**THE STATE EDUCATION DEPARTMENT** / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

**TO:**               P-12 Education Committee
                      College and Career Readiness Working Group

**FROM:**             John B. King, Jr.

**SUBJECT:**          High School Mathematics Course & Exam Requirements

**DATE:**             March 28, 2011

**AUTHORIZATION(S):**

## SUMMARY

Issues for Discussion

Is the Regents Exam in Integrated Algebra the right minimum for college and career readiness? Should the math exam required for graduation be the Regents Exam in Geometry or the Regents Exam in Algebra 2/Trigonometry? Should the course sequence recommended in the Mathematics Core Curriculum (revised 2005) remain the same (Integrated Algebra, Geometry, and Algebra 2/Trigonometry)? Should students be required to take and pass four years of high school math?

Reason(s) for Consideration

Review of Policy.

Proposed Handling

These questions will come before the P-12 Education Committee and the College and Career Readiness Working Group for discussion at the April 2011 meeting.

Background Information

In 2005, the Board of Regents approved and published a revised learning standard for math and performance indicators for pre-K through Grade 12, resulting in the development and phasing in of three new high school level math exams: the Regents Exams in Integrated Algebra, Geometry, and Algebra 2/Trigonometry. The new math exams replaced the Regents Exams in Mathematics A and Mathematics B.

On July 19, 2010, the Board of Regents adopted the Common Core State Standards (CCSS) for Mathematics with the understanding that New York State may

add additional expectations. In July 2010, the Department convened educators that reviewed the CCSS and made recommendations for additional standards for New York State to add (up to 15%). On January 10, 2011, the Board of Regents approved the NYS P-12 Common Core Learning Standards (CCLS) for Mathematics, which includes the recommended additions and a new set of Prekindergarten Standards. In addition, the Board approved the traditional pathway for high school courses. In April 2011, SED will convene groups consisting of teachers, administrators, and higher education personnel to make recommendations on the content of three high school math courses (Algebra 1, Geometry, and Algebra 2/Trigonometry) and a recommended two semester, fourth-year course of Statistics and Advanced Trigonometry based on the CCSS.

<u>Current Math Graduation Requirement</u>

The math graduation requirement for a Regents Diploma requires students first entering grade nine in the 2008-09 school year and thereafter, to earn three units of math credit meeting the commencement level of the learning standards, provided that no more than two credits must be earned for any Integrated Algebra, Geometry, or Algebra 2/Trigonometry commencement level math course. In addition, students must pass one Regents Exam in math with a scale score of 65 or higher. The math graduation requirement for a Regents Diploma with Advanced Designation requires students to earn three units of credit in high school math and pass with a 65 or higher each of the Regents Exams in Integrated Algebra, Geometry, and Algebra 2/Trigonometry. Students who complete all coursework and testing requirements for the Regents Diploma with Advanced Designation and who earn a score of 85 or higher on each of the three Regents Exams in math may receive a Regents Diploma with Advanced Designation with an annotation denoting mastery in mathematics.
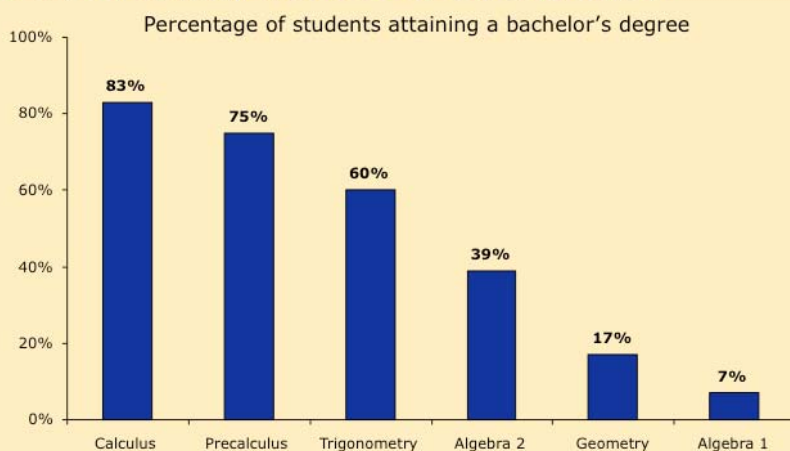
<u>College and Career Readiness</u>

According to Achieve, Inc., both two- and four-year colleges require rigorous math preparation. Students planning on attending community college need strong Algebra 2 skills[1]. Many college math placement tests cover both geometry and advanced algebra. Students who complete Algebra 2 in high school more than double their chances of earning a four-year college degree[2]. Those who do not take challenging math courses are much more likely to end up in remedial courses and are more likely to not complete their Associate or Bachelor's degree.

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[1] See www.achieve.org/files/ChallengingMath.pdf
[2] See www.postsecconnect.org/college-ready-assessments

**Highest level of math in high school is the strongest predictor of BA attainment, regardless of race, family income or background**

Percentage of students attaining a bachelor's degree

| Course | Percentage |
|---|---|
| Calculus | 83% |
| Precalculus | 75% |
| Trigonometry | 60% |
| Algebra 2 | 39% |
| Geometry | 17% |
| Algebra 1 | 7% |

Source: Clifford Adelman, U.S. Department of Education, *The Toolbox Revisited*, 2006.

Achieve, Inc.

Specific Course Sequencing Options

The NYS P-12 Common Core Learning Standards for Math (CCLSM) states, "…the organization of high school courses is a critical component to the implementation of the standards….sample high school pathways for mathematics—in both a traditional course sequence (Algebra 1, Geometry, and Algebra 2) as well as an integrated course sequence (Mathematics 1, Mathematics 2, and Mathematics 3)—will be made available shortly after the release of the final Common Core State Standards. It is expected that additional model pathways based on these standards will become available as well." Research by Achieve, ACT, and others, including the Common Core State Standards Initiative, suggests that high school graduates need to take four years of challenging math covering Advanced Algebra, Geometry, and Data Interpretation (Statistics and Probability); the content of these courses needs to be aligned with college- and career-ready standards.

There are two high school model course sequences: traditional and integrated. Traditional consists of two algebra courses and a geometry course, with some Data Interpretation (Statistics and Probability) included in each course. An Integrated sequence consists of three courses, each of which includes number sense, algebra, geometry, probability, and statistics. Because the content of the traditional course sequence goes beyond what is typically considered traditional, Achieve has called it traditional "plus." The high school model for a three-year Traditional Plus Course Sequence includes: Algebra 1, Geometry, and Algebra 2.

As of February 2011, twenty states and the District of Columbia require all students to complete a College- and Career-Ready Curriculum. Seven of the states and the District of Columbia have set mandatory course requirements with **no** opt-out provision. Thirteen states require students to automatically enroll in the College- and

Career-Ready Curriculum, but **allow an opt out provision** for students if their parents/guardian sign a waiver.

Regents Reform Agenda

The Regents Reform Agenda is centered on ensuring that all students graduate ready for postsecondary education and/or career opportunities. The Department is committed to building sequenced, content-rich statewide curriculum and revising its testing programs to ensure that all students demonstrate higher-order thinking skills on rigorous, performance-based exams. During this process, Department staff will work with the Regents Assessment and Curriculum Fellows, NYS teachers and administrators, and Higher Education representatives to ensure course relevancy, appropriate rigor, and to create a research agenda to track student performance for college and career readiness.  Revisiting the course requirements, sequences, and required levels of proficiency for earning a high school diploma is necessary given the indicators that show many students are leaving high school unprepared to enroll in credit bearing mathematics courses without remediation or for the work force.

## Performance of Students on Regents Exam in Integrated Algebra

| | 2008 (N=151,152) | | | 2009 (N=268,482) | | | 2010 (N=305,081) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 65-84 | 85-100 | 65-100 | 65-84 | 85-100 | 65-100 | 65-84 | 85-100 | 65-100 |
| | % | % | % | % | % | % | % | % | % |
| All Students | 56.3 | 18.3 | 74.6 | 53.4 | 13.6 | 67.0 | 52.7 | 13.3 | 66.0 |
| New York City | 49.5 | 10.7 | 60.2 | 45.9 | 6.2 | 52.1 | 47.0 | 5.9 | 52.9 |
| Big 4 | 39.5 | 3.9 | 43.4 | 36.4 | 2.0 | 38.4 | 35.5 | 1.7 | 37.2 |
| High Need Urb/Sub | 56.6 | 6.9 | 63.5 | 52.8 | 4.8 | 57.6 | 53.6 | 5.0 | 58.6 |
| Rural | 71.1 | 10.9 | 82.0 | 67.4 | 9.7 | 77.1 | 66.1 | 11.1 | 77.2 |
| Average Need | 64.8 | 22.5 | 87.3 | 64.3 | 18.7 | 83.0 | 62.6 | 19.7 | 82.3 |
| Low Need | 52.0 | 42.6 | 94.6 | 55.3 | 37.6 | 92.9 | 53.8 | 39.0 | 92.8 |
| Charter | 55.0 | 1.8 | 56.8 | 52.6 | 1.8 | 54.4 | 64.2 | 4.2 | 68.4 |
| Asian/Pacific Islander | 49.3 | 37.9 | 87.2 | 52.0 | 30.7 | 82.7 | 51.7 | 30.6 | 82.3 |
| Black/African American | 47.3 | 4.0 | 51.3 | 42.5 | 2.2 | 44.7 | 44.6 | 2.1 | 46.7 |
| Hispanic/Latino | 50.9 | 5.4 | 56.3 | 47.8 | 3.2 | 51.0 | 48.1 | 3.1 | 51.2 |
| American Indian | 55.7 | 7.0 | 62.7 | 49.3 | 5.9 | 55.2 | 51.5 | 5.8 | 57.3 |
| Multiracial | 50.0 | 14.5 | 64.5 | 49.3 | 12.4 | 61.7 | 54.3 | 13.4 | 67.7 |
| White | 62.6 | 25.4 | 88.0 | 62.1 | 22.1 | 84.2 | 60.4 | 23.1 | 83.5 |
| English Language Learners | 33.7 | 4.4 | 38.1 | 34.3 | 3.4 | 37.7 | 37.3 | 4.0 | 41.3 |
| Students w/ Disabilities | 40.6 | 3.0 | 43.6 | 36.5 | 1.7 | 38.2 | 37.6 | 1.7 | 39.3 |

*Regents Exam in IA was first administered in June 2008

## Performance of Students on Regents Exam in Geometry

| | 2009 (N=113,748) | | | 2010 (N=167,458) | | |
|---|---|---|---|---|---|---|
| | 65-84 | 85-100 | 65-100 | 65-84 | 85-100 | 65-100 |
| | % | % | % | % | % | % |
| All Students | 48.6 | 24.4 | 73.0 | 50.7 | 19.8 | 70.5 |
| New York City | 41.6 | 16.4 | 58.0 | 42.8 | 12.0 | 54.8 |
| Big 4 | 26.4 | 4.0 | 30.4 | 23.1 | 2.4 | 25.6 |
| High Need Urban/Sub | 48.9 | 11.8 | 60.7 | 48.1 | 8.5 | 56.7 |
| Rural | 57.4 | 17.7 | 75.0 | 60.1 | 16.3 | 76.4 |
| Average Need | 55.9 | 28.4 | 84.3 | 58.6 | 23.5 | 82.1 |
| Low Need | 47.1 | 45.9 | 93.0 | 54.3 | 36.8 | 91.1 |
| Charter | 32.5 | 1.8 | 34.2 | 48.0 | 5.8 | 53.8 |
| Asian/Pacific Islander | 43.6 | 42.7 | 86.2 | 47.1 | 36.4 | 83.5 |
| Black/African American | 37.2 | 5.7 | 42.9 | 38.6 | 3.7 | 42.3 |
| Hispanic/Latino | 43.1 | 9.0 | 52.1 | 44.6 | 6.1 | 50.7 |
| American Indian | 46.3 | 12.4 | 58.7 | 48.9 | 11.3 | 60.1 |
| Multiracial | 41.6 | 22.7 | 64.4 | 50.5 | 18.1 | 68.6 |
| White | 54.1 | 30.9 | 85.0 | 57.1 | 26.2 | 83.3 |
| English Language Learners | 33.8 | 10.3 | 44.1 | 37.6 | 10.0 | 47.6 |
| Students w/ Disabilities | 37.1 | 5.6 | 42.7 | 38.9 | 4.1 | 43.0 |

* Regents Exam in Geometry was first administered in June 2009

**Performance of Students on Regents Exam in Algebra 2/Trigonometry**

|  | 2010 (N=84,951) | | |
|---|---|---|---|
|  | **65-84** | **85-100** | **65-100** |
|  | **%** | **%** | **%** |
| All students | 38.2 | 26.6 | 64.8 |
| New York City | 32.1 | 20.8 | 52.9 |
| Big 4 | 17.2 | 5.1 | 22.3 |
| High Need Urban/Sub | 31.1 | 12.4 | 43.5 |
| Rural | 44.2 | 19.6 | 63.8 |
| Average Need | 42.5 | 27.7 | 70.1 |
| Low Need | 41.2 | 41.0 | 82.2 |
| Charter | 24.3 | 6.1 | 30.4 |
| Asian/Pacific Islander | 34.3 | 42.3 | 76.6 |
| Black/African American | 26.9 | 7.8 | 34.7 |
| Hispanic/Latino | 32.1 | 11.0 | 43.1 |
| American Indian | 39.3 | 14.2 | 53.5 |
| Multiracial | 34.1 | 32.4 | 66.5 |
| White | 42.2 | 30.0 | 72.2 |
| English Language Learners | 29.8 | 21.4 | 51.2 |
| Students w/ Disabilities | 33.5 | 10.4 | 43.9 |

* Regents Exam in A2/Trig was first administered in June 2010

**New York State Education Department**
NYSED
EMSC
Elementary, Middle, Secondary and Continuing Education

# Mathematics Regents Examinations Implementation / Transition Timeline

On December 8, 2005, the Board of Regents unanimously approved the Education Department's recommended implementation timeline for the Regents Examinations in Integrated Algebra, Geometry, and Algebra 2/Trigonometry.

|  | Mathematics A | Mathematics B | Algebra | Geometry | Algebra 2/ Trigonometry |
|---|---|---|---|---|---|
| **2006-07** | X | X |  |  |  |
| **2007-08** | X | X | X First admin. in June 2008 |  |  |
| **2008-09** | X Last admin. in January 2009 | X | X | X First admin. in June 2009 |  |
| **2009-10** |  | X Last admin. in June 2010 | X | X | X First admin. in June 2010 |
| **2010-11** |  |  | X | X | X |
| **2011-12** |  |  | X | X | X |