Multiple Measures High School Variables Model Summary

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Introduction

This model summary document is for Multiple Measures Assessment Project (MMAP) pilot colleges as part of the Common Assessment Initiative (CAI). Below are a set of rules for predicting success in community college English and math courses based upon high school data. These rules can be used to inform placement of those students for whom CalPASS Plus has high school transcript and performance data available. Pilot colleges should also have incoming students continue to participate in the current placement system (e.g., standardized tests or essays). The multiple measures rule sets are designed to be used disjunctively with assessment testing data. That is, students should receive a placement based on analysis of both the local assessment test and the multiple measures. In many cases, the two approaches will converge, but where they diverge, it is recommended students should receive the higher (or "better") of the two. Additionally, there may be cases where a student has insufficient high school information to use with these rule sets, in which case other multiple measures information (currently under development if not already in place) would need to be applied. Pilot colleges should also follow any existing course articulation agreements with local high schools, including accepting advanced placement (AP) test scores or early assessment program (EAP) scores.

Please note that while every effort has been made to create valid models, improving the college success of former high school students is not ultimately a statistical problem. In the long run, collaboration among high schools and colleges leading to thoughtful articulation of course sequences and pathways is highly likely to outperform predictive analytics in increasing success and throughput rates for our students.

This document is intended to be a final draft of the fall 2015 high school performance multiple measures rule sets. Any clarifications or revisions will result in a new release with a clearly labeled version date. Feedback and questions can be sent to:

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Methods

The data universe for all the models included students who had all four years of high school transcript information from the California Partnership for Achieving Student Success (Cal-PASS Plus) database and who enrolled in either English or math at a California Community College. Models were created in R using classification and regression trees (CART), also known as recursive partitioning (rpart). A full technical write up will be provided in a forthcoming document. The following provides information on any additional caveats of the data.

- 12th Grade Models - Utilizes high school course enrollments up to 12th grade; 12th grade high school cumulative GPA; California Standards Test (CST) information; and a delay variable (number of academic terms from last high school subject course enrollment to first community college subject course enrollment).
- 11th Grade Models - Utilizes high school course enrollments up to 11th grade; 11th grade high school cumulative GPA included; and California Standards Test (CST) information. Because course-taking in 12th grade is not known or utilized for this model, the delay variable is undetermined and excluded from the model. This model would be used with most students who are transitioning directly to college from high school, as they will be assessing before completion of their 12th grade.

The decision rules represent sets of students who are predicted to have, as a group, a grade point of 2.2 or better in the target community college course. While a grade point of 2.0 represents a passing grade, a buffer of 0.2 has been added both to account for bias in model predictions and to enhance the face validity of model rules.

How to read this document

The column headers represent the most current grade level for which HS transcript information is available (11th grade or 12th grade) and the row labels represent the levels of community college English or math. Cells within the column and the row headers provide the rules for how students can be placed in each level based on the data. Predicted minimum grade points in the college course are shown in parentheses after the rule. Students may fit criteria for success at multiple levels. In these cases, the rules at lower levels are overridden by rules at higher levels and students should be placed into the highest level indicated. These rule sets are intended to be used disjunctively with the main placement instrument/test.

Further information is available on the MMAP project page: http://www.rpgroup.org/projects/multiple-measures-assessment-project

Table 1. English rule sets based on high school transcripts and test performance for up to 11th grade and up to 12th grade

	Only up through 11th Grade data available	Up through 12th Grade data available
Four Levels Below	Cumulative GPA >= 2.3	Cumulative GPA >= 2.6
		Delay < 1 academic term AND 12th Course GP >= C+ AND CST >= 316
Three Levels Below Transfer	Cumulative GPA >= 2.9	Cumulative GPA >= 3.0
		Cumulative GPA >= 2.0 AND 12th Course GP >= C+
Two Levels Below Transfer	Cumulative GPA >= 3.0	Cumulative GPA >= 2.5
	Cumulative GPA >= 2 .6 AND Did not enroll in any remedial courses	12th Course GP >= C+
		GPA >= 2.4 AND CST >= 334
One Level Below Transfer	Cumulative GPA >= 2.5	GPA >= 3.0
		GPA >= 2.4 AND 12th Course GP >= C+
Transfer Level	Cumulative GPA >= 2.7	Cumulative GPA >= 2.7
	Advanced Placement English with grade of C+ or better	Advanced Placement English with grade of C or better
		Cumulative GPA >= 2.3 AND 12th Course GP >= B-

Table 2. Remedial math rule sets based on high school transcripts and test performance for up to 11th grade and up to 12th grade

	Only up through 11th Grade data available	Up through 12th Grade data available
Four levels below	Place here if none of the higher-level rules apply and if the test indicates this placement level.	Place here if none of the higher-level rules apply and if the test indicates this placement level.
Three levels below	Cumulative GPA >= 2.9	Cumulative GPA >= 2.6
	Cumulative GPA >= 2.3 AND CST >= 278 AND CST Subject is Algebra II, Integrated Mathematics 3, Summative High School Mathematics (grades 9-11), or Unknown (subject codes 0, 2, 7, 8)	Cumulative GPA >= 2.4 AND CST >= 278
		Delay >= 12 academic terms
Two levels below	Cumulative GPA >= 2.9	Cumulative GPA >= 2.9
	Cumulative GPA >= 2.3 AND CST >= 284 AND CST Subject is Algebra II, Integrated Mathematics 3, Summative High School Mathematics (grades 9-11), or Unknown (subject codes 0, 2, 7, 8)	Cumulative GPA >= 2.7 AND CST >= 274 AND CST Subject is Algebra II, Integrated Mathematics 3, Summative High School Mathematics (grades 9-11), or Unknown (subject codes 0, 2, 7, 8)

	Only up through 11th Grade data available	Up through 12th Grade data available
One level below: *Algebra II/Intermediate Algebra*	Cumulative GPA >= 2.9 AND C+ or better in Algebra II	Cumulative GPA >= 3.2
	Cumulative GPA >= 2.9 AND Enrolled in Pre-Calculus	Cumulative GPA >= 2.8 AND Pre-Calculus B- or better
	Cumulative GPA >= 2.9 AND CST >= 310 AND CST Subject is Algebra II, Integrated Mathematics 3, Summative High School Mathematics (grades 9-11), or Unknown (subject codes 0, 2, 7, 8)	Cumulative GPA >= 2.8 AND CST >= 284 AND CST Subject is Algebra II, Integrated Mathematics 3, Summative High School Mathematics (grades 9-11), or Unknown (subject codes 0, 2, 7, 8)
	Cumulative GPA >= 3.2 AND CST >=310	Cumulative GPA >= 2.8 AND Algebra II C+ or better
	Cumulative GPA >= 2.4 AND C or better in Algebra II AND CST >=306	Algebra 2 C or better AND Pre-Calculus C or better

	Only up through 11th Grade data available	Up through 12th Grade data available
One level below: *Geometry*	Trigonometry C+ or better AND Enrolled in Calculus	Took Calculus in high school
	Cumulative GPA >= 2.7 AND CST >= 294	Trigonometry C+ or better

Special note on Math Remedial Models at Two, Three and Four Levels Below Transfer: Models for remedial levels 2, 3 and 4 excluded courses in each level that did not "fit in" with the majority of the content of the courses. For example, while the majority of enrollments in courses identified as four levels below transfer (CB21 = D) were arithmetic, there were enrollments where courses were identified as Pre-algebra. For courses identified (based on course titles) as pre-algebra in the four levels below models, these courses were excluded from the analysis. Pilot colleges will be instrumental in helping to refine the meaning and interplay of course title and CB 21 course level.

Models did not include information on higher level math coursework beyond Algebra II.

Table 3. Transfer-level math rule sets based on high school transcripts and test performance for up to 11th Grade and up to 12th Grade

	Only up through 11th Grade data available	Up through 12th Grade data available
Transfer level: *College Algebra*	Cumulative GPA >= 3.4 AND Algebra II B or better	Cumulative GPA >= 3.4
	Cumulative GPA >= 2.9 AND CST >= 310	Cumulative GPA >= 2.9 AND Calculus C or better
	Cumulative GPA >= 2.9 AND Pre-Calculus B- or better	Cumulative GPA >= 3.0 AND Geometry B or better
	Trigonometry B- or better	
	Cumulative GPA >= 2.9 AND DID NOT take Algebra I AND Geometry B or better	
Transfer level: *GE Math/Liberal Arts math/ Math for teachers, etc.*	Cumulative GPA >= 3.2	Cumulative GPA >= 2.8
	Cumulative GPA >= 2.5 AND CST >= 288 AND Algebra II C or better	CST >= 284 AND Took Trigonometry in high school
		Trigonometry B or better

	Only up through 11th Grade data available	Up through 12th Grade data available
Transfer level: *Statistics*	Cumulative GPA >= 3.2	Cumulative GPA >= 3.1
	Cumulative GPA >= 2.7 AND CST >= 310 AND Pre-Calculus C or better	Cumulative GPA >= 2.7 AND Statistics C or better
	Cumulative GPA >= 2.7 AND CST >= 310 AND Algebra II B or better	Cumulative GPA >= 2.7 AND CST >= 308 AND Advanced Placement math with grade of C+ or better
	Trigonometry B or better	Enrolled in Calculus
		Cumulative GPA >= 2.7 AND Pre-Calculus C or better

	Only up through 11th Grade data available	Up through 12th Grade data available
Transfer level: *Precalculus*	Cumulative GPA >= 3.7	Cumulative GPA >= 3.4
	Cumulative GPA >= 3.3 AND Trigonometry B or better	Cumulative GPA >= 3.2 AND CST >= 338
	Cumulative GPA >= 3.2 AND CST >= 348	Cumulative GPA >= 3.2 AND Calculus B or better
	Cumulative GPA >= 3.2 AND Pre-calculus of C+ or better	Cumulative GPA >= 3.1 AND Delay < 1 academic term
	CST >= 358 AND Took any Advanced Placement math class	
	CST >= 441	

	Only up through 11th Grade data available	Up through 12th Grade data available
Transfer level: *Calculus I*	Cumulative GPA >= 3.9	Cumulative GPA >= 3.7
	Pre-Calculus C+ or better AND Calculus C or better	Cumulative GPA >= 3.4 AND Calculus C or better
	Cumulative GPA >= 3.5 AND Enrolled in Pre-Calculus	Enrolled in Calculus AND Advanced Placement math with grade of B or better
	Cumulative GPA >= 3.0 AND Early Assessment Program (EAP) math College Ready	Cumulative GPA >= 3.1 AND CST >= 428
	Cumulative GPA >= 3.5 AND Calculus C+ or better	
	Cumulative GPA >= 3.0 AND CST >= 461	

	Only up through 11th Grade data available	Up through 12th Grade data available
Transfer level: *Calculus II*	Calculus I C or better AND Cumulative GPA >= 3.8	Calculus I C or better AND Cumulative GPA >= 3.4
	Calculus I C or better AND Cumulative GPA >= 2.9 AND CST >= 438	
	Calculus I C or better AND Cumulative GPA >= 3.4 AND CST >= 291 AND Algebra II C+ or better	
	Calculus I C or better AND CST >= 448	

NB: Transfer-level models did not include information on lower level coursework in Pre-Algebra and Algebra I.