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# Mathematics Curriculum Review

— Herricks School District —

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# Herricks Math Education Philosophy

- Develop students' critical thinking and problem solving abilities
- Student centered environment, investigation and discovery approach
- Appreciate the beauty of mathematics and study the relevance of application across disciplines

# Guiding Question

The purpose of this curriculum review is to ask ourselves:

**“How can we as a community of learners advance the teaching and learning of mathematics at Herricks and engage in continuous improvement?”**



# Overview

- **Math Curriculum and Standards**
- **Vertical and Horizontal Alignment of Curriculum**
- **Textbook Adoptions and Alignment to Standards**
- **Mathematical Practices and Growth Mindset**
- **Best Practices**
- **Data- How Are We doing ?**
- **Goals for Continuous Improvement**
- **Student Survey**
- **Recommendations**
- **Questions and Comments**

# Mathematics Progression of Domains

| K                                | 1                                 | 2                                 | 3 | 4 | 5                          | 6                     | 7         | 8 | HS                       |                          |
|----------------------------------|-----------------------------------|-----------------------------------|---|---|----------------------------|-----------------------|-----------|---|--------------------------|--------------------------|
| Mathematical Practices           |                                   |                                   |   |   |                            |                       |           |   |                          | College and Career Ready |
| Counting and Cardinality         | Operations and Algebraic Thinking |                                   |   |   | Expressions and Equations  |                       |           |   | Algebra                  |                          |
|                                  |                                   | Number and Operations – Fractions |   |   |                            | Ratio and Proportions | Functions |   | Functions                |                          |
|                                  |                                   |                                   |   |   |                            | The Number System     |           |   | Number & Quantity        |                          |
|                                  |                                   |                                   |   |   |                            |                       |           |   | Statistics & Probability |                          |
|                                  |                                   |                                   |   |   |                            |                       |           |   | Geometry                 |                          |
| Number and Operations – Base Ten |                                   |                                   |   |   | Measurement and Data       |                       |           |   |                          |                          |
|                                  |                                   |                                   |   |   | Statistics and Probability |                       |           |   |                          |                          |
|                                  |                                   |                                   |   |   | Geometry                   |                       |           |   |                          |                          |

MODELING

# Vertical and Horizontal Curriculum Alignment

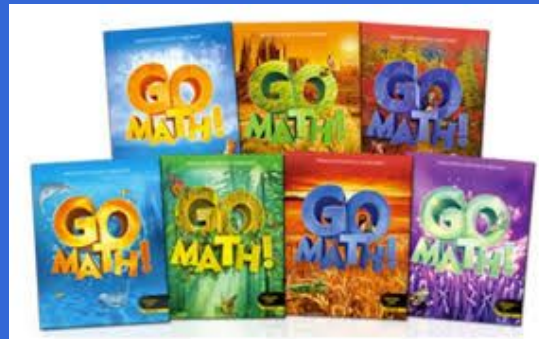
K-12 Vertical Team

Math Facilitators at the 3 Elementary Schools

Elementary Math/Science Coordinator

- Developing Common Mathematical Language and Strategies
- Developing Mathematical Practices
- Understanding the progression of standards from one grade to the next

# Textbook Adoption



Elementary Math - Go Math Program K-5 by HMH

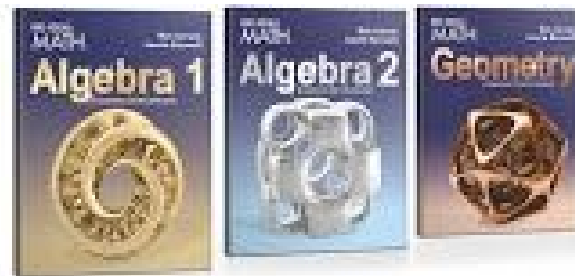
Middle School - Glencoe Math Course I, II and III

High School

Big Ideas Algebra 1

Big Ideas Geometry

Big Ideas Algebra 2



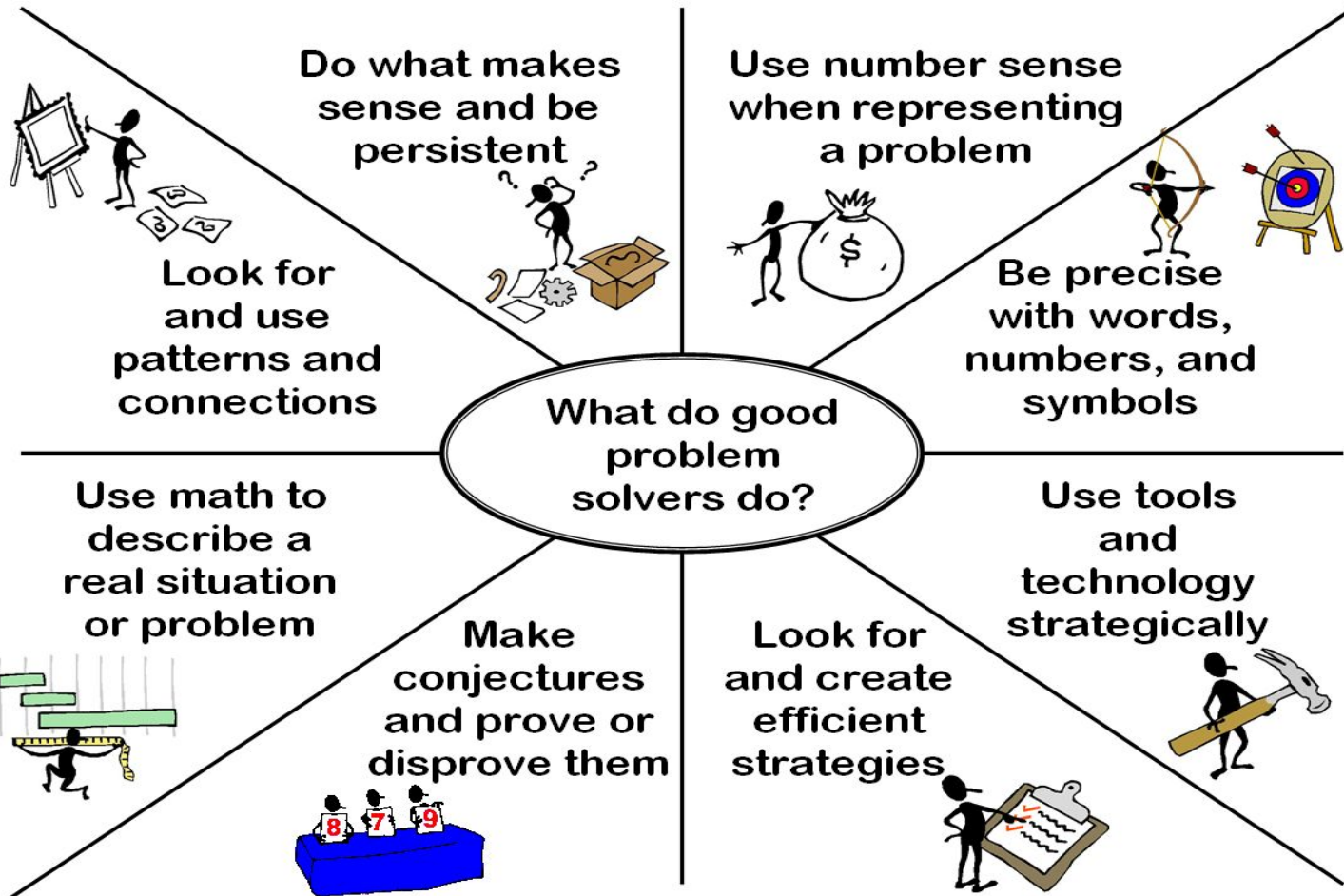
## Design of our Math Curriculum K-8

-Clear learning targets based on NYS Standards

-Go Math/Glencoe textbook and resources

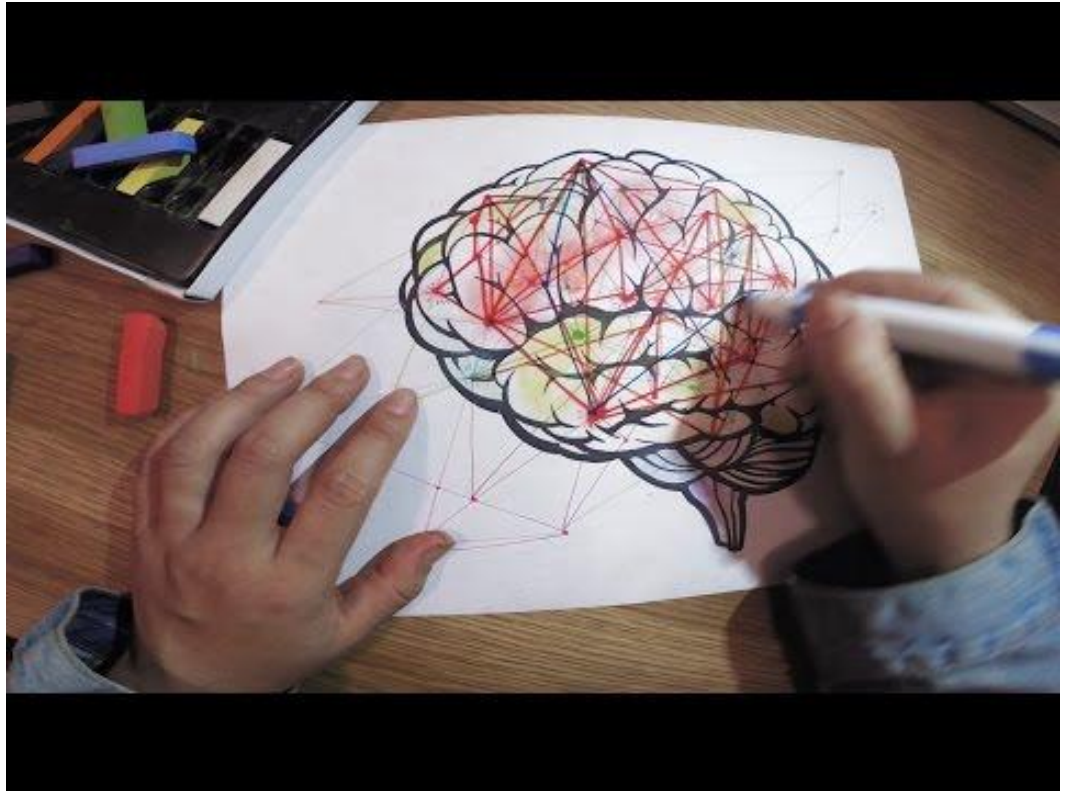
-Engage NY modules and other complementary resources

| Unit 1 Developing Fluency with Multiplication and Division |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                               |                                                 |                                                                                                                                                           |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Days                                                       | Learning Targets                                                                                | Expectations                                                                                                                                                                                                                                                                                                                                                                                  | Core Resources                                  | Complementary Resources                                                                                                                                   |
| 3-4 times per/week                                         | I will use mental math strategies to add and subtract by...                                     | <ul style="list-style-type: none"> <li>Participating in Grade level fluency activities</li> <li>Developing long term problem solving skills</li> <li>Visualizing math concepts.</li> </ul>                                                                                                                                                                                                    |                                                 | <ul style="list-style-type: none"> <li>Sprints</li> <li>Games</li> <li>Number lines</li> <li>Number bonds</li> </ul>                                      |
| 1-2                                                        | I can set rules and goals with my class by....                                                  |                                                                                                                                                                                                                                                                                                                                                                                               |                                                 |                                                                                                                                                           |
| 3                                                          | I can engage in Mathematical Practices by...                                                    | <ul style="list-style-type: none"> <li>build on others' ideas and express ideas clearly by asking thoughtful questions.</li> <li>Listening attentively and respectfully to others.</li> <li>Appropriately challenging others' ideas.</li> <li>Effectively following set behaviors and norms for discussion.</li> </ul>                                                                        |                                                 | <ul style="list-style-type: none"> <li>Talk Moves</li> <li>EngageNY Mathematical Practices</li> <li>Discussing Protocols i.e. Fish Bowl etc...</li> </ul> |
| 4-5                                                        | I can explain the relationship between digits in different places of a multi-digit number by... | <ul style="list-style-type: none"> <li>Building numbers with base-ten blocks.</li> <li>Using a place-value chart.</li> <li>Using a vertical number line.</li> <li>Comparing the value of different digits by using phrases such as, "___ is 10 times as much as ___" and "___ is 1/10 of ___."</li> <li>Writing multi-digit numbers in standard form, word form and expanded form.</li> </ul> | Ch. 1, Lesson 1.1, 1.2, 1.3                     |                                                                                                                                                           |
| 6-8                                                        | I can explain the relationship between digits in different decimal places by...                 | <ul style="list-style-type: none"> <li>Using base-ten blocks.</li> <li>Explaining the pattern for how the number of zeroes in a product relates to the power of 10.</li> <li>Multiplying a whole number by a power of 10.</li> <li>Using a basic fact and a pattern to multiply mentally by multiples of 10, 100, and 1000.</li> </ul>                                                        | M1L1<br>M1L3<br>M1L5<br>Omit lesson 1.4 and 1.5 | <ul style="list-style-type: none"> <li>Use M1L1 Template 2 for all place value</li> </ul>                                                                 |
| 9-10                                                       | I can read, write and                                                                           | <ul style="list-style-type: none"> <li>Using a place-value chart.</li> </ul>                                                                                                                                                                                                                                                                                                                  | M1L6                                            | Do not use PV Chart from                                                                                                                                  |



# Growth Mindset

Attitudes and messages that students get about their math abilities is critical for success



# Best Practices: Grade 1 Math

Students have fun in stations  
and develop math language



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## Best Practices: Algebra 2

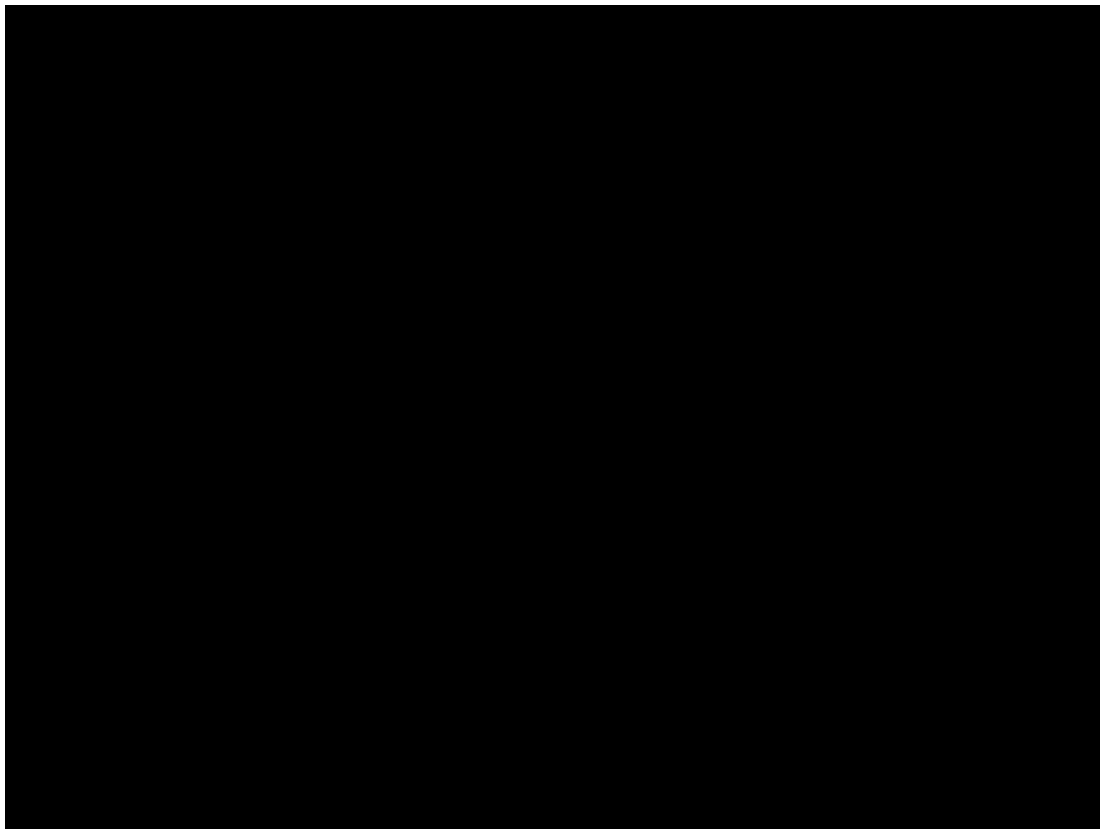
Students collaborate to  
solve problems and  
complete a puzzle



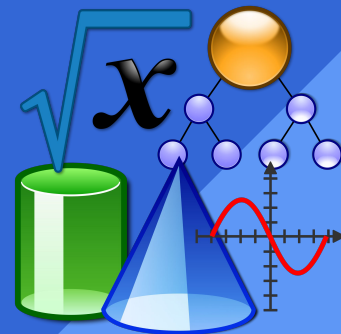
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# Best Practices Algebra 2

Students work in  
groups to solve  
problems



# How are we doing?

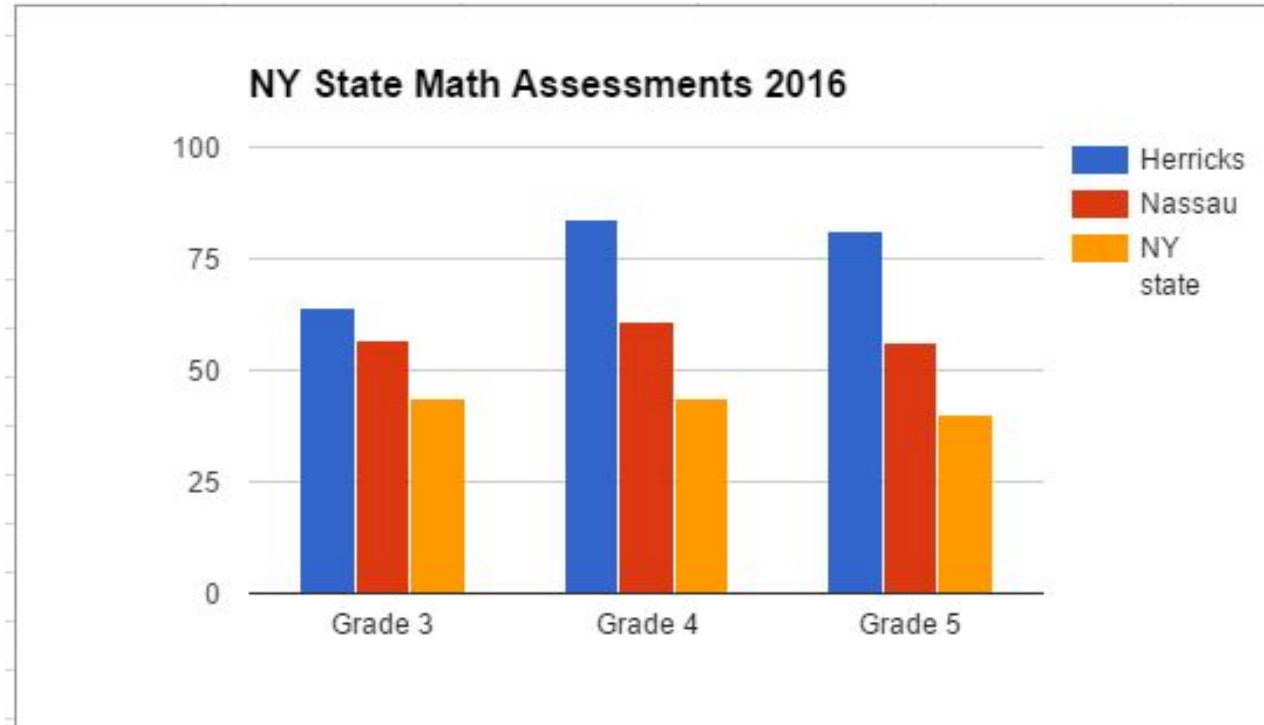


NYS Math Assessments Grades 3-8

Regents Examination

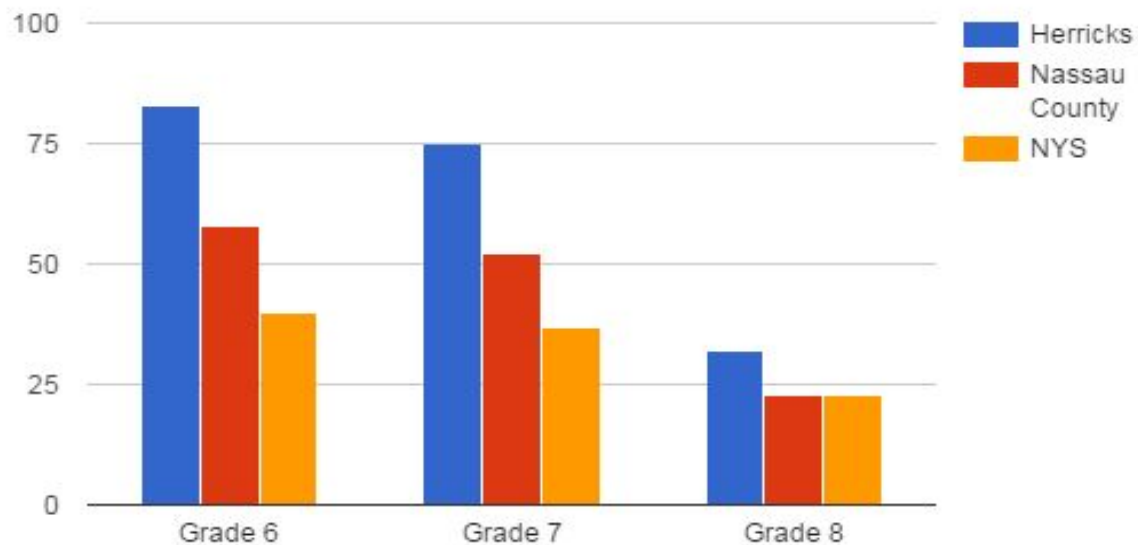
Advanced Placement Exams



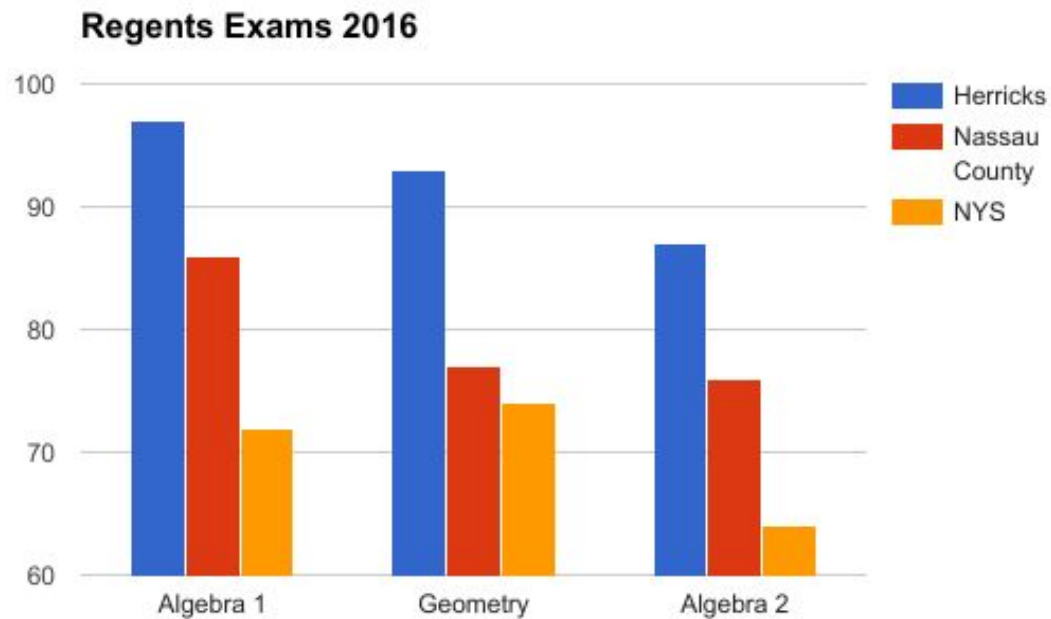


Percent of students scoring at Level 3 or higher in Grades 3, 4 and 5

### NYS Math Assessments Grades 6-8



Percent of students scoring at Level 3 or higher in Grades 6, 7 and 8



Percent of students scoring at Level 3 or higher in Regents Exams

# AP Math Data for Herricks High School

| AP Calculus AB |               |                     |
|----------------|---------------|---------------------|
| Year           | # of students | % level 3 or higher |
| 2013-14        | 123           | 52.0%               |
| 2014-15        | 94            | 63.0%               |
| 2015-16        | 111           | 59.4%               |

| AP Calculus BC |               |                     |
|----------------|---------------|---------------------|
| Year           | # of students | % level 3 or higher |
| 2013-14        | 26            | 96%                 |
| 2014-15        | 19            | 100%                |
| 2015-16        | 34            | 100%                |

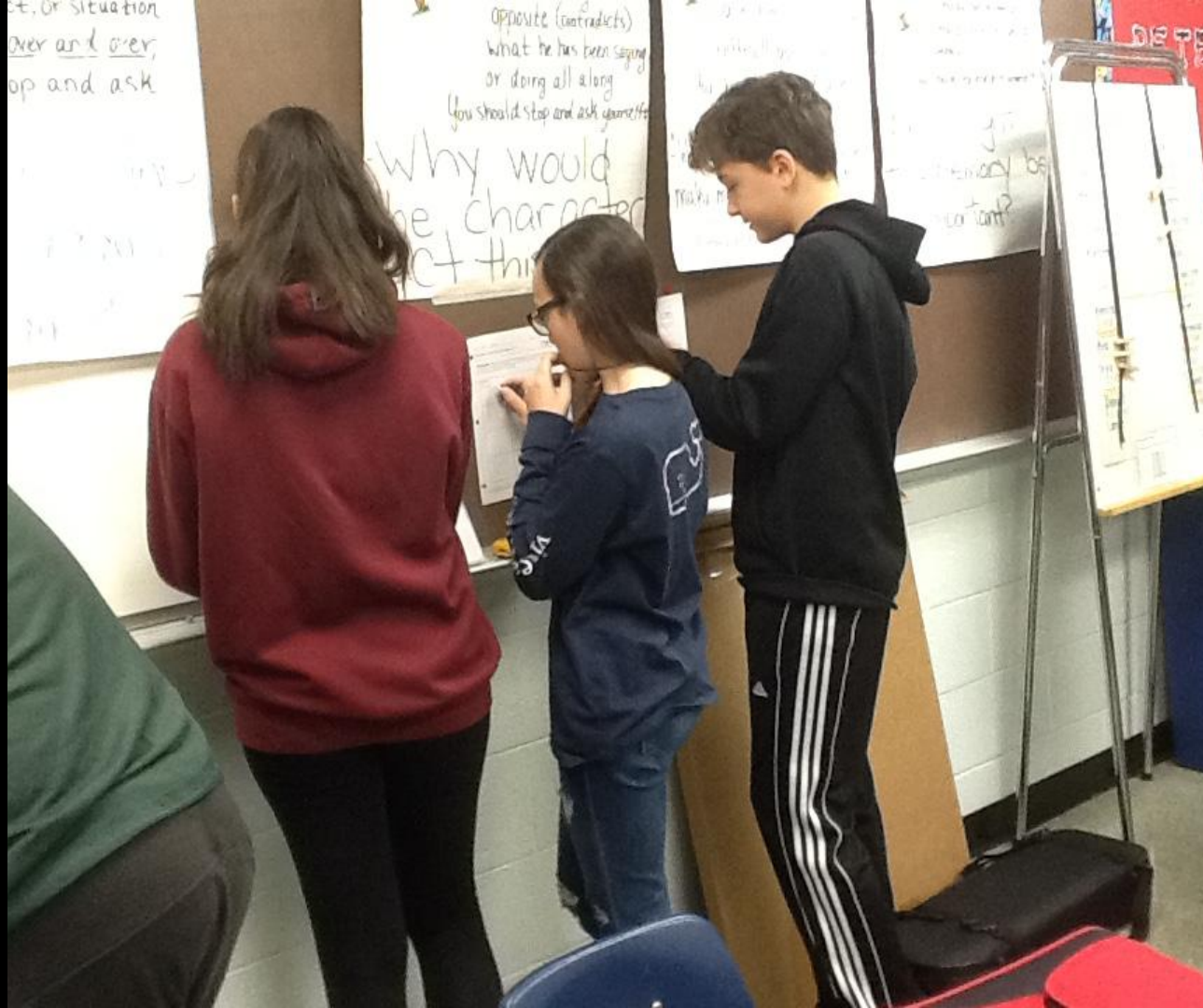
| AP Computer Science |               |                     |
|---------------------|---------------|---------------------|
| Year                | # of students | % level 3 or higher |
| 2013-14             | 21            | 95.2%               |
| 2014-15             | 24            | 83.3%               |
| 2015-16             | 22            | 86.4%               |

| AP Statistics |               |                     |
|---------------|---------------|---------------------|
| Year          | # of students | % level 3 or higher |
| 2013-14       | 21            | 76.20%              |
| 2014-15       | 28            | 92.90%              |
| 2015-16       | 30            | 69.90%              |

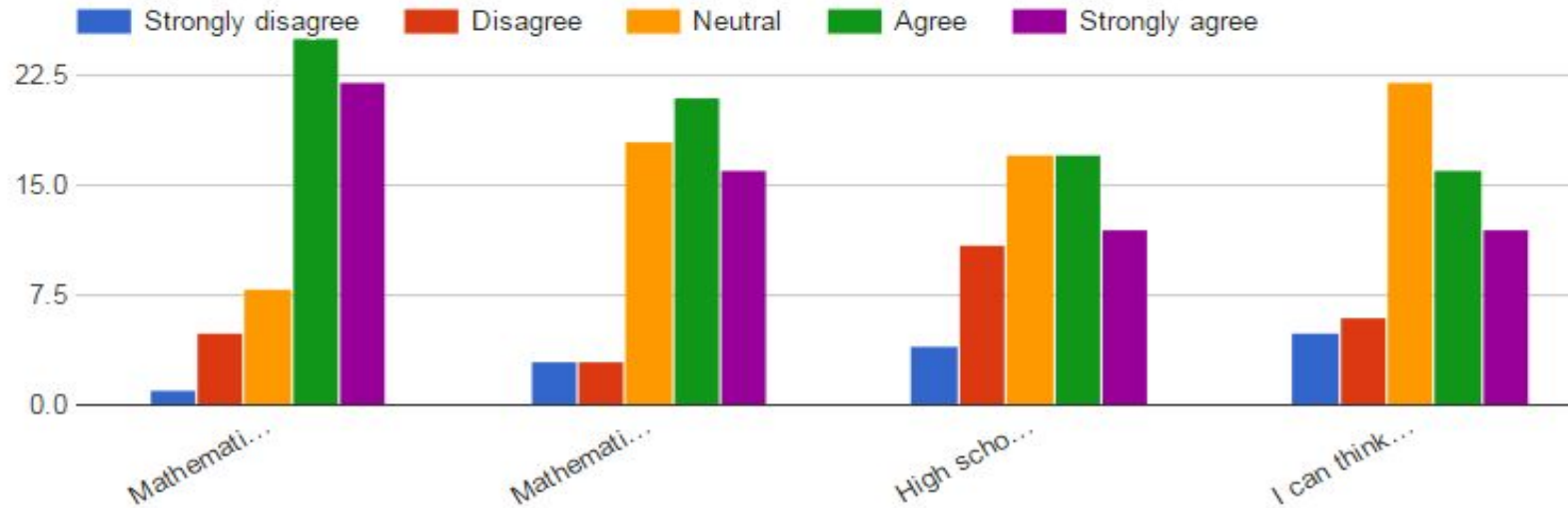
# Students' K- 12 Math Experience

## Grade 12 Student Survey Questions

- Value
- Motivation
- Self Confidence
- Instruction
- Technology



## Value and motivation



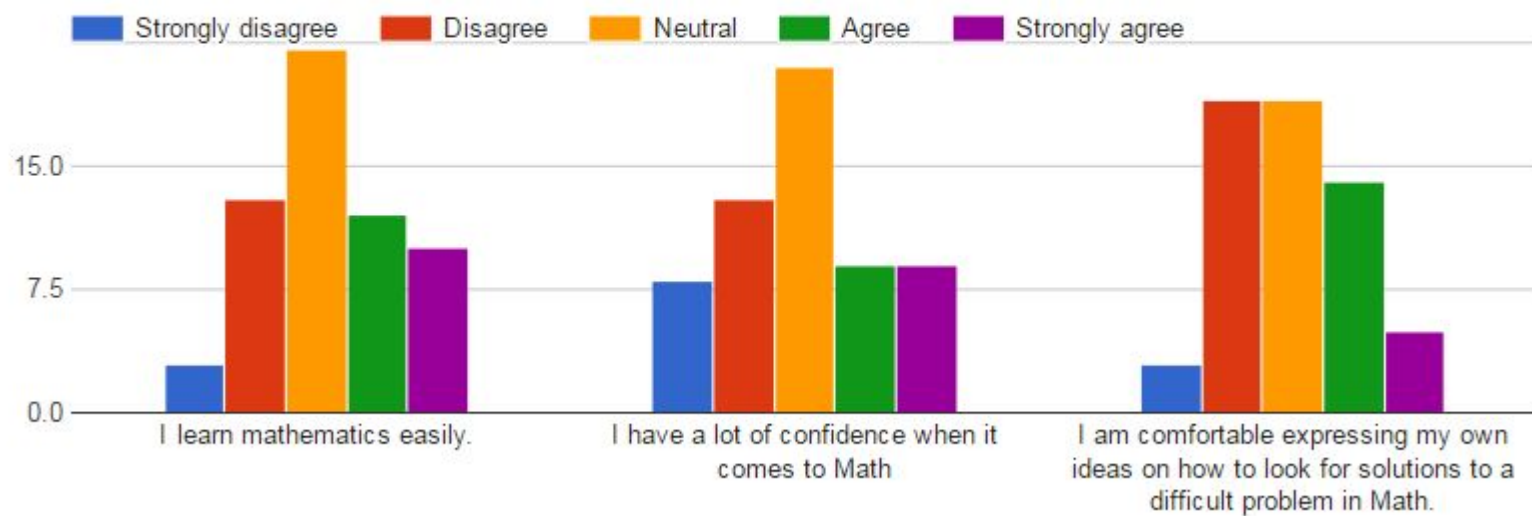
Mathematics is a very worthwhile and necessary subject.

Mathematics is important in everyday life

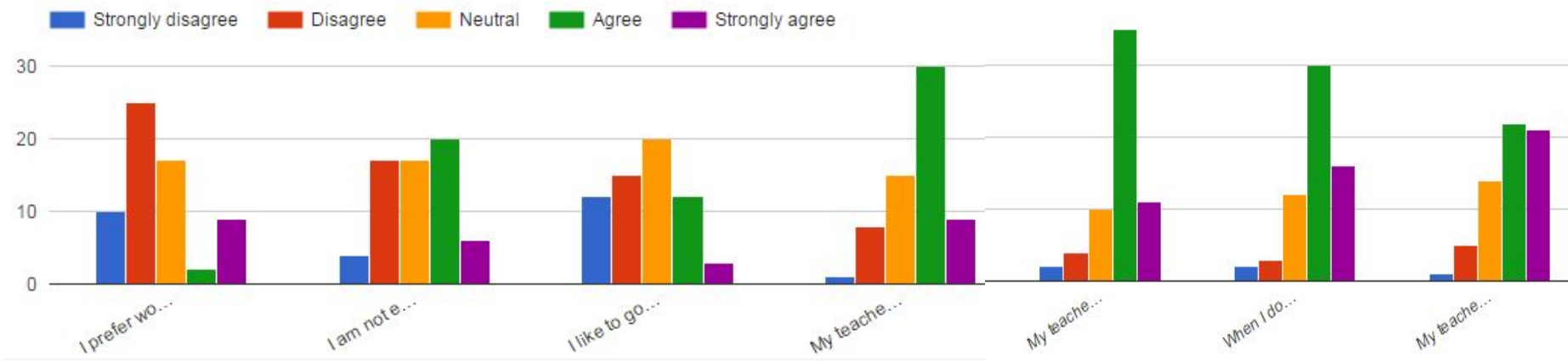
High school math courses would be very helpful no matter what I decide to study.

I can think of many ways that I use math outside of school.

## Self-confidence



# Math Class



I prefer working alone rather than in groups when doing Mathematics.

I am not eager to participate in discussions that requires me to share my ideas about solving a problem

I like to go to the board or share my answers with my peers

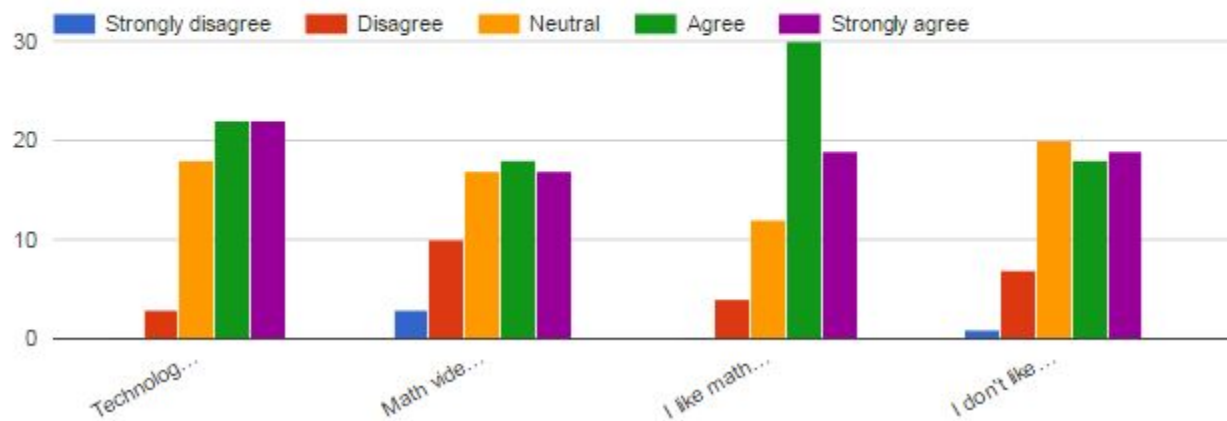
My teacher is interested in my work even if it is wrong.

My teacher asks me to explain how I got my answers to math problems.

When I don't understand something, my teacher tries to help me by asking me questions about my thinking.

My teacher introduces math problems to us and then lets us figure them out.

## Technology



Technology can make mathematics easier to understand when doing math.

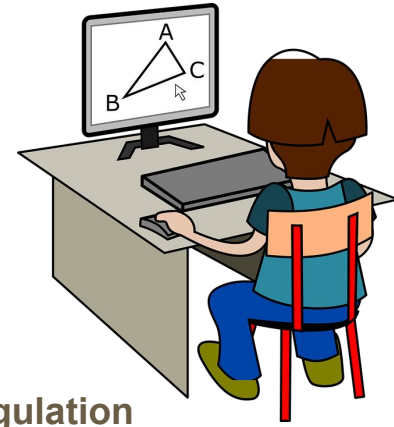
Math videos, such as Khanacademy, help me learn concepts at my own pace

I like math programs that give me instant feedback if my answer is correct or not.

I don't like using on-line math programs, I would rather have my teacher explain how to solve a problem

# Continuous Improvement

- Examining big and small data
- Opportunities for all students to reach their potential and excel
- Develop students non-cognitive skills such as grit, confidence and self-regulation
- Choosing best resources for instruction
- Incorporating technology tools to enhance instruction
- Providing high quality professional development
- Providing opportunities for teachers to collaborate
- Incorporate STEAM projects and performance tasks



# Recommendations for Elementary Math Program

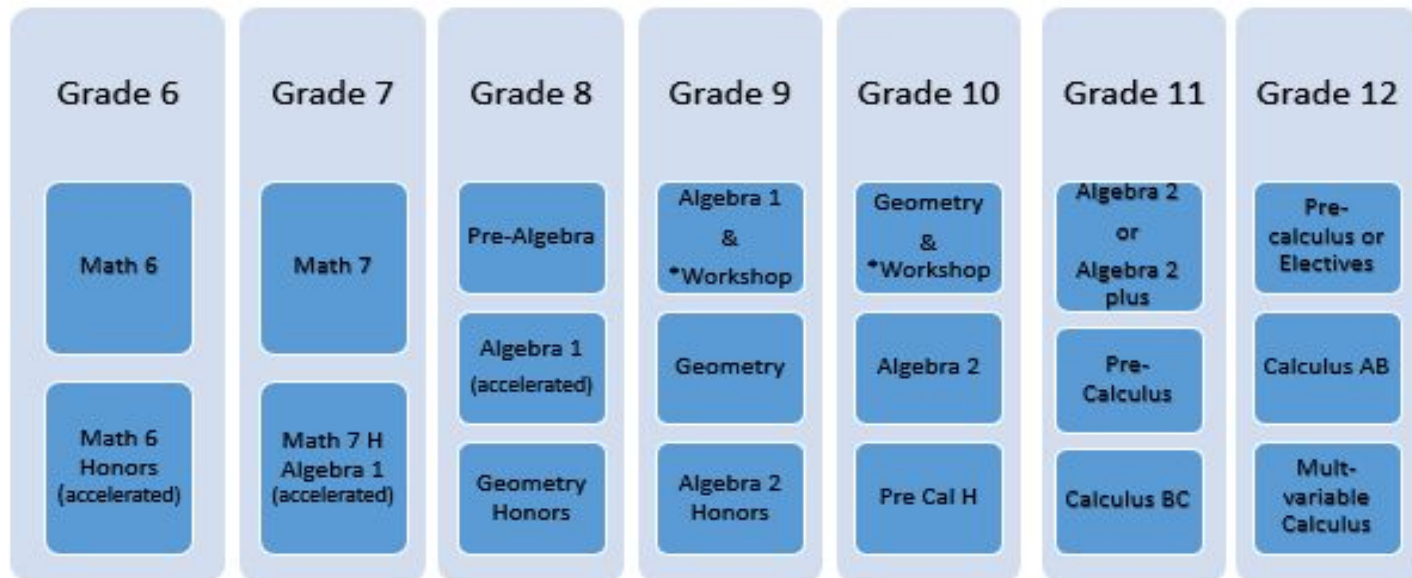
- ❖ Continue to develop math expertise by offering high quality PD and opportunities to collaborate
- ❖ Develop high quality common assessment tasks and project based learning tasks
- ❖ Incorporate individualized, adaptive online learning programs to develop fluency in math

# Recommendations For 6-12 Math Program

- ❖ Revise the math course pathways to provide all students flexibility and opportunities to take advanced courses
- ❖ Revise the double accelerated math program
- ❖ Continue to support students with individualized and adaptive math programs (IXL, ALEKS)
- ❖ Introduce Computer Coding classes in grades 7 and 8
- ❖ Offer electives such as AP Computer Principles , College statistics
- ❖ Provide additional chromebook carts for the math department

## MATHEMATICS DEPARTMENT

Flow Chart 2017-18



\*Workshop for Math Support

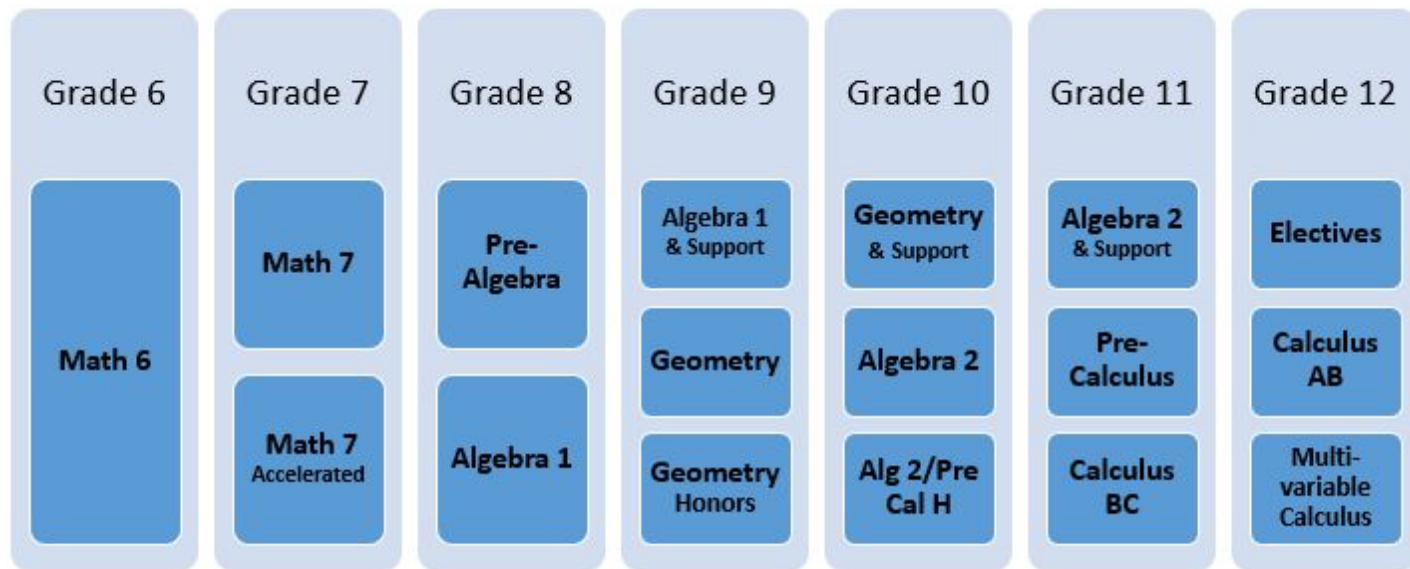
### MATH ELECTIVES

Grade 9- Math Research Beginner, Computer Science I

Grade 10- Math Research Advanced, Computer Science II

Grade 11 and 12- AP Computer Science, AP Statistics and Topics in Math

## MATH PATHWAYS –PROPOSED FOR 2018-19



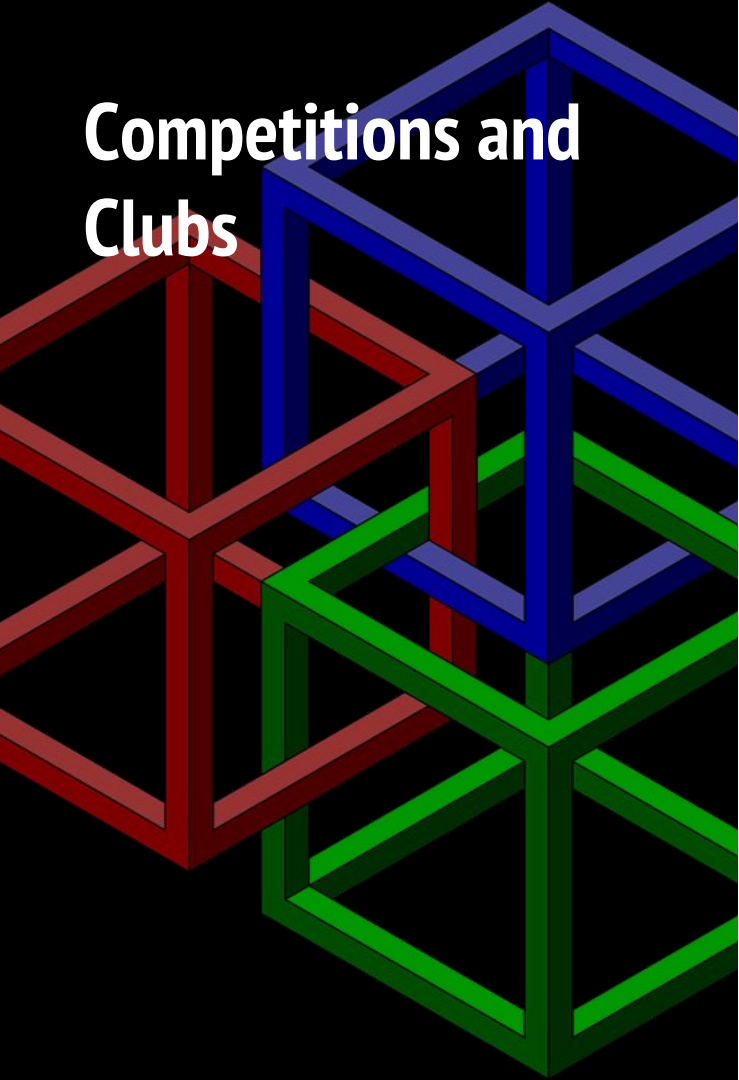
### MATH ELECTIVES

Grade 9- Math Research Beginner, Computer Science I

Grade 10- Math Research Advanced, Computer Science II

Grade 11 and 12- AP Computer Science, AP Statistics and Topics in Math

Grade 12 – College Statistics, College Algebra, Computer Science

The image features three interlocking cubes on a black background. One cube is red, one is blue, and one is green. They are arranged in a way that they appear to be connected at their corners, creating a complex geometric structure. The red cube is on the left, the blue cube is in the middle, and the green cube is on the right.

# Competitions and Clubs

Math Olympiads Club- Grade 5

AMC 8 and AMC 10/12

Math Counts Club and Contests

Math Olympiads

Mathletes

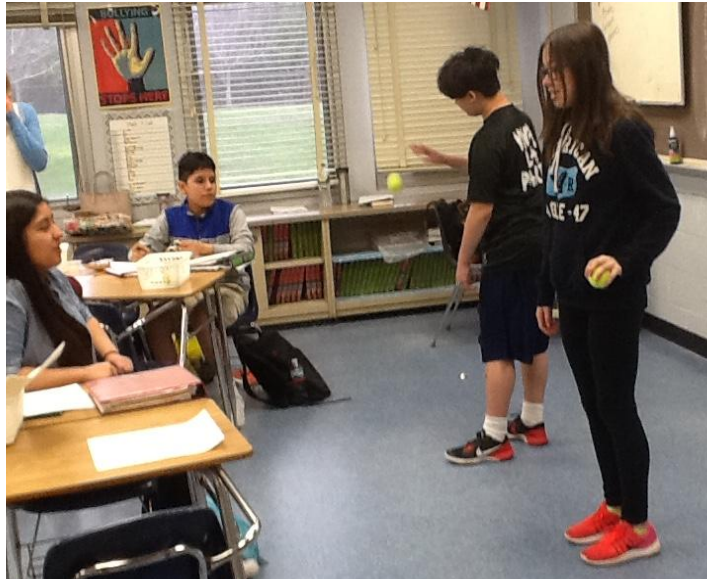
Math CON

Math Fair Competition

Nassau Math Tournament



## Questions and Comments ....



**“We can learn *only* from making mistakes. We *need* kids making mistakes. If kids are not making mistakes — if they’re not struggling — we’re limiting their brain growth”**

**~ Jo Boaler**

**Thank You!**

