Acceleration: Grade 8

- Science
- Math

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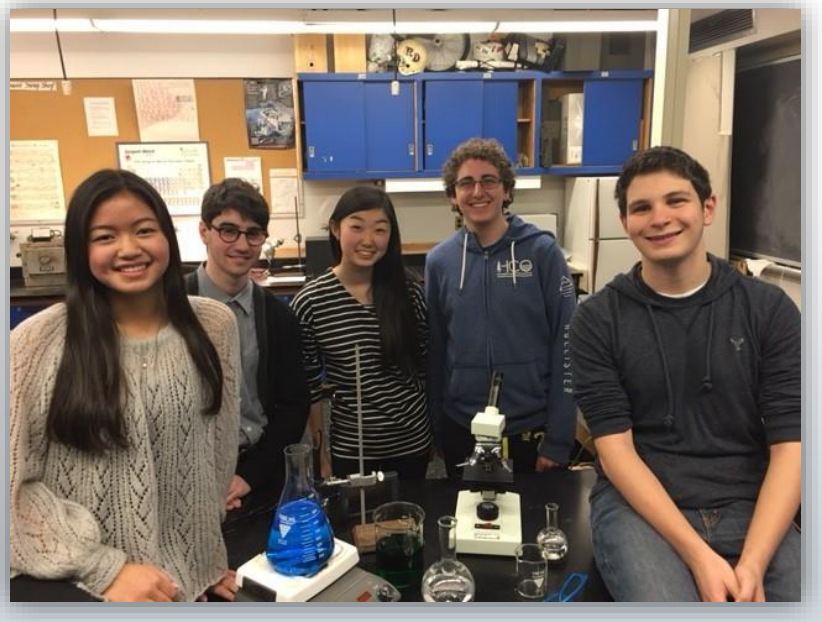
Science Acceleration - Overview

- Current Curriculum - Topics and Progressions
- Student Achievement Data Analysis
- Initiatives in Progress
- Next Generation Science Standards
- Recommendations

Tonight's 2016 Intel Semi-Finalists!



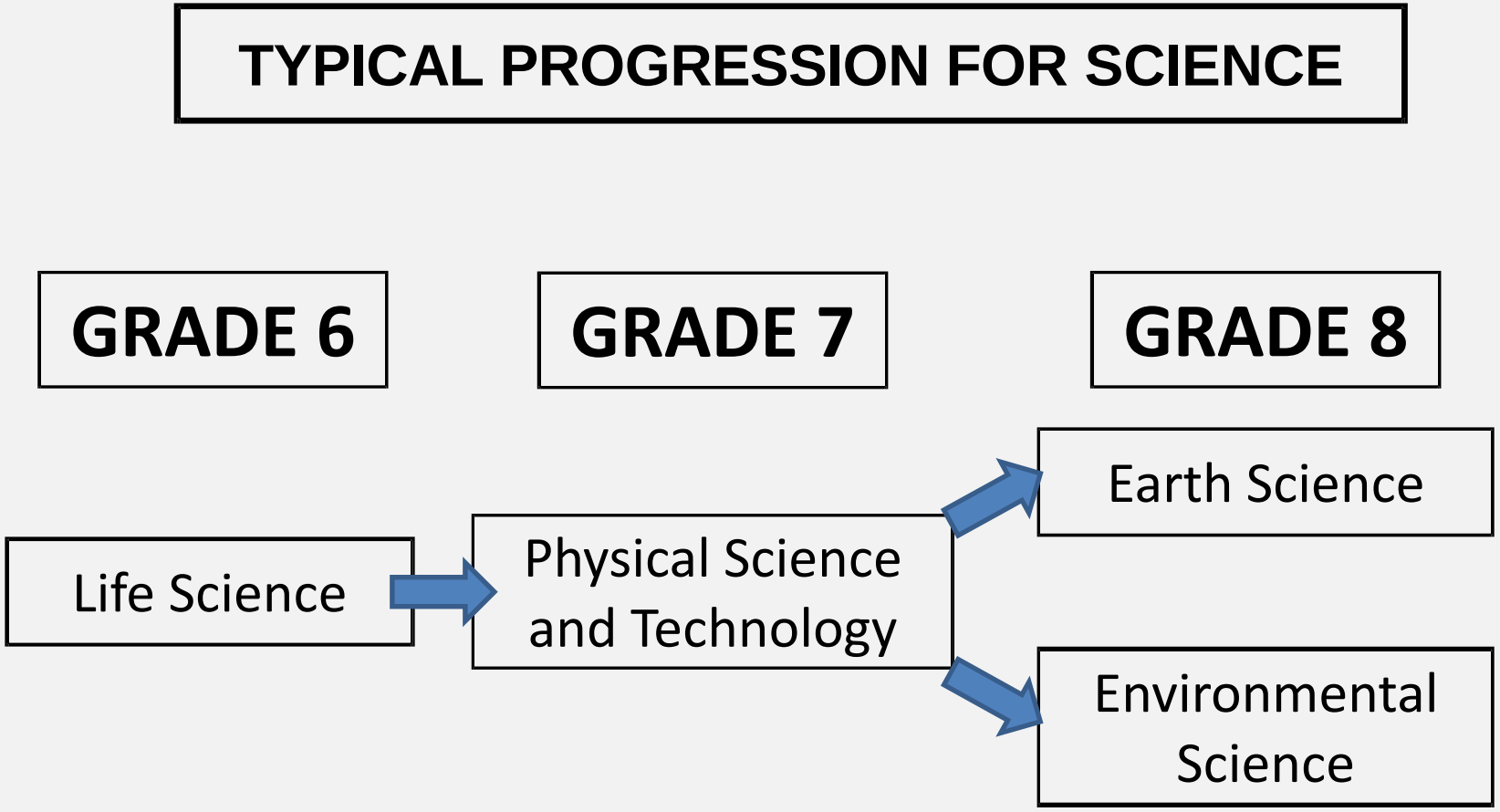
CURRENT K- 5 SCIENCE CURRICULAR TOPICS

Grade	Life and Earth Science		Physical Science and Technology
K	Chicks, Embryology	Properties	Nanotechnology
1	Organisms*	Weather	Solids and Liquids*
2	Soils*	Life Cycle of Butterflies	Changes*
3	Animal Studies*	Rocks and Minerals	Floating and Sinking*
4	Plant Growth and Development	Celestial Events	Electric Circuits, Magnetism Simple Machines*
5	Micro Worlds*	Ecosystems	Motion and Designs*

NANOTECHNOLOGY

* Student Lab Books

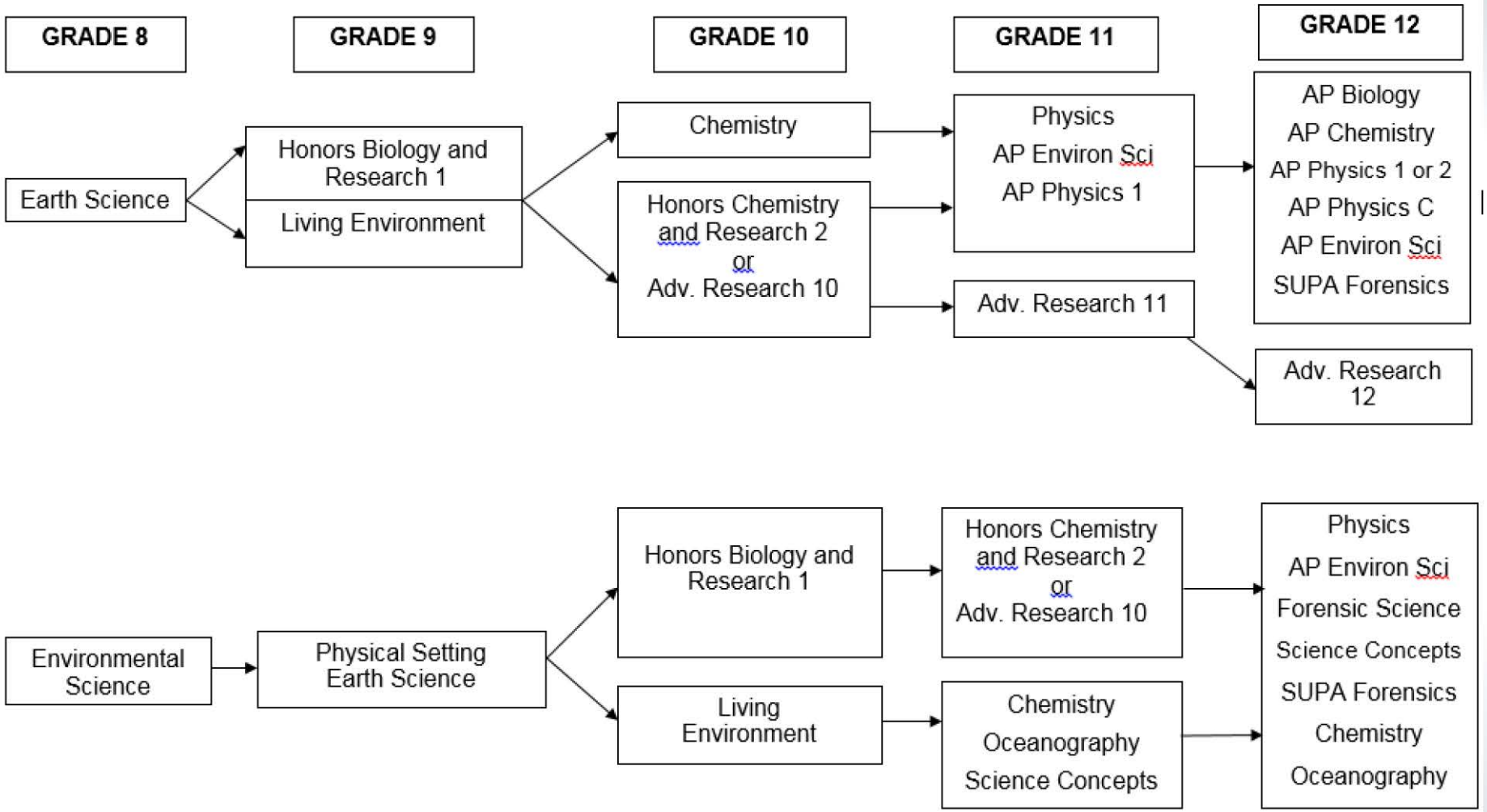
Middle Schools:



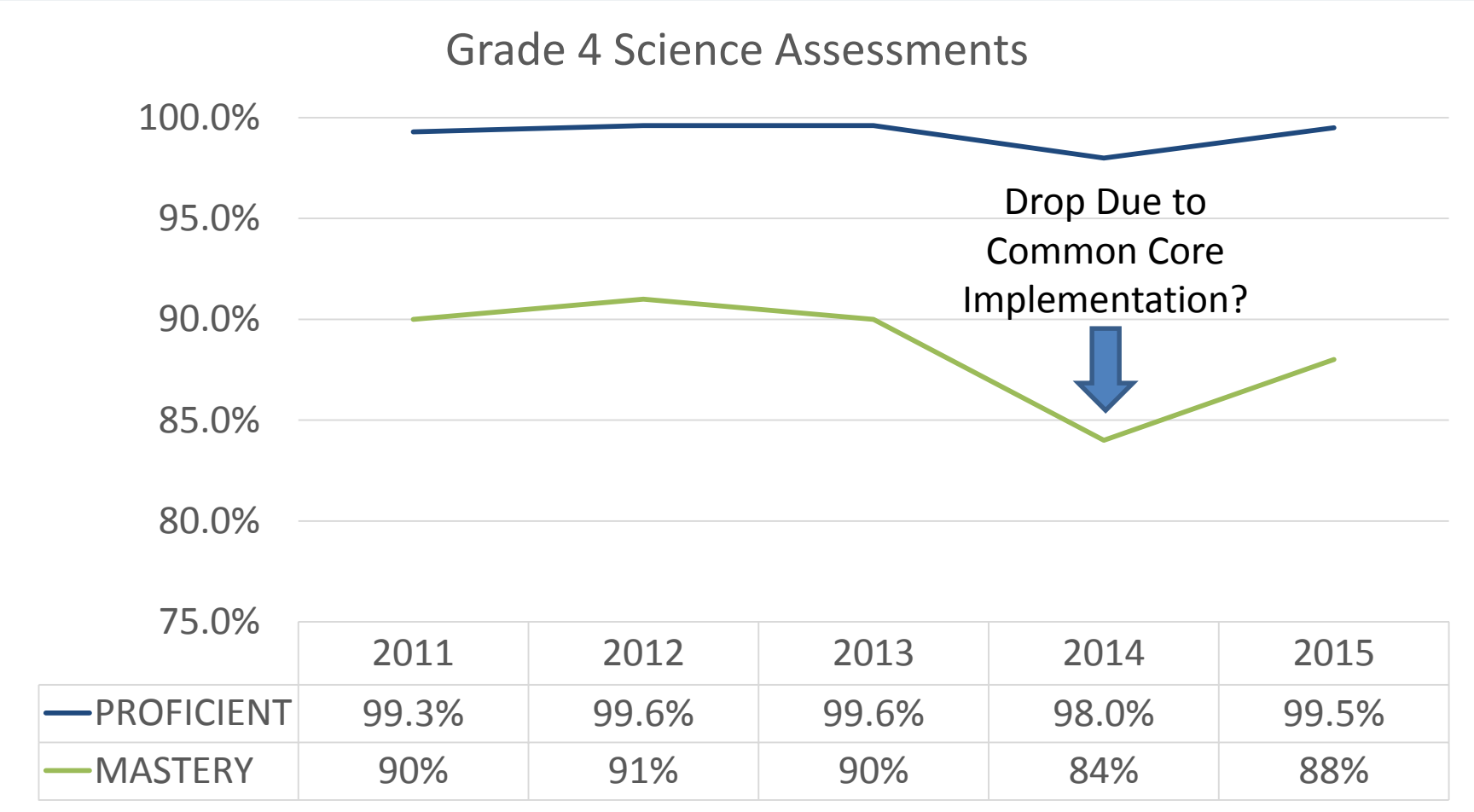
Historical Information

- Both Earth Science and Environmental Science have been courses for acceleration
- Both are high school courses offered in 8th Grade
- Both carry high school credit
- Only Earth Science ends with a Regents exam
- In 2015-16 we had 80% participation in Earth Science and 20% participation in Environmental Science

TYPICAL PROGRESSION FOR SCIENCE

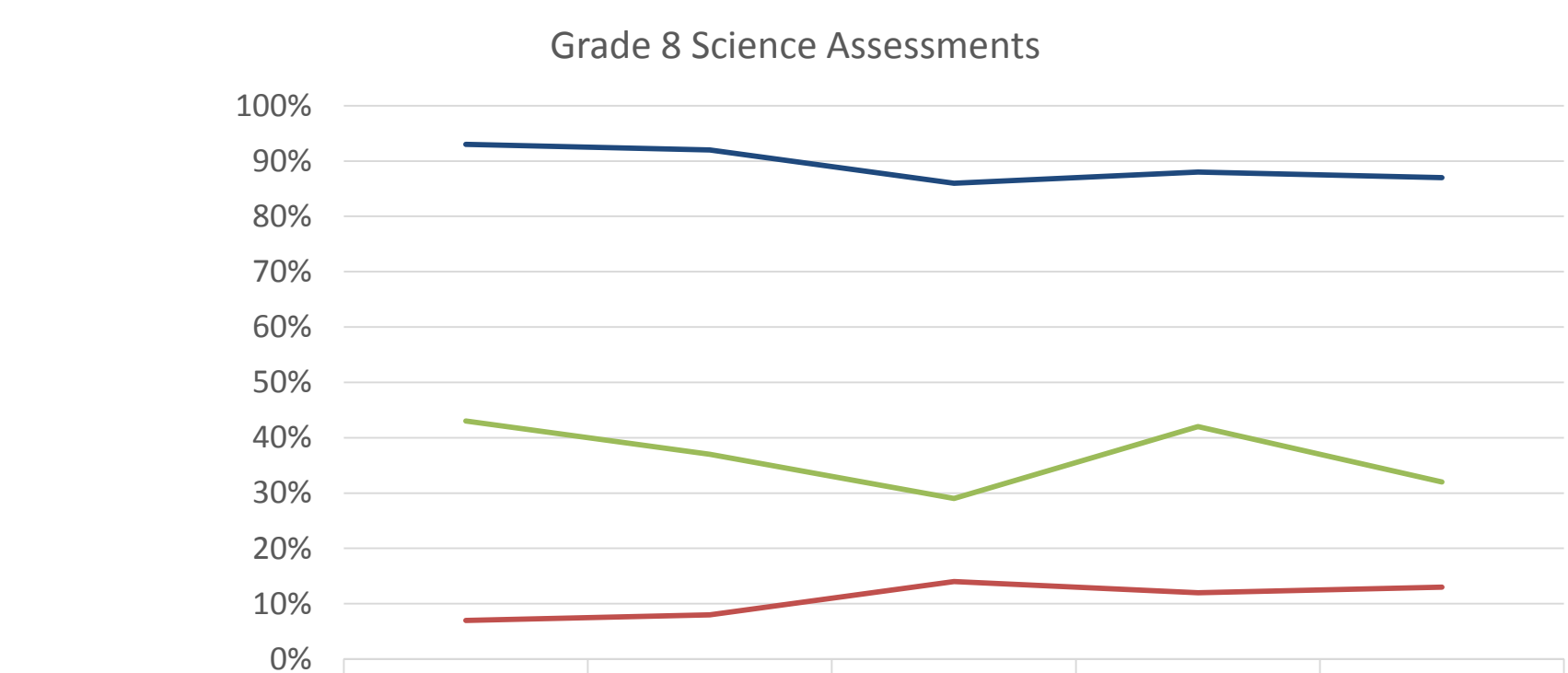


Student Achievement - Elementary



	2011	2012	2013	2014	2015
PROFICIENT	99.3%	99.6%	99.6%	98.0%	99.5%
MASTERY	90%	91%	90%	84%	88%

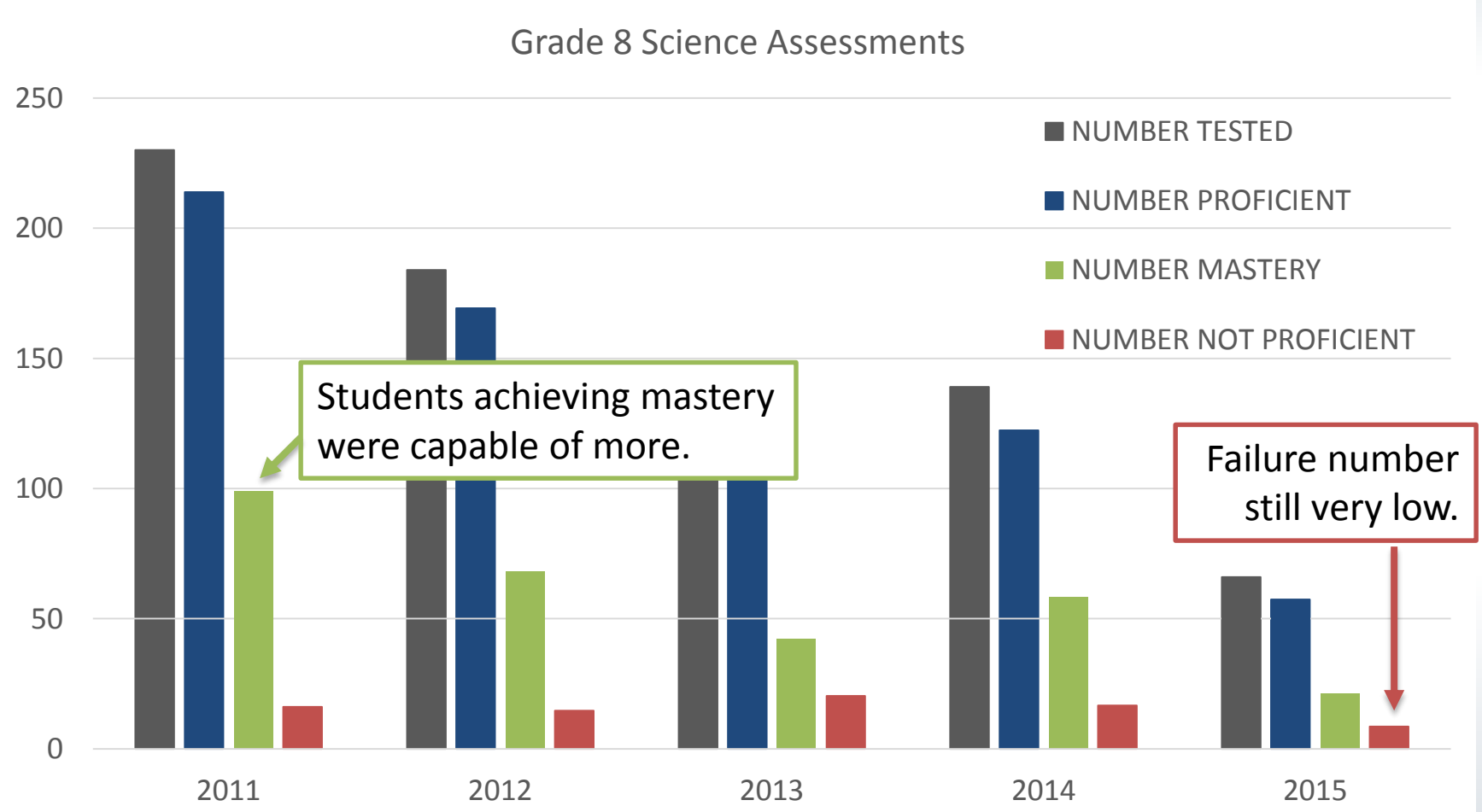
Student Achievement – Middle School



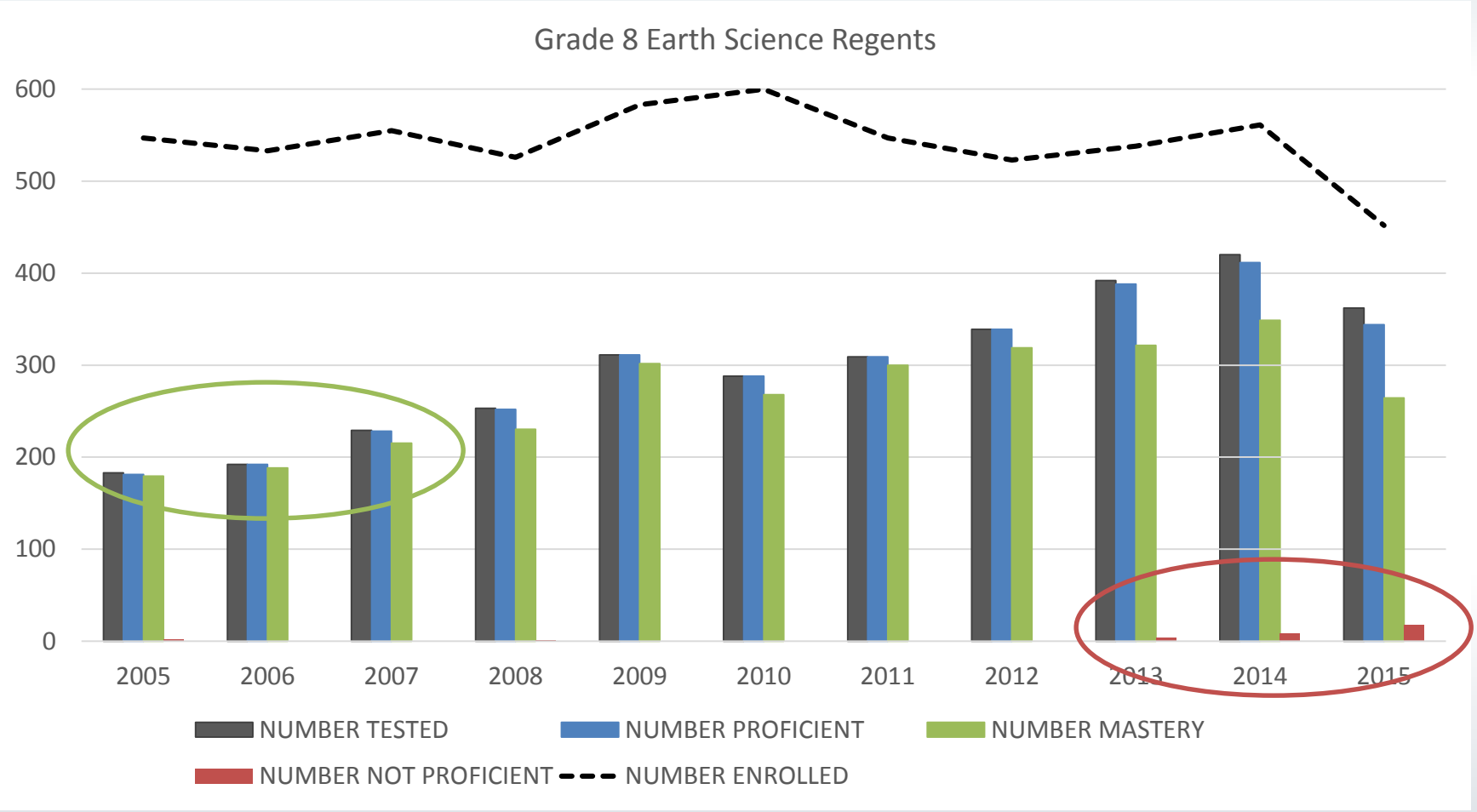
	2011	2012	2013	2014	2015
PROFICIENT	93%	92%	86%	88%	87%
MASTERY	43%	37%	29%	42%	32%
NOT PROFICIENT	7%	8%	14%	12%	13%

Is this significant?

Student Achievement – Science 8



Student Achievement – Regents



What does the data demonstrate?

- Common Core likely had an impact on the elementary science curriculum.
- Middle school students have risen to the challenge of a richer curriculum.
- Some students are now struggling with this curriculum.

Next Generation Science Standards

8 Practices from NGSS

1. Asking questions (for science) and defining problems (for engineering)
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 (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

http://www.nextgenscience.org/sites/ngss/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf

Authors: NGSS Lead States
Title: Next Generation Science Standards: For States, By States

NYS Science Learning Standards

- Built on NGSS 3 Dimensions:
  - Crosscutting Concepts
  - Inquiry-based (Discovery vs. Memorization)
  - Disciplinary Core Ideas
- Will (likely) be adopted spring/summer 2016
- Assessments in place 2-3 years after

References:
http://www.nextgenscience.org/three-dimensions
http://www.p12.nysed.gov/ciai/mst/sci/documents/NYSED-Fall-2015-Science-Update.pdf
Progress and Timeline http://www.p12.nysed.gov/ciai/mst/sci/nyssls.html
Draft Standards: http://www.p12.nysed.gov/ciai/mst/sci/nys-p12-science-ls-intro.html

Initiatives Grades K-5: Building “STEM”

- Since 2014-2015 a part time STEM teacher has been working with all elementary schools to turn our current science units into Science and Engineering opportunities
- Students have also been engaged in Lego Robotics in their enrichment classes
- Next Steps:
  - Begin aligning K-7 Science Curriculum to further include Math and Engineering practices

Recommendations

- "Keep building the ramp"
  - Continue/enhance investment in K-5 STEM;
  - Continue to review/enhance 6th & 7th grade science curriculum;
- Propose to Secondary Curriculum Council a new 8th grade "General Science" course with 3 goals:
  - Introduce NGSS 3-Dimensions approach.
  - Prepare students for 8th grade science assessment
  - Prepare students well for Earth Science (9th grade)
- Review all science after NYSSLS/NGSS adoption


Math
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Math Acceleration - Overview

- Current Curriculum - Topics and Progressions
- Student Achievement Data Analysis
- Initiatives in Progress
- Anticipated NYSED Standards Revisions
- Recommendations

MATH CC STATE STANDARDS Aligned GRADES K-5

GRADE K	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
Counting and Cardinality			Operations and Algebraic Thinking	Operations and Algebraic Thinking	Operations and Algebraic Thinking
Operations and Algebraic Thinking	Operations and Algebraic Thinking	Operations and Algebraic Thinking	Number and Operations in Base Ten	Number and Operations in Base Ten	Number and Operations in Base Ten
Number and Operations in Base Ten	Number and Operations in Base Ten	Number and Operations in Base Ten	Number and Operations-Fractions	Number and Operations-Fractions	Number and Operations-Fractions
Measurement and Data	Measurement and Data	Measurement and Data	Measurement and Data	Measurement and Data	Measurement and Data
Geometry	Geometry	Geometry	Geometry	Geometry	Geometry

MATH CC STATE STANDARDS Aligned
GRADES 6&7

GRADE 6	GRADE 7
Ratios and Proportional Relationships	Ratios and Proportional Relationships
The Number System	The Number System
Expressions and Equations	Expressions and Equations
Geometry	Geometry
Statistics and Probability	Statistics and Probability

Domains	Math K	Math 1	Math 2	Math 3	Math 4	Math 5	Math 6	Math 7	Math 8
Counting and Cardinality	Know number names and count sequence. Count to tell the number of objects. Compare numbers.								
Operations and Algebraic Thinking	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.	Represent and solve problems involving addition and subtraction. Understand and apply properties of operations and the relationship between addition and subtraction. Add and subtract within 20. Work with addition and subtraction equations.	Represent and solve problems involving addition and subtraction. Add and subtract within 20. Work with equal groups of objects to gain foundations for multiplication.	Represent and solve problems involving multiplication and division. Understand properties of multiplication and the relationship between multiplication and division. Multiply and divide within 100. Solve problems involving the four operations, and identify and explain patterns in arithmetic.	Use the four operations with whole numbers to solve problems. Gain familiarity with factors and multiples. Generate and analyze patterns.	Write and interpret numerical expressions. Analyze patterns and relationships.			
Number and Operations in Base Ten	Work with numbers 11-19 to grain foundations for place value.	Extend the counting sequence. Understand place value. Use place value understanding and properties of operations to add and subtract.	Understand place value. Use place value understanding and properties of operations to add and subtract.	Use place value understanding and properties of operations to perform multi-digit arithmetic.	Generalize place value understanding for multi-digit whole numbers. Use place value understanding and properties of operations to perform multi-digit arithmetic.	Understand the place value system. Perform operations with multi-digit whole numbers and with decimals to hundredths.			
Measurement and Data	Describe and compare measurable attributes. Classify objects in categories.	Measure lengths indirectly and by iterating length units. Tell and write time. Represent and interpret data.	Measure and estimate lengths in standard units. Relate addition and subtraction to length. Work with time and money. Represent and interpret data.	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. Represent and interpret data.. Geometric measurement: understand concepts of area and relate area to multiplication and, addition. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. Represent and interpret data. Geometric measurement: understand concepts of angle and measure angles.	Convert like measurement units within a given measurement system. Represent and interpret data. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.			
Geometry	Identify and describe shapes. Analyze, compare, create, and compose shapes.	Reason with shapes and their attributes.	Reason with shapes and their attributes.	Reason with shapes and their attributes..	Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	Graph points on the coordinate plane to solve real-world and mathematical problems. Classify two-dimensional figures into categories based on their properties.	Solve real-world and mathematical problems involving area, surface area and volume.	Draw, construct and describe geometrical figures and describe the relationships between them. Solve real-life and mathematical problems involving angle measure, area, surface area and volume.	Understand congruence and similarity using physical models, transparencies or geometry software.. Understand and apply the Pythagorean Theorem.. Solve real-world and mathematical problems involving volume of cylinders, cones and spheres..
Number and Operations — Fractions				Develop understanding of fractions as numbers.	Extend understanding of fraction equivalence and ordering. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. Understand decimal notation for fractions, and compare decimal fractions.	Use equivalent fractions as a strategy to add and subtract fractions. Apply and extend previous understandings of multiplication and division to multiply and divide fractions.			
Statistics and Probability							Develop understanding of statistical variability. Summarize and describe distributions.	Use random sampling to draw inferences about a population. Draw informal comparative inferences about two populations. Investigate chance processes and develop, use, and evaluate probability models.	Investigate patterns of association in bivariate data..
Ratios and Proportional Reasoning							Understand ratio concepts and use ratio reasoning to solve problems.	Analyze proportional relationships and use them to solve real-world and mathematical problems.	
The Number System							Apply and extend previous understandings of multiplication and division to divide fractions by fractions. Compute fluently with multi-digit numbers and find common factors and multiples. Apply and extend previous understandings of numbers to the system of rational numbers.	Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers.	Know that there are numbers that are not rational, and approximate them by rational numbers..
Expressions and Equations							Apply and extend previous understandings of arithmetic to algebraic expressions. Reason about and solve one-variable equations and inequalities. Represent and analyze quantitative relationships between dependent and independent variables.	Use properties of operations to generate equivalent expressions. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	Work with radicals and integer exponents.. Understand the connections between proportional relationships, lines and linear equations.. Analyze and solve linear equations and pairs of simultaneous linear equations..
Functions									Define, evaluate and compare functions.. Use functions to model relationships between quantities..

Math CC State Standards K-8

For Syosset Students

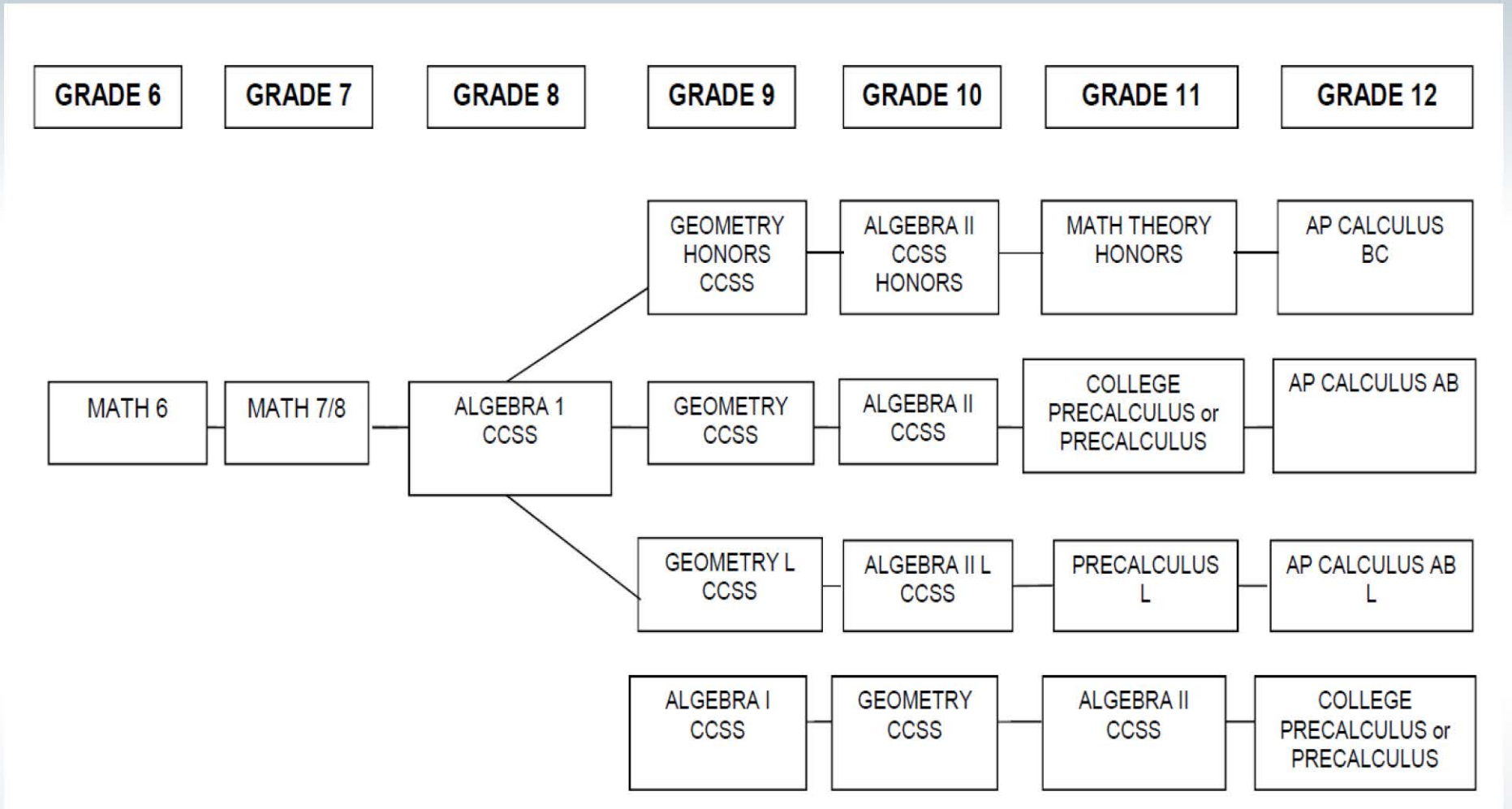
- We have a 10-year track record on Acceleration for Math
  - started prior to 2004 as Math A honors
- This allows students an opportunity to be able to take AP Calculus in grade 12
- In 2007-2008 school year SED changed to the Integrated Algebra curriculum

Middle School Math Progression

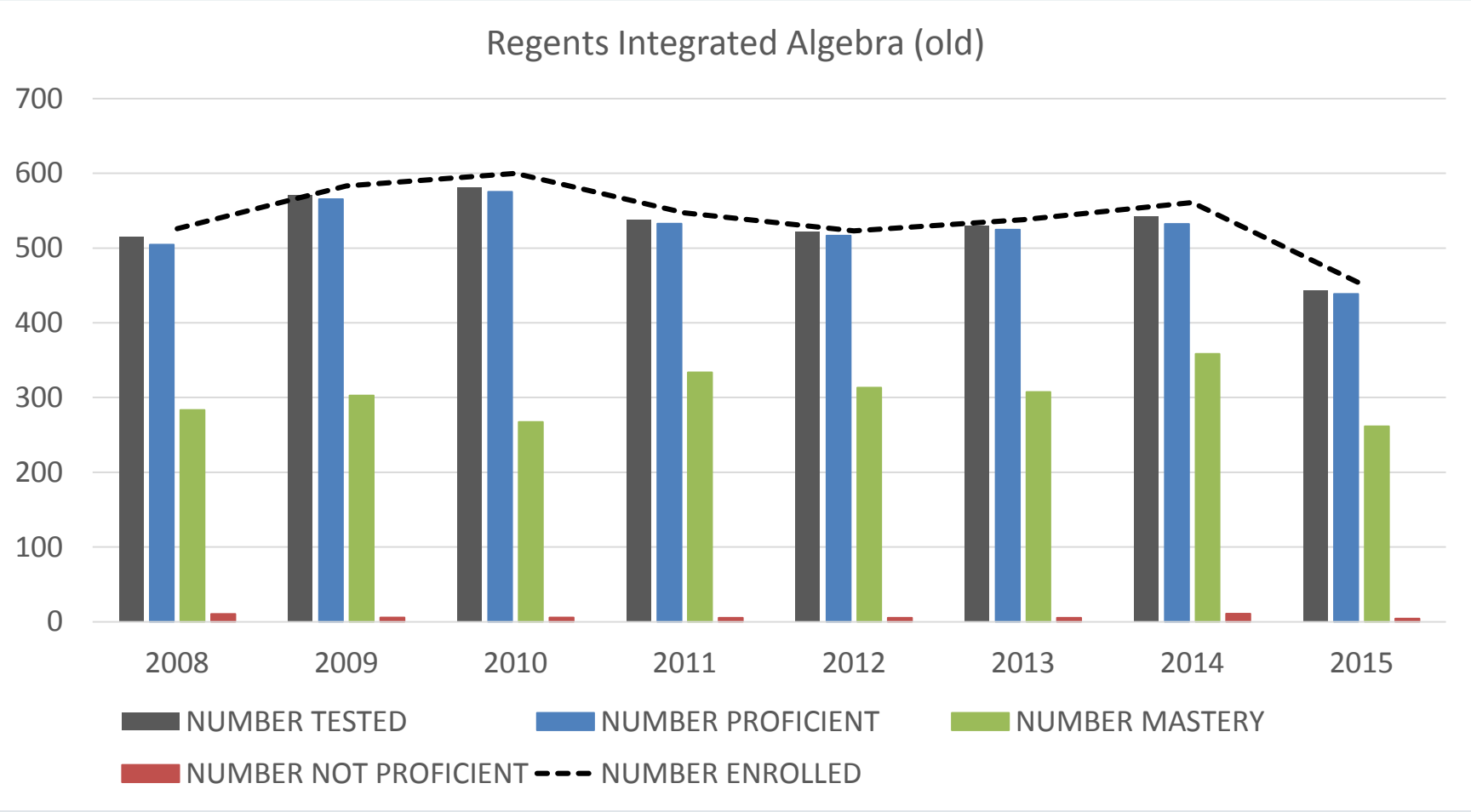
Curriculum was changed for Grades 6 & 7 to include standards from the succeeding year in preparation for all students to take Integrated Algebra since 2007-2008 school year.

- Grade 6 includes Grade 7 standards
- Grade 7 includes Grade 8 standards
- Grade 8 includes Grade 8 standards along with Algebra standards.
- In 2013- 2014, CCSS standards were introduced and CCSS Algebra 1 was administered for the first time in Grade 8

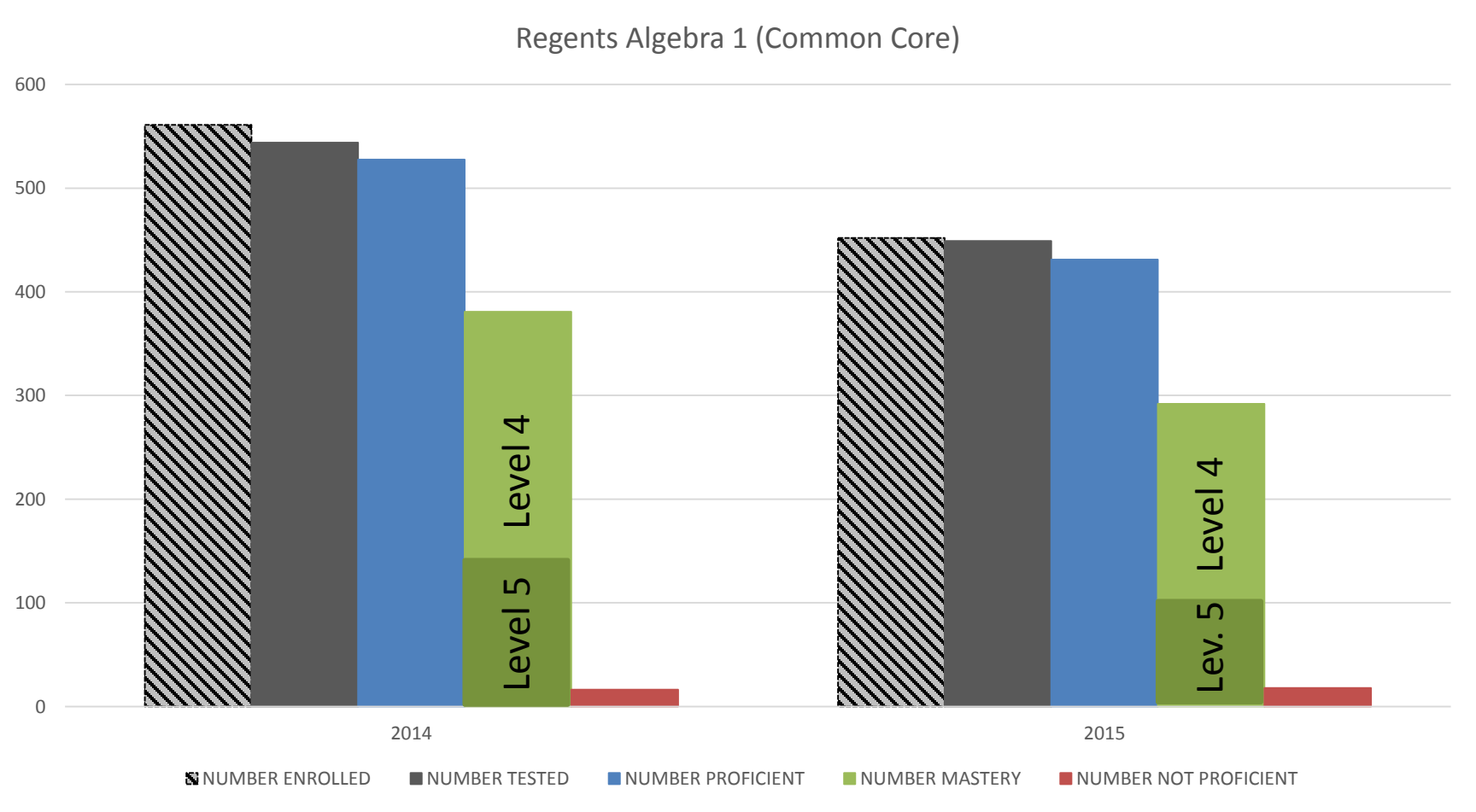
TYPICAL PROGRESSION FOR MATH



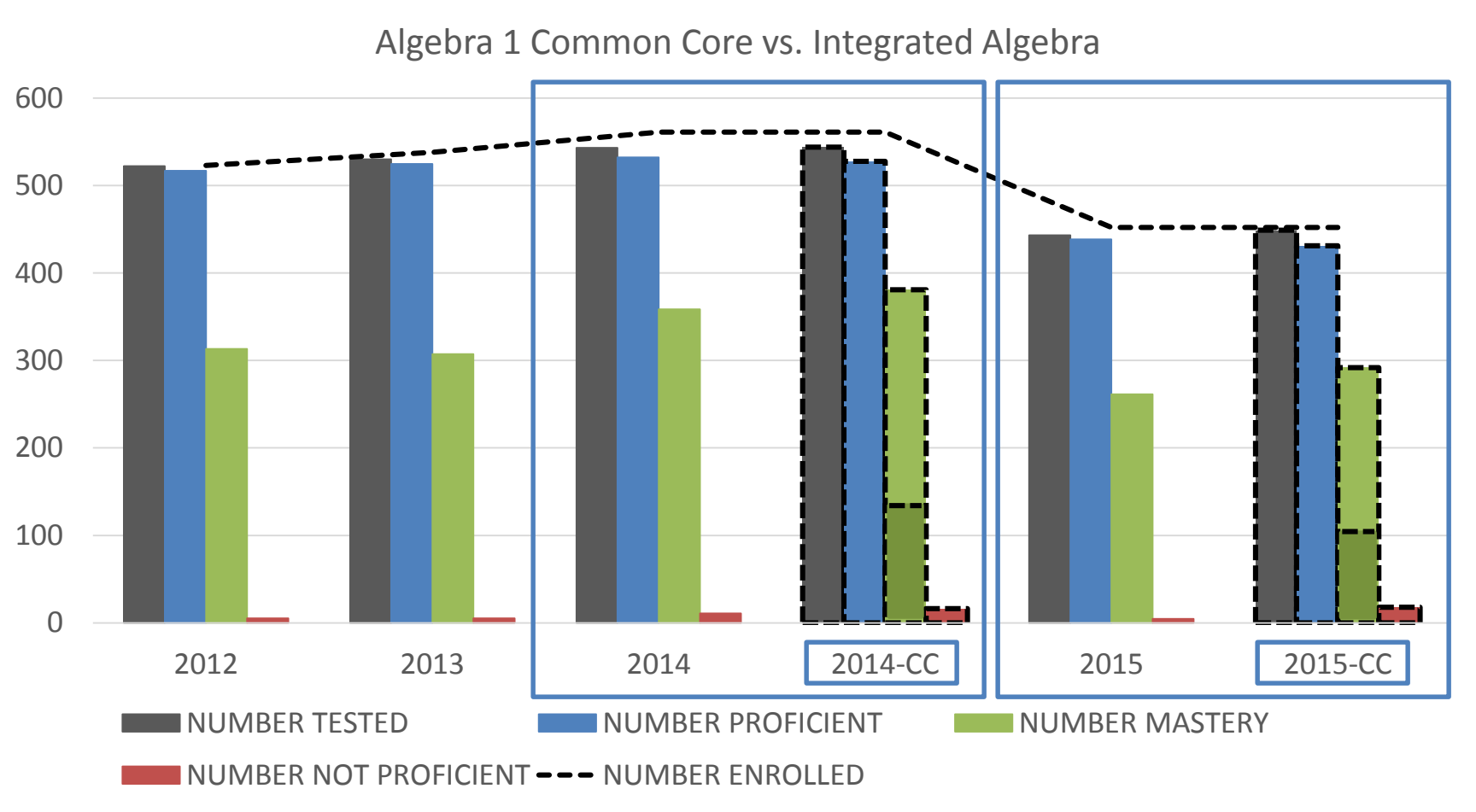
Student Achievement – Old Algebra 1



Student Achievement – New Algebra 1



Algebra 1 (Common Core vs. Old)



What does the data demonstrate?

- Middle school students have risen to the challenge of a richer curriculum.
  - Nearly all students passed Integrated Algebra.
- Algebra 1 Common Core is more challenging
  - Passing rates have dropped slightly
  - Level 4&5 ("College and Career Ready") rates are comparable to former mastery rates.
  - Mastery rates have dropped
    - New standard
    - Controversial conversion scale for mastery

Math Standards History

- 1967 – Math 9, Math 10, Math 11
- 1977 – Sequential I, II, III
- 2004 – Math A/Math B
- 2005 – Integrated Algebra, Geometry, Alg.2/Trig.
  - Adopted 2005; assessed in 2007-08
- 2010 – Common Core
  - Adopted 2010; assessed in 2013-14
- 2016?? – Common Core Review
  - Commissioner Elia announces review of entire CC Standards; indicates “Commencement Math” needs adjustment, early grade rigor needs attention.

Recommendations

- "Keep building the ramp"
  - Common Core math instruction began in 2011-12;
  - Current 8th graders are first with:
    - Go Math 6th grade (CC-aligned)
    - Big Ideas 7th grade (CC-aligned textbook)
  - Continue to review/enhance 6th & 7th grade math curriculum;
- Make all math options available in both HB Thompson & South Woods.
- Review all math sequences after (if?) Commissioner Elia revises standards.

APPENDIX

NYS GRADE 4 SCIENCE ASSESSMENT RESULTS

YEAR	2011	2012	2013	2014	2015
NUMBER TESTED	441	479	483	505	442
PROFICIENT	99.3%	99.6%	99.6%	98%	99.5%
MASTERY	90%	91%	90%	84%	88%
NOT PROFICIENT	< 1%	< 1%	< 1%	2%	< 1%
PROFICIENT REGION	96%	96%	96%	95%	94%
GAP REGION	3.3%	3.6%	3.6%	3%	5.5%

NYS GRADE 8 SCIENCE ASSESSMENT RESULTS

YEAR	2011	2012	2013	2014	2015
NUMBER TESTED	230	184	145	139	66
PROFICIENT	93%	92%	86%	88%	87%
MASTERY	43%	37%	29%	42%	32%
NOT PROFICIENT	7%	8%	14%	12%	13%
PROFICIENT REGION	82%	81%	81%	76%	70%
GAP FROM REGION	11%	11%	5%	12%	17%

MIDDLE SCHOOLS	Grade 8 EARTH SCIENCE REGENTS RESULTS										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
#Students enrolled	547	533	555	526	583	600	547	523	538	561	452
#Students exam	183	192	229	253	311	288	309	339	392	420	362
%Students exam	33.5	36.0	41.3	48.1	53.3	48.0	56.5	64.8	72.9	74.9	80.1
Average Grade	95.1	93.7	92.5	92.6	93.3	92.7	92.6	93.2	89.7	90.4	87.4
% Proficient	99	100	99.6	99.6	100	100	100	100	99	98	95
% Mastery	98	98	94	91	97	93	97	94	82	83	73
# Below 55	1	0	0	0	0	0	0	0	0	3	12
% Proficient Region	85	89	86	84	89	88	86	89	86	87	87
% Gap from Region	14	11	13.6	15.6	11	12	14	11	13	11	8

Grade 8 Math Regents Data

	MIDDLE SCHOOLS COMBINED-INTEGRATED ALGEBRA							
	2008	2009	2010	2011	2012	2013	2014	2015
# STUDENTS ENROLLED	526	583	600	547	523	538	561	452
# STUDENTS TESTED	515	571	581	538	522	530	543	443
% STUDENTS TESTED	97.9%	97.9%	96.8%	98.4%	99.8%	98.5%	96.8%	98.0%
AVERAGE GRADE	85	85	84	86	86	86	87	86
% PROFICIENT	98%	99%	99%	99%	99%	99%	98%	99%
% MASTERY	55%	53%	46%	62%	60%	58%	66%	59%
% NOT PROFICIENT	2%	1%	1%	1%	1%	1%	2%	1%
# BELOW 55	4	1	3	1	2	1	2	1
% PROFICIENT REGION	85%	87%	87%	87%	88%	87%	86%	70%
% GAP FROM REGION	13%	12%	12%	12%	11%	12%	12%	29%

Grade 8 Common Core Math Regents Data

	MIDDLE SCHOOLS COMMON CORE ALGEBRA I	
	2014	2015
# STUDENTS ENROLLED	561	452
# STUDENTS TESTED	544	449
% STUDENTS TESTED	97%	99.3%
AVERAGE GRADE	79	78
% PROFICIENT	97%	96%
% LEVEL 4&5	70%	65%
% MASTERY	25%	22%
% NOT PROFICIENT	3%	4%
# BELOW 55	0	3
% PROFICIENT REGION	79%	77%
% GAP FROM REGION	18%	19%

Students opportunities prior to Grade 8

- With the help of our part time STEM teacher students are participating in hands on activities via STEM related opportunities
- Leading up to Grade 8 students participate in courses in Technology and STEM Explorations which lead to
- Opportunities in Grades 10-12 for courses like SY-SYSTEM Robotics, Robotics Design and
- Grades 11-12 College Engineering and College Nanotechnology

Clubs and Other Activities

- Hour of Code
- Brown bag lunches
- Robotics FIRST Tech Challenge
- Computer Science classes
- Math club
- Math Olympics
- Math Fair for Grades 7 & 8