

# **BERKELEY UNIFIED SCHOOL DISTRICT**

**TO:** Donald Evans, Ed. D., Superintendent  
**FROM:** Neil Smith, Assistant Superintendent, Educational Services  
**DATE:** September 25, 2013  
**SUBJECT:** Common Core State Standards Mathematics Pathways and Acceleration Options at the Secondary Level

## **BACKGROUND INFORMATION**

### High School Curricular Pathways

The State of California has adopted the Common Core State Standards for Mathematics (CCSSM) which include two pathways for students to complete the required mathematics curriculum by the end of eleventh grade. These two pathways are the Traditional Pathway and the International or Integrated Pathway. The Traditional Pathway has historically been taught in the United States and includes Algebra I, Geometry, and Algebra II. The International Pathway is aligned to the mathematics curriculum taught throughout the world including those countries with the highest success rates in mathematics. Both the new California Framework for Mathematics and the University of California System (UC) support the adoption of either of these pathways for high school students. CCSSM for grades six, seven, and eight are prerequisites for either of these two pathways and are standard across the state.

The International Pathway's approach is used in most of the other developed countries of the world, and international test results show its value. Berkeley USD has an opportunity to bring students a proven, clear, and cohesive pathway and curriculum with the adoption of this pathway. Integrating Algebra and Geometry concepts that are connected deepens a student's ability to understand the content. A comprehensive and cohesive approach to math in all courses will decrease the failure rate, improve retention of mathematics concepts over the summer, and eliminate the challenge of the gap between Algebra I and Algebra II in the Traditional Pathway.

The mathematics department at Berkeley High School along with the math teachers at all three middle schools support the adoption of the International Pathway for BUSD: Mathematics I, II, and III. While these course titles may be unfamiliar, the scope and sequence of these three courses offer the same content as the Traditional Pathway but in a way that makes it more accessible to students. The International Pathway includes concepts of Algebra, Functions, Geometry, and Statistics throughout each of the three courses instead of in isolation.

The adoption of this pathway would also enable all math teachers at Berkeley High School to collaborate on aligned curriculum and thus increase rigor and coherence in mathematics and improve student achievement.

Finally, the 11<sup>th</sup> grade Smarter Balanced Assessment will be an integrated assessment of all high school mathematics, different from the California Standards Tests which are end-of-year course exams. Students will be required to have a thorough understanding of Algebra I, II and Geometry for their 11<sup>th</sup> grade assessment. Continuing to integrate these concepts each year will be a benefit to students when they are assessed.

A transition to the International Pathway would be gradually phased in, starting with 9<sup>th</sup> grade in 2015-16 and the eventual elimination of the traditional pathway by 2018-19. This change would not impact current Berkeley High students or their current pathway.

#### Acceleration Options for High Achieving Students

Historically, a small number of BUSD students has taken Algebra 1, the current standard grade 8 course, in 7<sup>th</sup> grade. There are several reasons for this acceleration. First, the existing state standards have focused heavily on learning mathematics procedures, and there is some redundancy in the curriculum from 5<sup>th</sup> through 7<sup>th</sup> grade. Students who master these procedures early in this sequence have been accelerated in order to provide them with a greater challenge in mathematics. The common core standards are addressing this reason for acceleration by increasing the rigor and decreasing the redundancy of topics in the middle school curriculum. The increased focus on problem solving and mathematical reasoning and justification will support challenging students within the middle school curriculum rather than asking them learn superficial procedures quickly.

Another reason for accelerating students in the current curriculum is to enable these students to study more advanced topics in mathematics including calculus and statistics while they are in high school. Part of this need is met by the common core standards, which integrate more advanced mathematics topics, such as the study of functions and more thorough treatment of statistics into the core sequence of Mathematics I, II and III. However, for students who wish to take one or more advanced mathematics courses in high school after the core sequence (including Pre-calculus, AP Statistics, Calculus AB or Calculus BC), providing for some acceleration in completing the core mathematics sequence may be appropriate.

At the middle school level, Algebra is no longer the standard 8<sup>th</sup> grade

course in the CCSSM; instead a set of math courses in sixth, seventh, and eighth grades prepares students to be successful in high school. As stated in the Acceleration Options Appendix of the draft California Frameworks for Mathematics,

*“The CCSSM Grade 8 standards are of significantly higher rigor than the former Algebra I course that many students have taken while in 8<sup>th</sup> grade. In addition, the statistics presented in the CCSSM Grade 8 are more sophisticated than those previously included in the middle school and connect linear relations with the representation of bivariate data.”*

The California Framework stresses the need for all students to master Grade 8 standards prior to beginning any available acceleration option.

Based on the recommendation of both the Common Core State Standards document and the California Framework for Mathematics, options for acceleration at the secondary level are outlined below. These options should be carefully selected for students and require evidence of mastery of 8<sup>th</sup> grade standards prior to beginning any high school level mathematics course (Mathematics I or Algebra I).

Option 1 - Middle School Acceleration: Combine the grade 7 and part of the grade 8 standards into the 7<sup>th</sup> grade year and the remainder of the 8<sup>th</sup> grade and Mathematics I standards into 8<sup>th</sup> grade. Selection for this pathway would be based on results of 6<sup>th</sup> grade assessment data and other factors.

**Pro:** This option gives students the opportunity to participate in Calculus or higher level mathematics in the fourth year of high school.

**Con:** Students would not be able to show proficiency in 8<sup>th</sup> grade standards prior to entering this pathway. Students who are not able to meet the level of rigor required may need to be placed in regular 8<sup>th</sup> grade mathematics if not proficient at the end of 7<sup>th</sup> grade.

This option risks having students miss key foundational skills, especially since middle school courses have fewer instructional minutes than high school courses.

This option will create two math curriculums at grades 7-8 which will make comprehensive curriculum, assessments, and collaboration opportunities difficult. It also creates a tracking situation at all middle schools that can impact other subject areas in the smaller schools.

High School Math I will include both Geometry and Algebra II topics which middle school teachers may not be thoroughly prepared to teach.

Students may not develop the foundational depth of understanding and knowledge essential for future success if rushed through the core content of any grade level.

Option 2 - Early High School Acceleration: Combine Mathematics I with part of Mathematics II in the 9<sup>th</sup> grade, and complete Mathematics II and Mathematics III in 10<sup>th</sup> grade.

Pro: This option gives students the opportunity to participate in Calculus or higher level mathematics in the fourth year of high school.

All students enter BHS completing the rigorous 8<sup>th</sup> grade standards and would be selected based on demonstrating a high level of understanding of these standards. Middle schools would focus on the increased rigor of the new CCSSM and deepening students understanding of mathematics concepts before entering high school.

This option would allow students coming from outside BUSD middle schools to enter an accelerated pathway, if they are able to demonstrate mastery of the 8<sup>th</sup> grade standards.

All students will have the key foundational knowledge of Math 6-8 before beginning high school Mathematics I.

Con: Students will not be able to accelerate before high school because skipping a grade level of mathematics is not an option in the CCSSM.

Option 3 - Late High School Acceleration: Combine Mathematics III and Trigonometry (or Pre-Calculus) during 11<sup>th</sup> grade, which may require summer school or enrollment in two math courses in junior year.

Pro: It gives students the opportunity to participate in Calculus or higher level mathematics in the fourth year of high school.

It would allow all students to focus on the rigor of CCSSM in 9<sup>th</sup> and 10<sup>th</sup> grade before determining if they wish to enter an accelerated pathway. It provides an acceleration pathway for students who have excelled in mathematics in grades 9 and 10 and wish to enroll in Calculus.

This option would allow students coming from outside BUSD during grades 9 and 10 to accelerate, if they are able to demonstrate proficiency in the Mathematics II standards.

Con: This option would require a significant time commitment from students during the summer and/or during the 11<sup>th</sup> grade when many high achieving students are also enrolled in challenging AP or IB classes.

Below find a chart outlining the acceleration options for students:

	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade	9 <sup>th</sup> Grade	10 <sup>th</sup> Grade	11 <sup>th</sup> Grade	12 <sup>th</sup> Grade
Standard	CCSS7	CCSS8	Math I or Alg. I	Math II or Geometry	Math III or Alg. II	AP Stats or Trig.
Middle Sch Acceleration	CCSS7 and Sem. 1 CCSS8	Sem. 2 CCSS8 and Math I or Alg. I	Math II or Geom.	Math III or Alg. II	Pre- Calc.	Calculus

Early HS Acceleration	CCSS7	CCSS8	Math I & Sem. 1 Math II; or Alg. I and sem 1 of Geom	Sem. 2 Math II and Math III; or Sem 2 Geom. & Alg. II	Pre- Calc.	Calculus
Late HS Acceleration	CCSS7	CCSS8	Math I or Alg. I	Math II or Geom.	Math III or Alg. II and Pre- Calc.	Calculus

Conclusion

After careful study, staff believes that the best curricular option is the selection of the International Pathway for Berkeley High School students. In addition, staff is proposing the adoption of both the Early and Late High School Acceleration Options to provide two pathways to Calculus.

Next Steps

At this meeting, staff is presenting options for Board information and discussion. Staff will return to the Board on November 13, 2013 for the Board’s decision. In the meantime, information sessions have been scheduled at all three middle schools to present these options the community and solicit feedback:

- Longfellow Middle School on Tuesday, October 22
- King Middle School on Monday, October 28
- Willard Middle School on Wednesday, October 30

**DISTRICT GOAL**

I. Curriculum and Instruction

**POLICY/CODE**

Board Policy 6142.92

**FISCAL IMPACT**

None

**STAFF RECOMMENDATION**

Receive the presentation on CCSS Mathematics Pathways and acceleration options for information.