

Office of the Superintendent of Schools  
MONTGOMERY COUNTY PUBLIC SCHOOLS  
Rockville, Maryland

August 21, 2002

MEMORANDUM

To: Members of the Board of Education

From: Jerry D. Weast, Superintendent of Schools

Subject: Update on Strengthening the Mathematics Curriculum

Significant progress has been made by the Office of Instruction and Program Development in the design and implementation of a greatly strengthened mathematics curriculum. This work, which has been conducted under the leadership of Ms. Theresa Cepaitis and Dr. Leah Quinn, program supervisors of Pre-K–12 Mathematics in the Department of Curriculum and Instruction, has focused on improving the entire mathematics program of studies, with a special emphasis on providing accelerated pathways for greater mathematics achievement in elementary school.

The improvements have immediate and long-term implications for the advancement in the teaching and learning of mathematics in the Montgomery County Public Schools (MCPS), particularly in providing opportunities that will increase the number of students completing algebra by the end of Grade 8 and participating in more advanced and rigorous instruction in high school. The improvements also address key elements of the mathematics audit in 2001 and provide a basis for using the revisions in mathematics as a model for similar reform efforts throughout the school system.

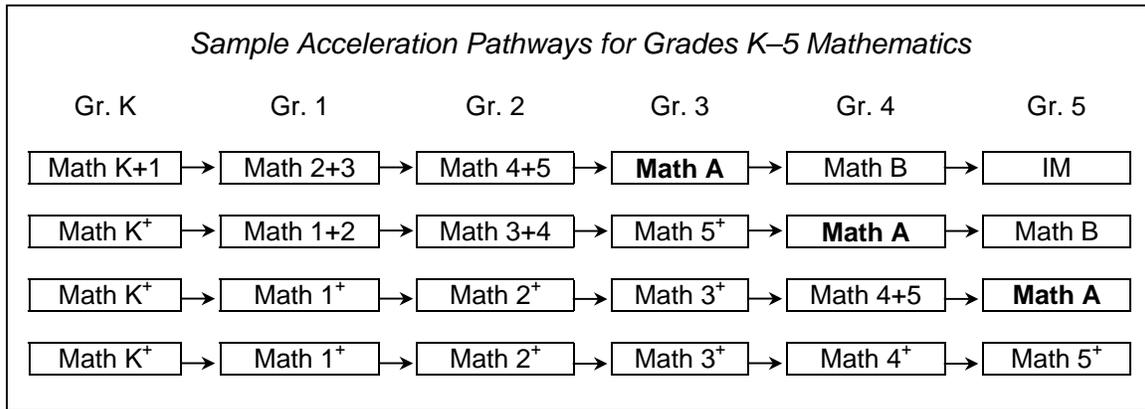
The continuing interest in algebra as a middle school gateway course for more advanced instruction in high school underscores the importance placed on providing more opportunities for students to succeed in rigorous courses. However, the emphasis on more rigorous mathematics actually begins much earlier, and the improvements being made in elementary school instruction demonstrate that accelerated instruction can begin in kindergarten.

**Accelerated Pathways for Grades K–5 Mathematics**

One of the key innovations in the revised mathematics program is the opportunity for able students to engage in accelerated mathematics instruction as early as kindergarten, with the possibility of completing the first middle school mathematics course (Math A) as early as Grade 3. The program, titled “Accelerated Pathways,” is designed so that all students receive the appropriate mathematics instruction at each grade level and all students have the opportunity to receive accelerated curriculum during each unit within every grade level.

**Sample of Accelerated Pathways in Elementary School**

The introduction of accelerated mathematics instruction can begin as early as kindergarten. The diagram below illustrates four sample acceleration pathways, with one pathway placing a student on grade level and three higher pathways leading to a middle school level of instruction before the end of elementary school.



+ Indicates student is working on some above grade level indicators

These sample pathways demonstrate how all students can have access to the appropriate level of instruction in Kindergarten through Grade 5.

- The first pathway in the diagram shows how a student could accelerate through the K-5 mathematics curriculum and take Math A in Grade 3. This student masters two grade levels of mathematics each year in Kindergarten, Grade 1, and Grade 2.
- The second pathway shows an example of how a student could accelerate to Math A by Grade 4. The plus signs in the diagram indicate that a student moving along this pathway may be working on some above grade level mathematics each year in Kindergarten through Grade 3. The student masters two grade levels of mathematics during two of those years.
- The third pathway shows an example of how a student could accelerate to Math A by Grade 5. A student moving along this pathway may be working on some above grade level mathematics each year in Kindergarten through Grade 4. The student masters two grade levels of mathematics during one of those years.
- The fourth pathway shows a student who takes Math A on grade level in Grade 6. A student moving along this pathway has the opportunity to work on some above grade level mathematics each year in Kindergarten through Grade 5. This student masters one grade level of mathematics every year.

### Mathematics Acceleration Guidelines for Teachers

The mathematics instructional guides provide teachers with specific processes for accelerating students through the next grade level in mathematics. For example, if a student is two or more grade levels ahead in mathematics, then the student should receive instruction based on the appropriate grade level instructional guide. An illustration would be a student in Grade 2 who has already demonstrated mastery of the Grade 2 and Grade 3 mathematics curriculum and who would be receiving instruction based on the Grade 4 instructional guide.

Each grade level instructional guide is organized into units of instruction. Within each unit, teachers are given direction for the appropriate acceleration to the next grade level. The table below identifies the components of the instructional guides that provide this direction and how to use these components.

<b>Mathematics Instructional Guide Component</b>	<b>How to use for acceleration</b>
Pre-assessment	Determine what students already know and are able to do.
Resources – Acceleration/Enrichment Column	Identify for each part of an instructional unit: <ul style="list-style-type: none"> <li>• What students need to know and be able to do at the next appropriate grade level and for enrichment.</li> <li>• Appropriate instructional resources for acceleration/enrichment.</li> </ul>
Instructional Sequence – Acceleration/Enrichment	Identify for each part of an instructional unit: <ul style="list-style-type: none"> <li>• Appropriate enduring understandings, essential questions, and indicators for the next level of acceleration.</li> <li>• Appropriate instructional strategies for developing student understanding at the next level of instruction.</li> </ul>
Unit Assessment	Determine what students know and are able to do both on grade level and at the next grade appropriate level within each unit of instruction.

### Promoting Achievement in the Mathematics Curriculum

The improvements in the mathematics program are grounded in the revisions to the mathematics curriculum. The curriculum revisions address the findings and recommendations of the mathematics audit of 2001, as well as changes sought by principals, teachers, parents, and

mathematics specialists to add more rigor to the teaching and learning of mathematics at every grade level. The primary factors in curriculum revision have responded to four main questions that illustrate the interrelated elements of not only the curriculum, but also assessment, intervention, and rigor:

- What do students need to know and be able to do? (Curriculum)
- How do we know if they know it? (Assessment)
- What do we do if they don't? (Intervention)
- What do we do if they have already learned it? (Rigor)

Since the curriculum revisions began following the mathematics audit in September 2001, there has been significant progress. The following table provides a summary outline of the changes in the development of the mathematics curriculum and the implementation of the changes.

Sept 2001	Math Audit
July 2001	PreK-8 Mathematics Curriculum Framework adopted by the Board of Education.
July 2001	Year-long training began for kindergarten teachers in mathematics instruction and assessment.
August 2001	CAI Blueprints
June 2002	Algebra I and Geometry Curriculum Framework provisionally adopted by the Board of Education. Instructional guides will be developed for implementation during the 2003-04 school year.
July 2002	Extended Learning Opportunities for 18 Title I schools provided a focused mathematics curriculum for students and previewed the instruction students will receive during the 2002-03 school year. Teachers were trained and provided with daily mathematics lesson plans.
July 2002	Mathematics Instructional Guides for Grades 1 through 8 provide teachers with a sequence for mathematics instruction. The guides are organized by unit with formative assessments to monitor student learning. In addition to an on grade level sequence, a review sequence and an above grade level sequence are provided. The review provides teachers with strategies to meet the diverse needs of students in their classroom. Students who complete the on grade level and above grade level sequence could master two years of mathematics indicators.
July 2002	Summer Institute for teachers in Grades 1 and 2
July 2002	Training for Math A, B, C (middle school) revised curriculum  Revised curriculum provides a clear pathway for mathematics instruction for students to be prepared for Algebra I by Grade 8.

August 2002	Grade 3 through 5 mathematics curriculum training for 18 Title I schools and six pilot schools
2001-2003	<p>Bridge Goals Project</p> <p>Counties, in collaboration with institutes of higher education, are developing mathematics goals and assessment. These goals are to bridge the gap between Core Learning Goals and what students need to be prepared for college level mathematics. The Bridge Goals will be a core for mathematics courses beyond Algebra I and Geometry.</p>
Additional Activities at the Secondary Level That Promote Math Achievement	
	<ul style="list-style-type: none"> <li>• Class size reduction in Grade 7 to prepare students for algebra in Grade 8</li> <li>• Class size reduction in Algebra I for Grade 9 students</li> <li>• Related Math course to give additional support to struggling Algebra I students</li> <li>• Training for Algebra I teachers on High School Assessment rubrics and scoring</li> <li>• Training for Math A, B, C teachers throughout the school year</li> <li>• Training for Algebra I and Geometry teachers throughout the school year</li> </ul>

The continuing efforts to invigorate the mathematics program, including the collaboration with Achieve Inc. and the College Board on a review of the algebra countywide exam, establish the school system's commitment to superior student achievement in mathematics. The school system demonstrated that high school students can achieve record-setting scores in mathematics on the SAT in 2001 and the Third International Mathematics and Science Study (Repeat). I look forward to even greater results in the months and years to come as the full impact of the curricular and program improvements are implemented.

I will keep you informed.

JDW:kmy

Copy to:  
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