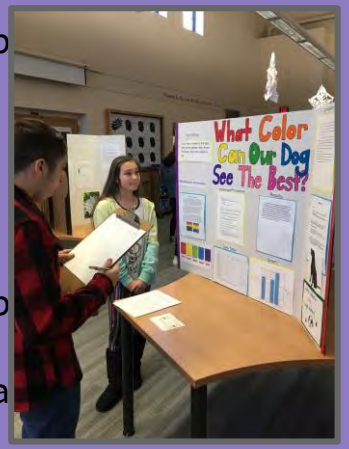
LISEF Particip

2018-2019 AP Research Rollout

Enrollment Waned

LISEF Particip

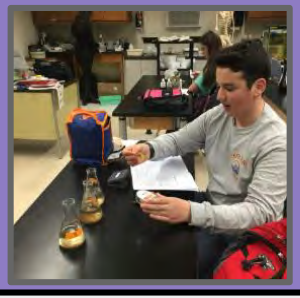
Cold Spring Ha

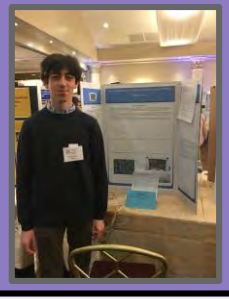


Goal 1: Retain and Grow Students in Research

Goal 2: To Build a Regionally and Nationally Competitive Program

"Research Track"





Intel ISEF
Regeneron
Siemens
Exploravisions

Grade	9th Grade	10th Grade	11th Grade	12th Grade
Proposed Courses for "Research Track"	LE Honors + .5 Credit Honors Research	Chemistry H and/or AP Bio + AP Seminar (English)	AP Physics 1 or College Physics + 1.0 Credit Honors Research	Honors or AP Science Research
Considerations	How can we best build our partnerships in anticipation of a growing program? Which and how many competitions should we strategically target?			

Computer Science and Instructional Technology

K-12 Computer Science

- K-12 Computer Science Teacher Association Standards
- Crosswalk of K-12, informed Computer Science Essentials Course Development, and identified gaps (6-8)

  Ex: computational models, encryption, and data exchange

K-12 Instructional Technology

- International Society for Technology in Education Standards
- Changing curricula: keyboarding, communication and collaboration

  Ex: online safety and digital identity

OBEN SCIENCE AND TECHNOLOGY BEYOND THE CLASSROOM

NASTECH Innovation Grant Presentation

LISTEMELA Regional Fall Conference Kindergarten Science and Elementary Technology Presentation

Model Schools DATE Forum Genius Hour 2nd Grade Presentation

HS Hour of Code

STEM Night/Night of Code

First Lego League (Highest Alliance Round Score and Core-Values Teamwork Award)

Science Research Symposium (May)

Second Grade Science Night

Long Island Science and Engineering Fair

Techathon

First Tech Robotics

7th Grade Science Fair

Engineers Breakfast (March)

Makerspace

Computer Science Club

THANK YOU!

Techathon 2019

Questions?

Science and Technology
2019 Instructional Update