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English Placement Models for the Multiple Measures Assessment Project – Phase 2

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Introduction

This document provides decision tree output used for the creation of high school transcript-based placement rules for Phase II of the Multiple Measures Assessment Project (MMAP). Interpretation of these decision trees benefits from knowledge of high school and community college course sequencing, database codes, and policy and practice contexts. This handout is not intended to be a complete guide to all of these issues. The Phase 1 progress report provides historical context leading up to the Phase 2 effort and can be found here: <http://bit.ly/2fmOuiV>. An example of how to interpret the CB21 codes used for each tree is as follows:

	Highest Level Reading Course Offered		
Level of Decision Tree	Transfer Level	One-Level Below	Two-Levels Below
Transfer Level	LO Y		
One-Level Below	LO A	L1 A	
Two-Levels Below	LO B	L1 B	L2 B
Three-Levels Below	LO C	L1 C	L2 C

Key differences between Phase I and Phase II decision tree creation include:

Phase I	Phase II
Predicted grade points in target college course	Predicted success rates in target college course
Used ANOVA-based classification and regression trees	Used Poisson-based classification and regression trees
Each college course level modeled independently	Each college course level modeled recursively

Independent sets of decision trees and decision rules were developed for each level, using the same recursive Poisson method as is used to grow the reading, ESL and math trees. In order to prevent overlapping or redundant decision rules, the Phase II decision trees were run recursively, meaning that once students have been placed in a higher level course, they were no longer eligible to be included in models developing placement rules for subsequent course levels in the discipline (since they'd already effectively been assigned to a higher level course). This recursive process was repeated for each progressively lower level of the sequence. Another innovation in Phase II involved changing the model estimation method from ANOVA, which estimates the mean grade points that would be expected of groups of students with a given set of characteristics, to the Poisson method, which estimates the proportion of students with a given set of characteristics who would pass any given college class with a C grade or higher.

The proportion of students who are predicted to pass can then be used as a criterion level to identify which decision rules would qualify students for placement into a given course or course level (e.g., a group had to have at least 70% of its members pass - a proportion of 0.70 - in order to be included as a decision rule for placement into transfer level, 65% for placement into one-level below, etc.). This means the groups of students identified as eligible to be placed at that level would always have an average success rate higher than the criterion level.

Decision rules are formed by selecting leaves from the decision tree that meet or exceed a certain minimum average probability of success, or the criterion. The criterion represents the minimum average successful completion rate (i.e., success rate) of groups of students that the model places into that level of courses. Importantly, because it selects groups of students whose average minimum successful completion rate is at the criterion or higher, the actual average for students placed at each level will often be above that rate, sometimes a fair amount above the average because it will include students whose success rate is substantially above the criterion. Typical criterion levels for English decision trees are as follows:

Transfer-Level (L0) criterion	0.70
One-Level Below Transfer (L1) criterion	0.65
Two-Levels Below Transfer Level (L2) criterion	0.60
Three-Levels Below Transfer Level (L3) criterion	0.55

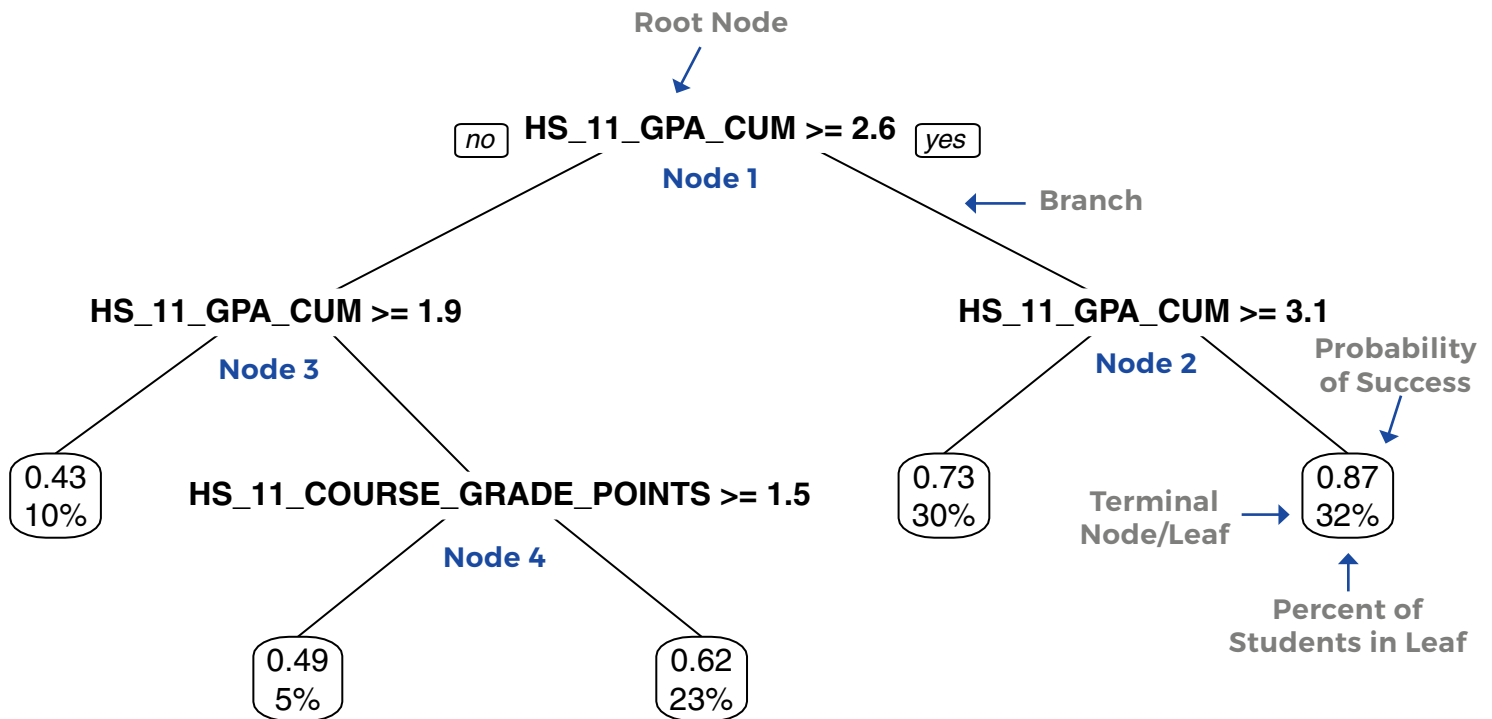
Three sets of trees were developed based on when the student completed high school, and if their CST scores were available: one set of trees for direct matriculants (DMs), another for non-direct matriculants (NDMs), and a third for non-direct matriculants with available CST scores (NDMs with CST).

- **Direct Matriculant Models (11th grade):** These models utilize cumulative high school grade point average (GPA) as of the completion of 11th grade and high school course enrollments and grades up to 11th grade as predictors of successful completion of courses in each discipline at the community college. This model would be used with most students who are transitioning directly to college from high school, as they will be assessing, matriculating, and even enrolling before the results from their 12th grade courses are available.
- **Non-Direct Matriculant Models (12th grade):** These models utilize cumulative high school GPA as of the completion of 12th grade, high school course grades through 12th grade, California Standards Test (CST) information as predictors of successful completion of courses in each discipline at the community college. These models would be used for students who had more than a one semester gap between their high school exit and community college entry.

It should be noted, that these rules operate under the assumption that colleges will continue to use additional methods such as a test or informed self-placement to place students in the course section, as not every community college student can be successfully placed with the current method. For example, colleges that use methods like the EAP or the SAT/ACT will likely need to continue to use these additional methods to make sure they maintain the capacity to place every student.

How to Read a Decision Tree for English

Figure 1. Interpreting Transfer Level English - LO Y DM Decision Tree



The tree depicted in Figure 1 includes all students in the California Community College (CCC) System who had four full years of high school data available in Cal-PASS Plus and whose first English class at a CCC was transfer-level English (as indicated by the LO in the title and or the Y in the CB21). This tree depicts these students' success rates using grades and other transcript information through 11th grade for students attending community college directly out of high school (i.e. direct matriculants (DM)) for whom 12th grade information would not yet be available for use in placement.

In this tree, the root node (node 1) splits on high school 11th grade cumulative GPA ($hs_11_gpa \geq 2.6$), with the right-hand path including students having a GPA equal to or greater than 2.6 and the left-hand path including students with less than a 2.6 GPA. The criterion for this model was set at a probability of success at 70% or better at transfer-level.

On the right side at node two, we now see students with either greater than a 2.6 GPA but less than a 3.1 GPA or greater than a 3.1 GPA. 32% of the student population had greater than a 3.1 GPA and exhibited a probability of success at 87% or better. Students with greater than a 2.6 but less than a 3.1 make up 30% of the population and exhibited a probability of success at 73% or higher.

Table 1. Crosswalk of Variable Names for English Decision Rules

Variable Name	Variable Description
hs_11_gpa / hs_12_gpa	Cumulative high school (hs) grade point average (gpa) up through 11th (hs_11_gpa) or 12th grade (hs_12_gpa) as indicated.
hs_11_course_grade_points / hs_12_course_grade_points	Grade points in high school (hs) English course in 11th (hs_11_course_grade_points) or 12th (hs_12_course_grade_points) grade as indicated. A = 4 grade points B = 3 grade points C = 2 grade points D = 1 grade point F = 0 grade points
CST	Scaled score on the English California Standards Test (CST) typically taken in 11th grade of high school. The CST is no longer being offered as of 7/1/2013.
CB21 Value	Y = Transfer Level A = One-Level Below Transfer B = Two-Levels Below Transfer C = Three-Levels Below Transfer

A full list of variable names used in the models and their definitions can be found here: <http://bit.ly/2citDJW>.

Table 2. English Decision Rules

Level	Direct Matriculants (Through 11th grade)	Non-Direct Matriculants
Transfer level	High school 11th grade cumulative GPA of 2.6	High school 12th grade cumulative GPA of 2.6 or better
One-level below	High school 11th grade cumulative GPA of 2.3	High school 12th grade cumulative GPA of 2.2 or better AND High school 12th grade English course grade of C or better
Two-levels below	High school 11th grade cumulative GPA of 2.0	High school 12th grade cumulative GPA of 1.8 or better AND high school 12th grade English course grade of D (or better) OR High school 12th grade cumulative GPA of 1.8 or better AND English CST score of 268 or higher
Three-levels below	High school 11th grade cumulative GPA of 1.4	High school 12th grade cumulative GPA of 1.7 or better OR High school 12th grade cumulative GPA of 1.5 or better AND English CST score of 288 or higher
Colleges	111	111
Students	214,394	214,394

Figure 2. Transfer-Level English - LO Y English DM

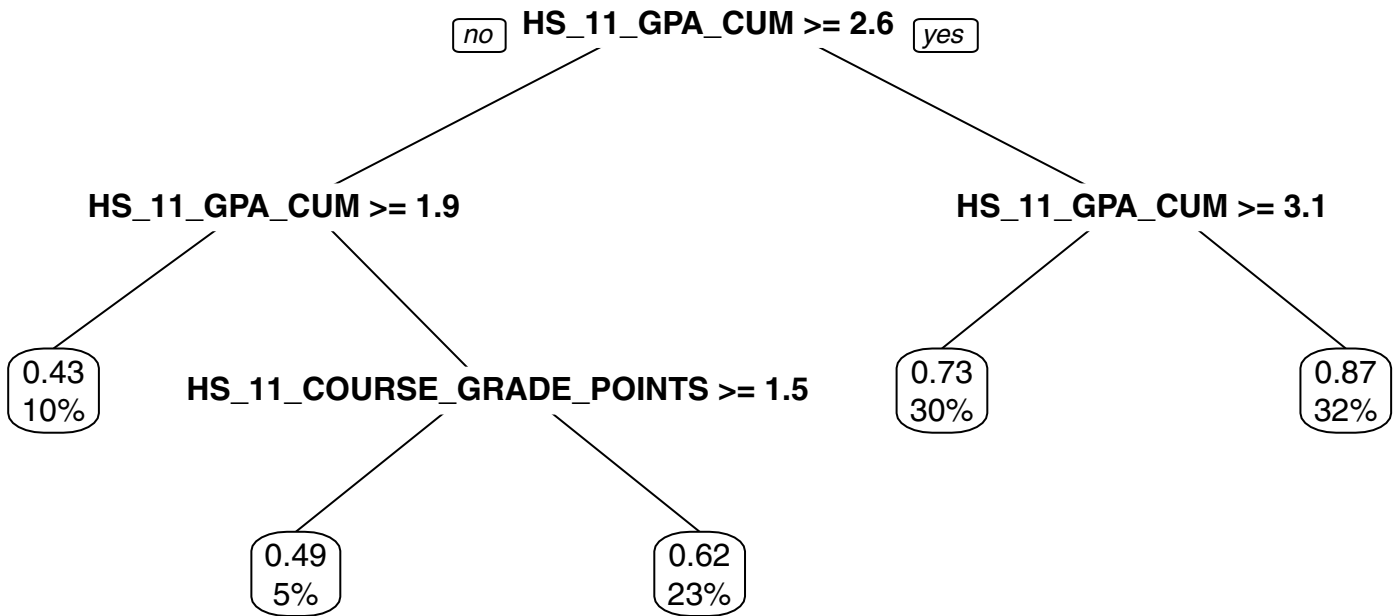


Figure 3. Transfer-Level English - LO Y English NDM

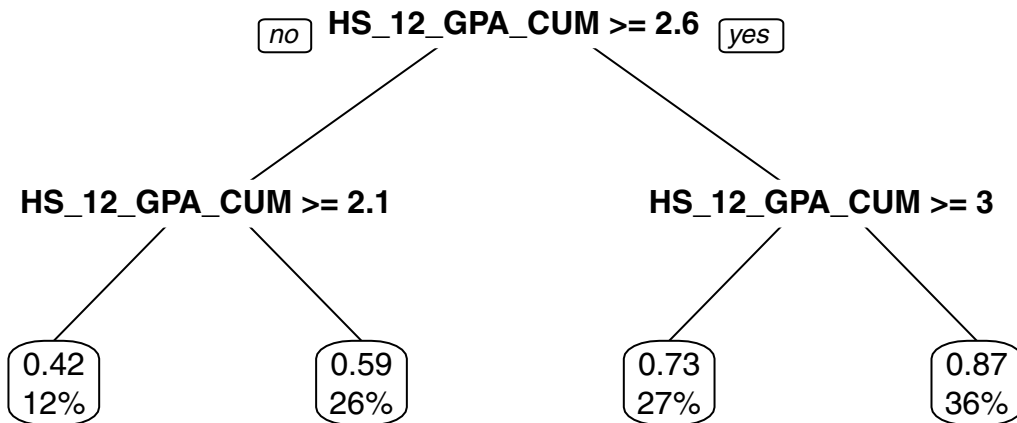


Figure 4. Transfer-Level English - LO Y English NDM CST

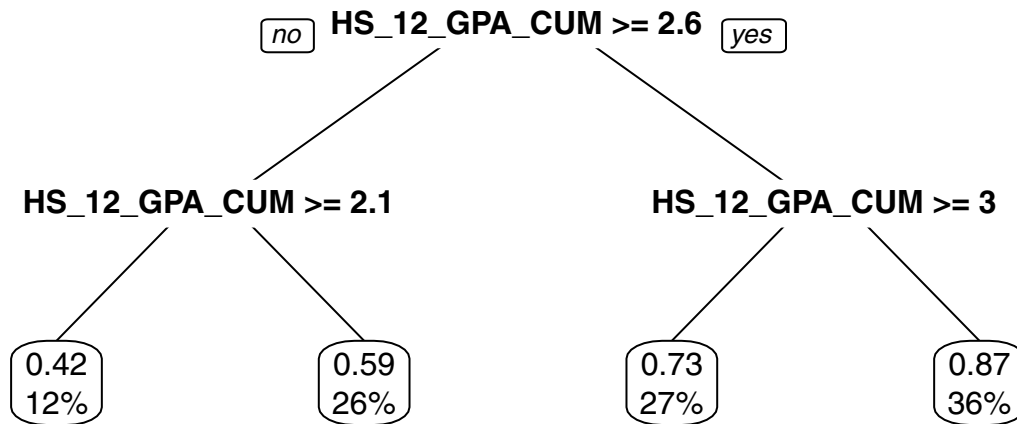


Figure 5. One-Level Below Transfer Level - LO A English DM

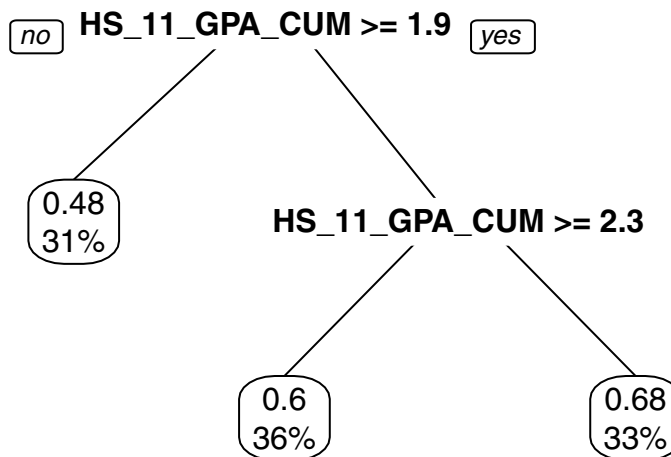


Figure 6. One-Level Below Transfer Level - LO A English NDM

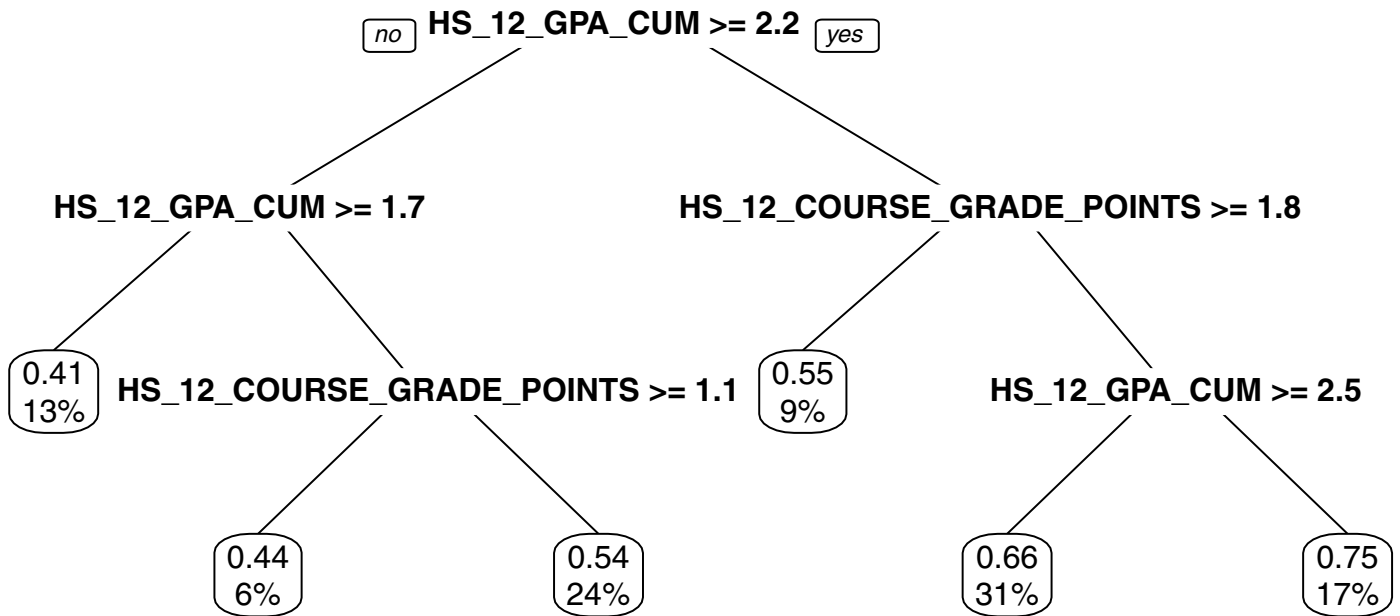


Figure 7. One-Level Below Transfer Level - LO A English NDM CST

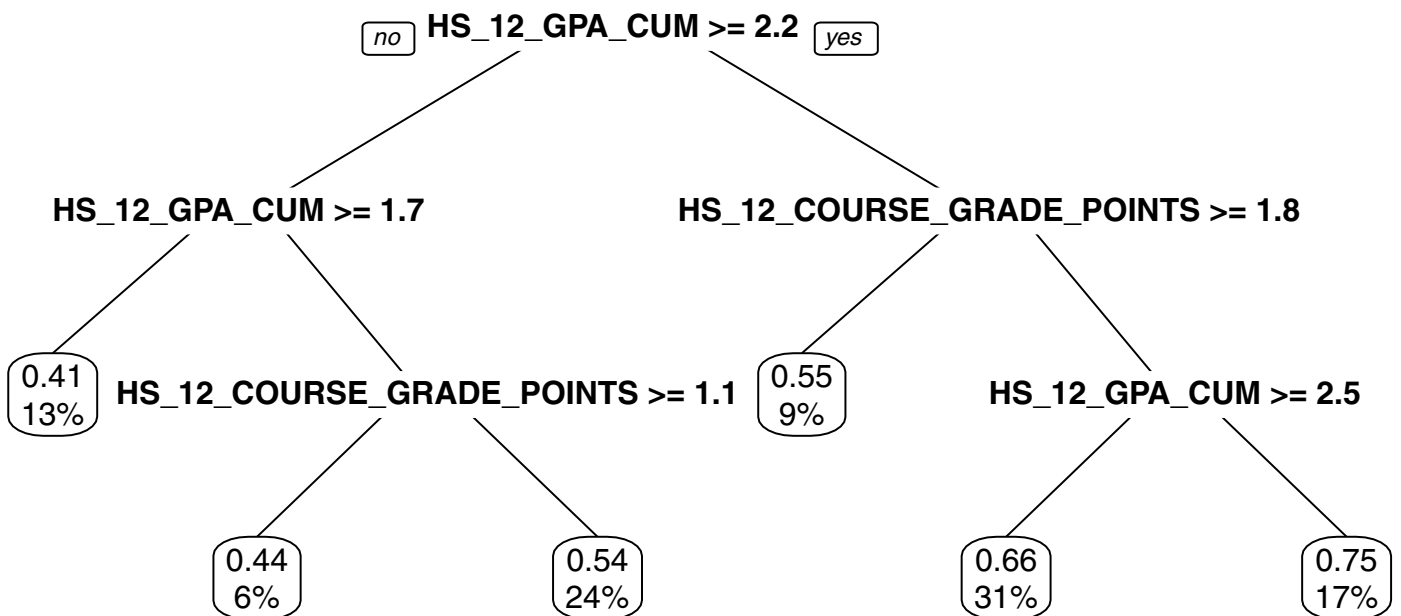


Figure 8. Two-Levels Below Transfer Level - LO B English DM

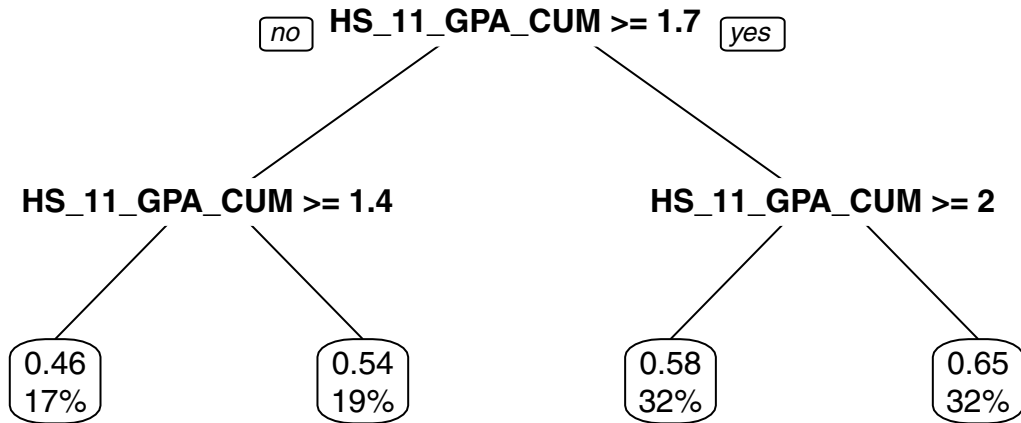


Figure 9. Two-Levels Below Transfer - LO B English NDM

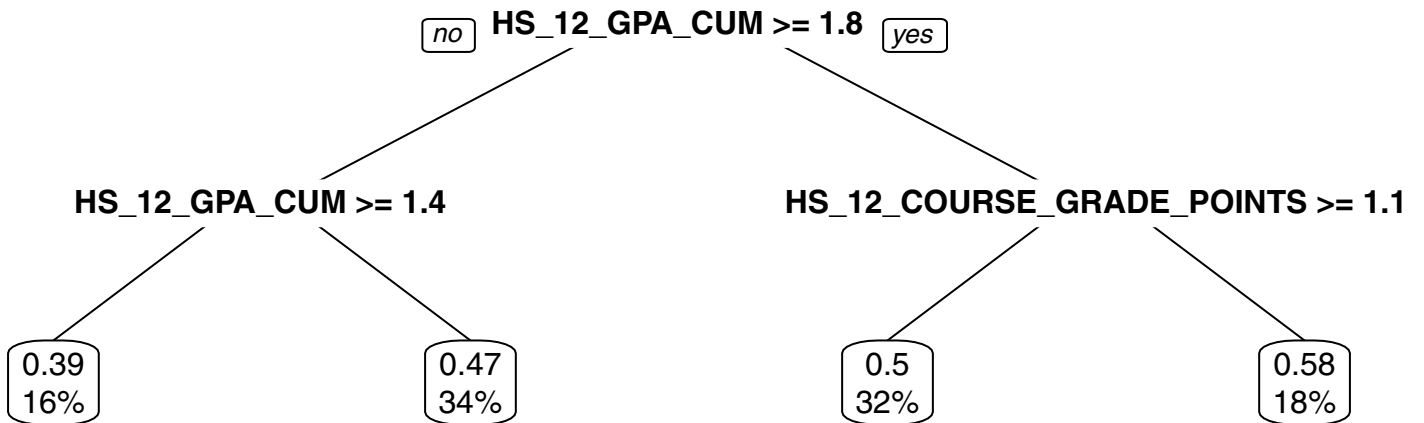


Figure 10. Two-Levels Below Transfer - L0 B English NDM CST

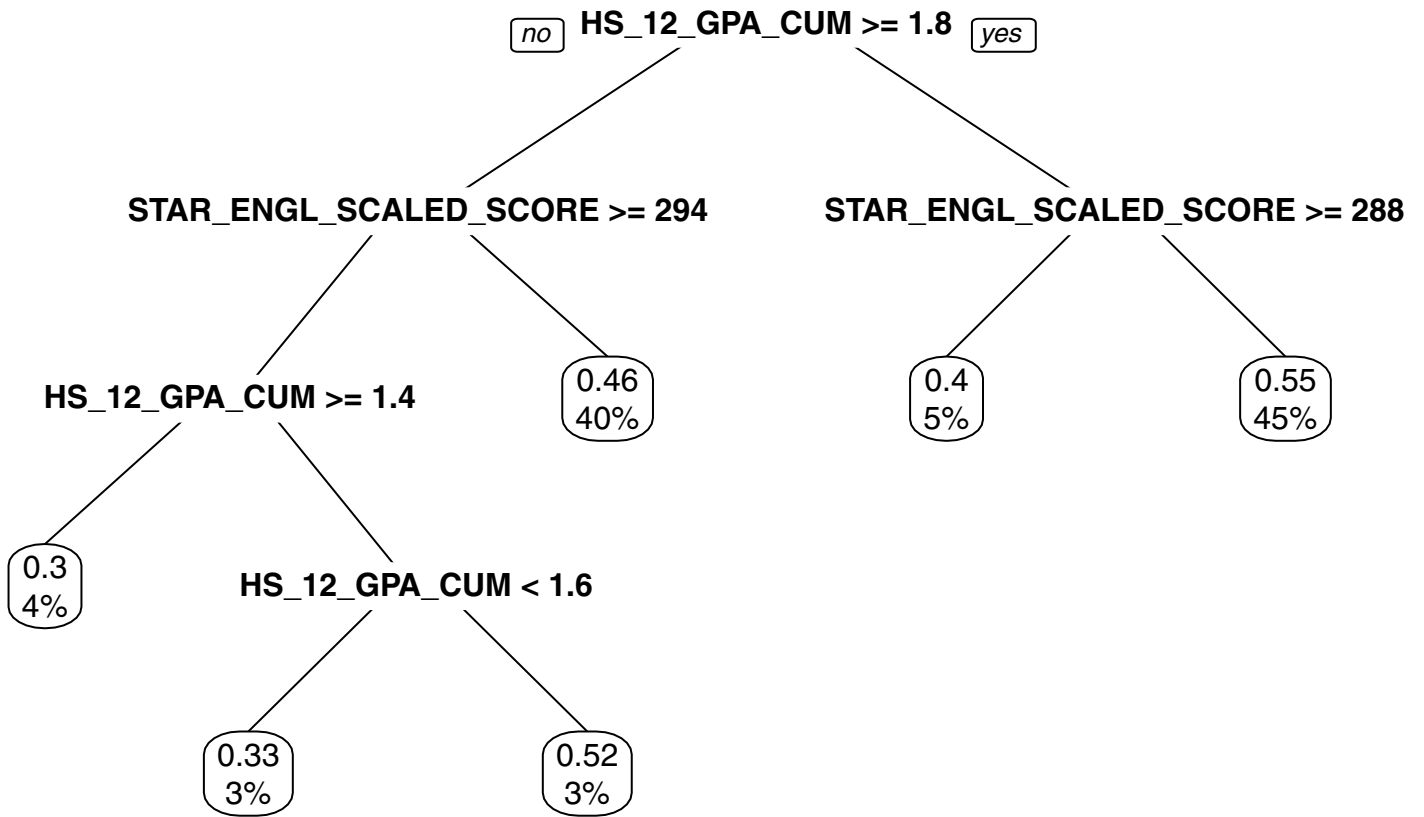


Figure 11. Three-Levels Below Transfer - L0 C English DM

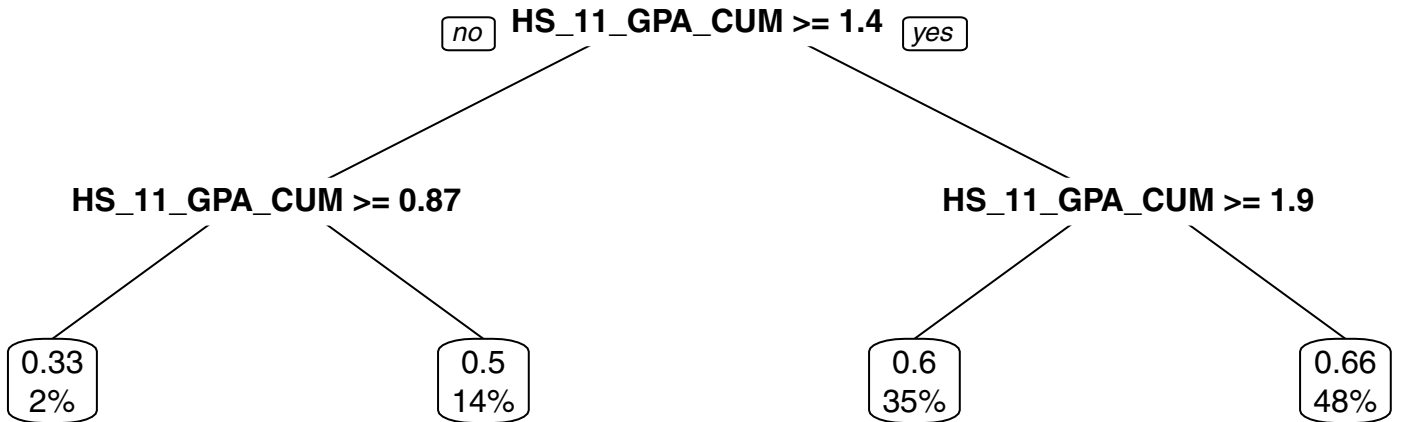


Figure 12. Three-Levels Below Transfer - L0 C English NDM

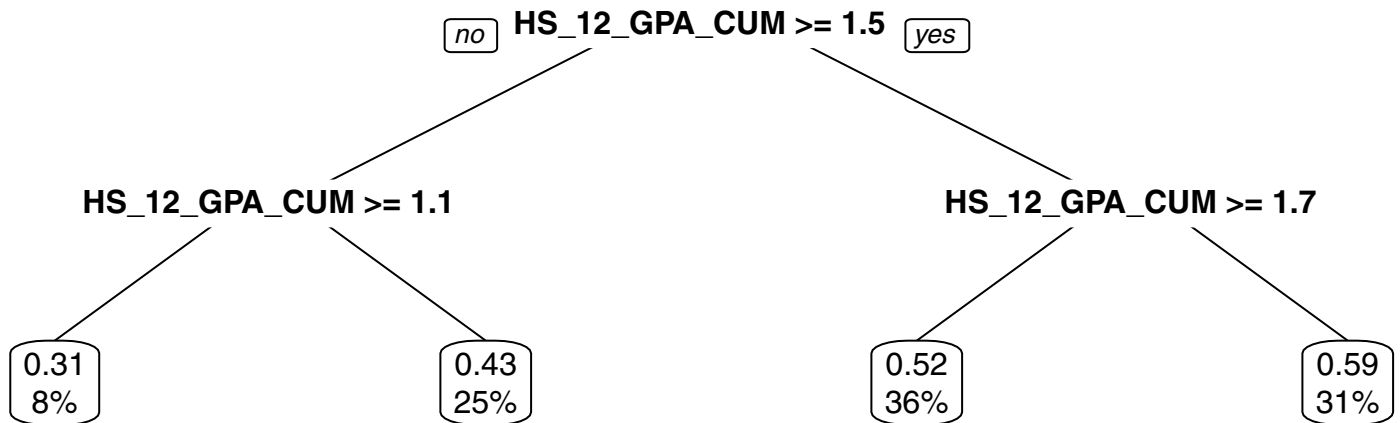


Figure 13. Three-Levels Below Transfer - L0 C English NDM CST

