Middle School Math

Parent Forum - January 12, 2016

Agenda

- Goal
- History
- Middle School Philosophy
- Options for Implementation
- Math Sequence Options
- Next Steps
  - Recommendations to School Committee
  - Criteria for Placement
- Feedback Stations (cafe)

Goal

Provide acceleration options for students who have the prerequisite skills while maintaining a middle school model.

History

- 2011 - MA Curriculum Framework in Math was adopted
- 2012 - APS Math Curriculum Review
- 2013 - APS Curriculum Adoption of Math in Focus (MIF) K - 8
- 2014 - Year 1 Implementation of MIF
- 2015 - Change in Math Sequence at AHS
- 2016 - New Schedule Adopted at AHS

Grade Levels & Shifts in Math Standards

MA 2011

8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.
For example, $3^2 \times 3^{-5} = 3^{-3} = {}^{1}/_{(3)\text{^}3} = {}^{1}/_{27}$.

MA 2000

10.N.2 / AI.N.2 Simplify numerical expressions, including those involving positive integer exponents or the absolute value, e.g., $3(2^4 - 1) = 45$, $4|3 - 5| + 6 = 14$; apply such simplifications in the solution of problems.

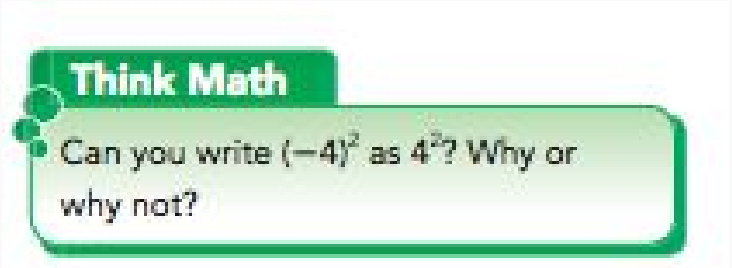
12.N.2 / AII.N.2 Simplify numerical expressions with powers and roots, including fractional and negative exponents.

Examples

Simplify each expression. Write your answer in exponential notation.

$$\frac{25^2 \cdot 25^6}{5^4 \cdot 5}$$

$$\frac{(9^3)^4 \cdot 6^{12}}{27^{12}}$$



Math in Focus Course 3 Lesson 1.4

Another Example

A formula for converting degrees Fahrenheit, *F*, to degrees Celsius, *C* is $C = \frac{5}{9}(F - 32)$. Express *F* in terms of *C*.

If normal body temperature is 37 degrees C, what is this temperature in degrees Fahrenheit?

Think Math

Do you think it is easier to find the values of *F* by expressing *F* in terms of *C* first? Why?

MIF Course 3 Lesson 3.4

8.EE.7b Solve linear equations … including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Middle School Philosophy

Children between the ages of 10 and 14 are unique in intellectual, social, emotional, and physical growth.

Recognizing that these children are also strikingly different from each other, the middle school is designed to meet the needs of a child as well as an adolescent during the transition from the elementary to the high school.

Through a caring and secure environment, the middle school program ensures that all students experience challenge and success. The curriculum is based upon the developmental needs of the young adolescent, with the following goals:
Mastering basic skills within an interdisciplinary context.

- Acquiring a fundamental body of knowledge and the critical thinking skills necessary for its interpretation and application.
- Developing and maintaining a positive self-image.
- Accepting increased social, personal and academic responsibilities. Exploring a diversity of curricular and extracurricular activities. Developing an increased awareness of individual differences and respect for others.
- Participating responsibly in the school community.

Middle School Philosophy

Middle School provides students with an authentic opportunity to work with a diverse range of peers. There are numerous benefits to this - for all of our learners!

The Middle School focus on educating the whole child sets middle schools apart from junior high schools. Teams of teachers know students well, and can support their needs in a variety of ways. Heterogeneous grouping is central to this model.

The Middle School teaming model allows teachers to use blocks of time flexibly - to extend and enhance academic activities, as well as to provide opportunities for enrichment.

While leveling classes allows teachers to target instruction to different groups of students in a scheduled way, it restricts a team's ability to use academic time in the most optimal way.

Options for Implementation Reviewed

1. Math On Team
2. Math Off Team
3. Math During Flex Time
4. Algebra for All

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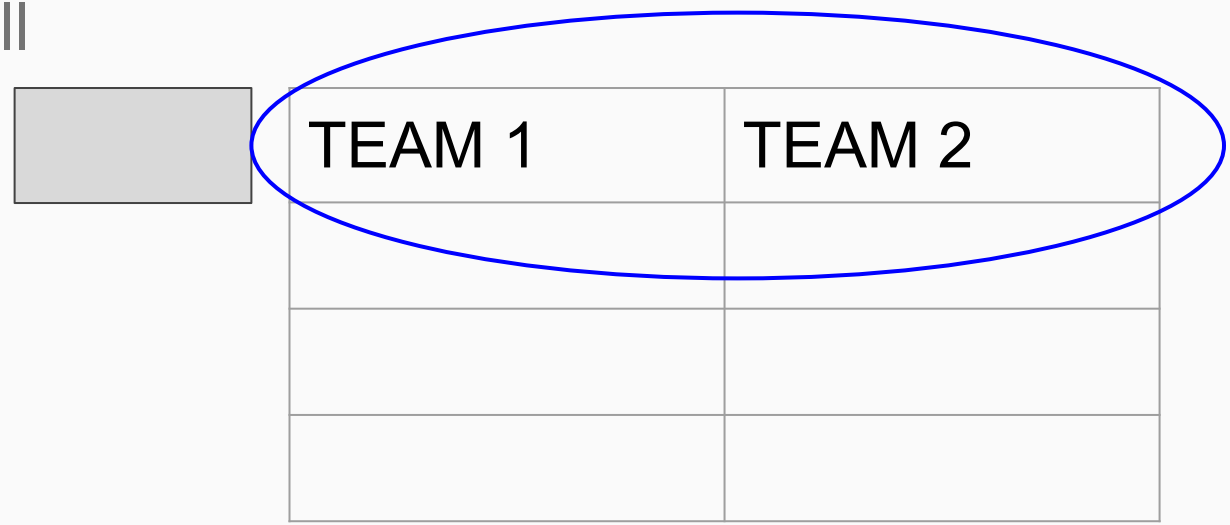

Math On Team

Rationale

To provide students that have demonstrated mastery of the middle school content standards continued challenge in math.

Description

Version A: Create one section of accelerated math per grade level.

Version B: Create two sections of accelerated math for grade 7 and two sections of Algebra I for grade 8, one section per team.

Math On Team: Version A

Develop a Grade 8 Algebra I class that pulls students from each team into one combined class section. Math remains “on team.”

Pros	**Cons**
Accelerated math students would be more challenged.	This model “locks” the schedule and limits flexibility in use of team time.
Accelerated math students would be able to begin 9th grade in position to reach AP Calculus without “doubling up” at HS.	Identifying students for accelerated classes now needs to occur earlier… in grades 6 and 7.
Partially maintains the middle school model by allowing some students to remain “on team” for ELA, Science, and SS.	Leveling students on a team diminishes heterogeneous grouping and is at odds with some aspects of middle school philosophy.
	There is an inequity between the teaching duties of the Alg. I teacher vs. their counterpart on the other team. The Alg. I teacher has one extra prep.

Math On Team: Version B

Develop a Grade 8 Algebra I class on both teams.

Pros	**Cons**
Students who are ready for accelerated pace/content would be more challenged.	Identifying students for accelerated classes now needs to occur earlier… in grades 6 and 7.
Does not “lock” the schedule: each team can manage their own schedule without the need to coordinate with the other team.	
Accelerated math students would be able to begin 9th grade in position to reach AP Calculus without “doubling up” at HS.	
Partially maintains the middle school model by allowing some students to remain “on team” for ELA, Science, and SS.	Leveling students on a team diminishes heterogeneous grouping and is at odds with some aspects of middle school philosophy.
There is equity between the teaching duties of each 8th grade teacher.	

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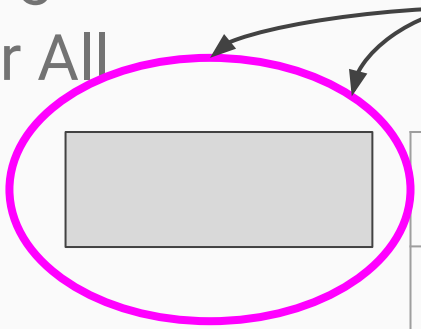

TEAM 1	TEAM 2

Math Off Team

Rationale

To be able to provide students that have demonstrated mastery of the middle school content standards continued challenge in math. This model also offers additional support for all levels, including our struggling learners.

Teaching, Support and Enrichment

Math Support 6- Teacher provides support to 6th grade math classes

Enriched Math for grade 6 student cohort from both teams- during flex

Accelerated Math for grade 7- student cohort from both teams

Algebra 1 for grade 8 - student cohort from both teams

Math Off Team

Pros	Cons
Provides for accelerated math in all grades	Additional 3 FTE- Math teachers (one for each middle school)
Provides students the opportunity to move levels during the school year	Creates more preps and an inequity within the department
Creates opportunity for schedule not to be locked.	Locked schedule for grades 7th and 8th for all teams-if one section per grade
Leveling only in math- doesn't impact all other subjects	Pulls students from teams
Allows for BOC participation	Impacts heterogeneous grouping in math
Decrease math class sizes	Requires additional classroom space or need to share a classroom space

Math Off Team

Pros	Cons
Provides math support and enrichment to a wider range of students	
Ability to identify accelerated students in 6th grade	
Assist with differentiation within the math grade 6 classroom	
Preserves and supports the MS model	

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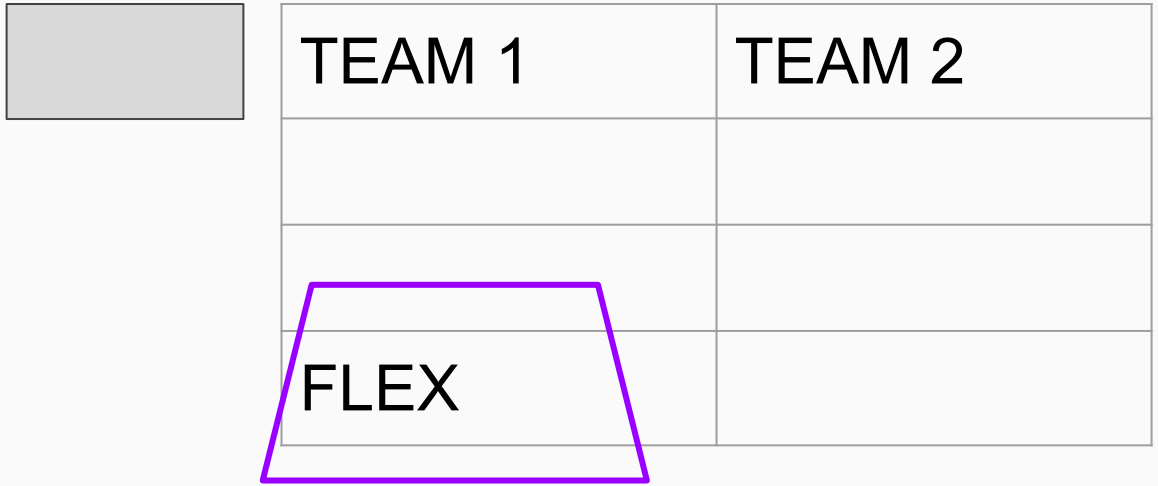

Math During Flex Time

Description of Model: Current middle school schedules support an additional teaching period (flextime) beyond the four (4) periods of academics. This period currently allows for a variety of additional learning opportunities for students (band, orchestra, chorus, assisted study, as well as extended and supplemented curriculum learning.)

The Flex Time Enriched Math model proposes to offer an enriched math during this period, taught by the math teacher on the team, for students who meet a pre-determined criteria.

Math During Flex Time

Pros	Cons
Allows for heterogeneous grouping on the team	Enriched Math students will not be able to access band, orchestra, chorus (Under current schedule)
Allows for team flexibility with the schedule	Possible limits to access for all students
Opportunity for enriched student teaching and learning in general math class – strengthening math skills	Will affect flexibility to team schedule
No additional cost attached to the plan	Team Time (DMS & WMS) and CREW time (WHMS) will be eliminated
Keeps math on team	Possible need for additional teacher prep time

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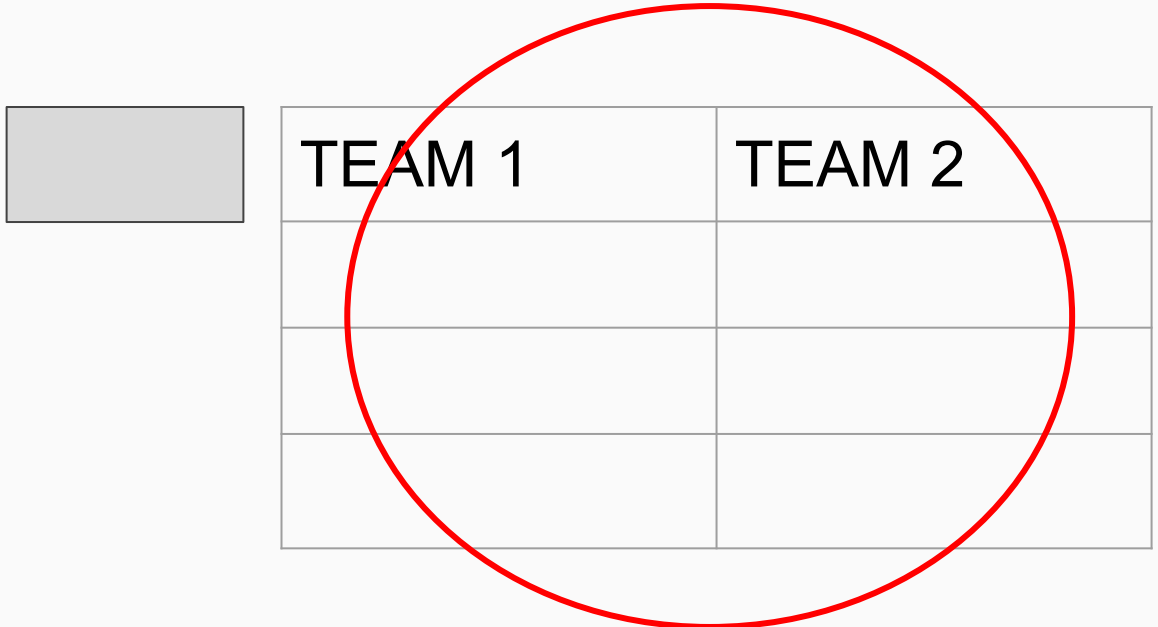

Algebra: Not ‘If’ but ‘When’

By NCTM President Linda M. Gojak

NCTM *Summing Up*, December 3, 2013

“One of the questions I am frequently asked by teachers, parents, and reporters is, “When should students take algebra?” Let’s assume that we’re talking about a college preparatory algebra 1 course. The content and instruction must be designed to develop both conceptual and procedural understanding. For students to be considered successful in first-year algebra, the expectation must be that reasoning and making sense will be priorities of both teaching and learning.”

“Successful completion of a rigorous algebra course requires students to have prerequisite mathematical understandings and skills as well as a work ethic that includes the tenacity to stick with a problem or concept until it makes sense and the willingness to spend more time on assignments and class work.”

Algebra: Not ‘If’ but ‘When’

(excerpts continues)

“Furthermore, a key characteristic of students who are successful in algebra, no matter when they take it, is a level of maturity that includes a readiness to understand abstract mathematical definitions, to work with abstract models and representations, and to understand and make connections among mathematical structures—and this readiness should extend to making abstract generalizations.”

“My experience, both as a student and as a teacher, leads me to believe that we do more harm than good by placing students in a formal algebra course before they are ready….”

https://www.nctm.org/News-and-Calendar/Messages-from-the-President/Archive/Linda-M_-Gojak/Algebra_-Not-_If_-but-_When_/

Algebra for All

Pros	Cons
Equity - All students regardless of outside preparation would take Algebra I in Grade 8. This is exactly what Andover did from 2003 to 2011. The district utilized the Connected Math Program (CMP), which covered a basic Algebra I curriculum.	New PreK - 8 standards represent a tight progression of skills and knowledge that is inherently rigorous and designed to present a strong foundation for success in the new, more advanced Algebra I course. CCSS Grade 8 now covers approximately one-third to one-half of what used to be taught in a traditional high school Algebra I course.
Keeps with the Middle School Model of heterogeneous classrooms	To prepare students for high school mathematics in eighth grade, there needs to be a well-crafted sequence of compacted courses. Compacted courses means to compress, not skip, content.
	Under CCSS some states/districts are reconsidering their stance on Algebra 1 in middle school.
	Failure in Algebra I has a strong negative impact.
	NAEP scores show that ‘misplaced’ students perform significantly below grade. The 2008 Brown Center Report on American Education.

Resources

Association for Middle Level Education http://www.amle.org/Shop/ProductDetails.aspx?productid={B8E51055-988B-4910-A3AC-97F70BDE4973}