COMPASS
COLLEGE ALGEBRA & GEOMETRY RENEWAL

APPLICATION FOR THE RENEWAL AS LOCALLY MANAGED INSTRUMENTS

November 14, 2006
BACKGROUND

The information contained herein is being submitted for renewal consideration of the ACT COMPASS College Algebra and Geometry tests currently in use at Santa Monica College. We seek FULL APPROVAL of these instruments.

Information Required for Renewal:

ACT COMPASS College Algebra & Geometry
- Content Validity
- Cut Score Validation
- Disproportionate Impact
- ADA Accommodations Provided
- Approval Request Form with Signatures

Please address any comments or questions to:
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Or

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Placement Based on COMPASS College Algebra & Geometry Tests

Given the adaptive nature of the COMPASS mathematics tests, placement at Santa Monica College into 12 mathematics courses ranging from arithmetic/pre-algebra to Calculus 1 is determined by students successfully completing one of the five mathematics tests. The math assessment, as Figure 1 below suggests, is setup so that every student starts with the Algebra test and depending on their performance they are routed to a lower test or higher test. Students are routed “up” until the score for a given test falls below a specific cut score. It should be noted that the Geometry test is simply used as a “screening” test and only upon obtaining the requisite score will they take the Trigonometry test, where placement into Precalculus or Calculus is determined. For the purpose of this report, only the College Algebra and Geometry tests will be discussed as we once again seek full approval of these instruments.

Figure 1. COMPASS Mathematics Tests: Placement Courses

Courses placed:

<table>
<thead>
<tr>
<th>Numerical Skills</th>
<th>Algebra</th>
<th>College Algebra</th>
<th>Geometry</th>
<th>Trigonometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 22 (cut score: 37-45)</td>
<td>Math 23 (cut score: 46-100)</td>
<td>Math 2 (cut score: 35-45)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Placement Based on College Algebra & Geometry
Students successfully completing the College Algebra test are placed into Math 22 (College Algebra for Business and Social Sciences) and Math 23 (Calculus 1 for Business & Social Science); placement into Math 2 (Precalculus) is determined by students successfully completing both the Geometry and Trigonometry tests. Placement for Math 2 is specifically assigned upon students demonstrating sufficient mastery of trigonometry skills (score of 45-65). If students do not reach such score, they are then placed into Math 23 (with a recommendation to consider other specific courses given their specific educational goals).

Overview of Remainder of Report
The remainder of this report will provide the necessary information to gain full approval of the College Algebra and Geometry tests. We first will present a content analysis of the tests based on the entry skills expected for the three courses named above. Next, we discuss the results of the latest consequential validity study we conducted this Fall 2006, which will summarize findings from a student and faculty survey on students’ placement adequacy and preparation for the courses in which they were placed. Based on this consequential validity analysis, new cut scores are proposed to maximize student and faculty satisfaction with placement as well as student success. We will then discuss the ADA accommodations provided to students taking these tests.
COMPASS Content Validity

The Santa Monica College Mathematics Department has developed a list of entry and exit skills for each of its courses, all of which are published on the department website (http://www.smc.edu/math/default.htm), in the course outlines of record, and instructors’ syllabi. Appendix A lists the entry skills for three courses (noted below) for which we believed the COMPASS College Algebra and Geometry tests might be useful in measuring such skills. Table 1 below identifies the courses for which the content validation took place and are listed in order of increasing difficulty by test. It should be noted that students may also gain entry into these courses by meeting the appropriate prerequisite course as demonstrated in Figure 2.

<table>
<thead>
<tr>
<th>COMPASS Test</th>
<th>Content Validity—Courses Reviewed</th>
</tr>
</thead>
</table>
| College Algebra | Math 22: College Algebra for Business & Social Science  
                     Math 23: Calculus 1 for Business & Social Science |
| Geometry | Math 2 – Precalculus |

*Figure 2. Mathematics Course Sequencing Chart*
Content Analysis Procedure
Copies of the “COMPASS Standard Item Sets” were obtained from ACT and eight faculty teaching the reviewed courses evaluated the College Algebra and Geometry instruments on the extent to which these tests reflected measurement of prerequisite skills for the above courses. Instructors were provided with a list of expected entry skills for the reviewed course and were directed to examine how important the academic knowledge or skill measured by each item was for successful acquisition of the skills taught in the course. Prior to analyses being conducted, it was determined that the reviewed test items must at a minimum account for a mean rating of 2.5 to deem the test useful in measuring the prerequisite skills for the courses (Math 22, 23, and 2).

As seen in Table 2, the Geometry test items accounted for a mean rating of 3.68, which strongly indicated the appropriateness of the test in assessing geometric skills expected for Math 2. Though the ratings for the College Algebra test were lower, these were still above our cutoff of 2.5. Accordingly, the College Algebra test was judged appropriate in measuring advanced algebraic skills for all three courses: Math 22—2.97; Math 23—2.72; and Math 2—3.3.
Table 2. Content Validity Study – COMPASS Geometry & College Algebra Skills
Santa Monica College

Faculty Reviewer ________________________________ Date ___________

Instructions: Please rate each item’s importance for each math course using the scale shown below. How important is the academic knowledge or skill measured by this item for successful acquisition of the skills taught in this course?

4. Critically Important
3. Important
2. Slightly Important
1. Not Relevant

<table>
<thead>
<tr>
<th>Geometry Test</th>
<th>Math 2 (Precalculus)</th>
<th>Math 22</th>
<th>Math 23</th>
<th>Math 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Item Number</td>
<td>00521</td>
<td>3.8</td>
<td>00345</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>00485</td>
<td>3.8</td>
<td>00768</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>00925</td>
<td>3.8</td>
<td>00289</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>00255</td>
<td>3.7</td>
<td>01095</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>00572</td>
<td>3.7</td>
<td>00793</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>00529</td>
<td>3.7</td>
<td>00711</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>01010</td>
<td>3.8</td>
<td>03034</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>00492</td>
<td>3.7</td>
<td>07536</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>00544</td>
<td>3.0</td>
<td>00551</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>00378</td>
<td>3.7</td>
<td>00983</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>00825</td>
<td>3.7</td>
<td>08995</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>00230</td>
<td>3.8</td>
<td>00920</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>00610</td>
<td>3.8</td>
<td>09077</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>00783</td>
<td>3.3</td>
<td>07457</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>00958</td>
<td>3.7</td>
<td>07445</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>00387</td>
<td>3.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College Algebra Test</th>
<th>Math 22</th>
<th>Math 23</th>
<th>Math 2</th>
</tr>
</thead>
</table>

| N Reviewers | 6 | 8 |
| N Items Rated 2.5 or Higher | 16/16 | 11/15 |
| Mean Rating | 3.68 | 2.97 |

| % Items Rated 2.5 or Higher | 100% | 73% |
| Mean Rating | 2.72 | 3.3 |

| % Items Rated 2.5 or Higher | 93% | 60% |
CONSEQUENTIAL VALIDITY & CUT SCORE VALIDATION

Consequential Validity Assessment
Early in Fall 2006, faculty teaching students enrolled in Math 22, 23, and 2 were surveyed on their perceptions of placement adequacy and on students’ academic preparedness for the course. Similarly, students enrolled in these courses were surveyed along the same dimensions. As indicated in Table 3 (p. 9), the analysis indicated that students were much more likely than faculty to deem their placement into these courses as appropriate:

\[
\text{Student vs. Faculty Ratings} \\
\begin{itemize}
  \item 84\% vs. 66\% for Math 22; \\
  \item 97\% vs. 70\% for Math 23; and \\
  \item 79\% vs. 80\% for Math 2.
\end{itemize}
\]

In terms of student academic preparation for the course in question:
\[
\begin{itemize}
  \item Math 22 students tended to underestimate their preparation for the course compared to how faculty perceived these students (59\% vs. 79\%); \\
  \item Math 23 students and faculty were just as likely to agree that the majority of students had the academic preparation necessary to succeed in the course (69\% vs. 69\%); \\
  \item In Math 2, a slightly higher percentage of students overestimated their academic preparation for the course compared to faculty perceptions (85\% vs. 79\%).
\end{itemize}
\]

Cut Score Validation & Consequential Validity
Existing cut scores for placement into Math 22 and Math 23 require the completion of the College Algebra test with a score of 37-45 and 46-100, respectively. Based on our consequential validity analysis, only 11\% of test takers scored between 37 and 45 points with the remaining 89\% scoring above 45 points.

Math 22 Placement
Thus, based on the information presented in the Table 3, it is readily apparent that most Math 22 students score well above the cut score band of 37-45 points. While there appears to be a slight discrepancy in faculty perceptions of correct placement and student academic preparation for the course—66\% of students appropriately placed and 79\% appropriate academic preparation—it stands to reason that cut scores for Math 22 can be adjusted slightly in an attempt to increase placement accuracy while still addressing academic preparation. Given that the mean college algebra score for Math 22 students is 51.4 and the median 52 points, as well as accounting for the related information for Math 23, it is proposed that cut scores for College Algebra be adjusted by:
\[
\begin{itemize}
  \item Setting the basal placement cut score to 41 points; and \\
  \item Place students into Math 22 if they score between 41 and 55 points.
\end{itemize}
\]

A review of students’ unofficial midterm grades in Math 22 further lend support for the increase in cut scores. Compared across the five-point cut score bands, analyses show that only 50\% of students with a College Algebra score of <41 were passing the class with a C or better. This increased to 66\% for students with a score of 41-45 points, and to 100\% above 46 points.
Math 23 Placement
As may be seen in Table 3, the sample size for Math 23 for the consequential validity analysis is 30 students. This is due in part to only three classes being taught this fall, of which two instructors participated in the study. However, we believe this sample size is “large enough” to allow us to carry out the analysis below.

Given the general agreement between faculty and students on student academic preparation for the course (69% appropriately prepared), the fact that faculty estimate that 30% of students should have placed into a lower course (i.e., Math 22), and students’ own perceptions of correct placement, it is clear that the cut score for Math 23 must be adjusted. When considering the information presented in the latter part of Table 3 (Student & Faculty Perception of Correct Placement by Cut Score Five-Point Band), it can be seen that in general, faculty perception of correct placement increases as the cut score band increases. Given that the current college algebra mean score for students participating in the consequential validity study is 56.4 (SD= 6.5) and the median is 55, we propose to move the current cut score from 46 points to 55 points. Thus, placement into both Math 22 and Math 23 will be optimized.

While a review of students’ unofficial midterm grades in Math 23 suggests that a higher cut score might be in order, given the sample size, a higher cut score should be considered once additional data is collected. The midterm grade analysis indicated that 34% of students with scores of 46-50 points were passing the class with a C or better, increasing to 43% for those with scores of 51-55, to 50% for 56-60, to 66% for 66-70, and to 100% for those with a score above 70 points.

Rather than increasing the score at this time, in collaboration with the Mathematics Department, the placement message for Math 23 will be modified significantly to better advise students as to whether or not they should consider taking Math 23 as opposed to Math 22 or another college-level math. We have discovered that not every student enrolling in Math 23 anticipates majoring in a Business—thus students may not necessarily be motivated to get a good grade.

Math 2 Placement
Based on the descriptive information provided in the middle of Table 3, it appears that the vast majority of students taking the Geometry test score well above the cut score of 66 points. It can be seen that both the mean and median are 85 points. Additionally, considering that students and faculty generally agree on students’ correct placement (79% vs. 80%, respectively), and given the fact that students across all five-point cut score bands are perceived to have been correctly placed (with exception of discrepant information for scores of 66-70), it is proposed that the cut score of 66 points remain in place to route students up to the Trigonometry test until more data is collected. If a similar pattern were found for the lower five-point band, the Mathematics Department should consider increasing the cut score to 70 points.

If we are to take the score itself and the instructor and student consequential data, one may infer that students at and above the cut score, possess the geometric skills to succeed in Math 2. A review of students’ unofficial midterm grades, compared across the five-point cut score bands, indicated that most students were passing the class with a C or better (66%-100%). The lowest passing rate was for scores of 66-70.
Table 3. Consequential Validity Analysis: Student & Faculty Perception of Placement Adequacy

<table>
<thead>
<tr>
<th>Course Placement Perception</th>
<th>Math 22</th>
<th>Math 23</th>
<th>Math 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student</td>
<td>Faculty</td>
<td>Student</td>
</tr>
<tr>
<td>Lower</td>
<td>3%</td>
<td>31%</td>
<td>3%</td>
</tr>
<tr>
<td>Appropriate</td>
<td>84%</td>
<td>66%</td>
<td>97%</td>
</tr>
<tr>
<td>Higher</td>
<td>13%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Academic Preparedness for this Course

<table>
<thead>
<tr>
<th>Not Prepared</th>
<th>Math 22</th>
<th>Math 23</th>
<th>Math 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student</td>
<td>Faculty</td>
<td>Student</td>
</tr>
<tr>
<td>Not Prepared</td>
<td>41%</td>
<td>21%</td>
<td>31%</td>
</tr>
<tr>
<td>Appropriate</td>
<td>59%</td>
<td>79%</td>
<td>69%</td>
</tr>
</tbody>
</table>

Descriptives for College Algebra & Geometry Test by Course

**College Algebra**
- **Math 22 current cut score: 37—45**
  - Mean = 51.4 (8.7); Median = 52
  - Range = 47-78
- **Math 23 current cut score: 46—100**
  - Mean = 56.4 (6.5); Median = 55
  - Range = 48-72

**Geometry**
- **Math 2 current cut score: 66—100**
  - Mean = 85.08 (7.5); Median = 85
  - Range = 69-99

Student & Faculty Perception of Correct Placement by Cut Score Five-Point Band

<table>
<thead>
<tr>
<th>Cut Score Band</th>
<th>Math 22</th>
<th>Math 23</th>
<th>Math 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student Perception</td>
<td>Faculty Perception</td>
<td>Student Perception</td>
</tr>
<tr>
<td>&lt;= 40.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>41.0 - 45.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>46.0 - 50.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>51.0 - 55.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>56.0 - 60.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>61.0 - 65.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>66.0 - 70.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>71.0 - 75.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>76.0 - 80.0</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>81.00 - 85.00</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>86.00 - 90.00</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>91.00 - 95.00</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>&gt; 95</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*Other percentages higher placement
**Other percentages, lower placement
*Other percentages, lower placement, however, failed to obtain necessary Trigonometry score
**Disproportionate Impact**

In accordance with Title 5 and Matriculation regulations, a disproportionate impact study was conducted to assess the rate of placement for impacted groups (gender, ethnicity, age, non-native English speakers) into courses currently accessible through the College Algebra and Geometry placement exams. In order to evaluate the extent of disproportionate impact, the 80% guideline established by the EEOC’s *Uniform Guidelines for Selection Procedures* was utilized as stipulated by the California Community Colleges Chancellor’s Office. According to this guideline, the ratio between the *minority* placement rate over the *majority* rate should be greater than 80% to demonstrate that disproportionate impact does not exist.

To assess disproportionate impact, variables studied were broken down by *minority* and *majority* subgroups. For example:

- **Gender**: females are considered the impacted or *minority group* and males, the non-impacted or *majority group*.

- **Ethnicity**: African American, American Indian, Filipino, Latinos, and Pacific Islanders constitute the *minority group*; White and Asian students the *majority group*.

- **Age**: Students over the age of 25 constitute the *minority group*; those under the age of 25 are the *majority group*;

- **Language**: Study not conducted as Santa Monica College no longer collects this information.

- **Disability**: Study not conducted as there were only 7 self-identified disabled students.

**Demographic Characteristics of the sample**
The sample for the disproportionate impact study consisted of 783 students taking the College Algebra or Geometry test from April 2004 through June 2006. In order to be included in this analysis, students must have initially placed AND enrolled into the respective course: Math 2, 22, or 23. Specifically, it consisted of:

- 59% males and 41% females;

- 46% Asian, 28% White, 10% Latino, 3% African American/Black, 2% Filipino; .4% Pacific Islander; .3% American Indian;

- Less than 1% were self-identified as disabled;

- Mean age = 19.69 years ($SD = 3.80$); 92% under 25.
Disproportionate Impact by Gender
As seen in Table 4, there is no evidence of disproportionate impact by gender for placement into Math 2, 22, or 23. Placement for female students is well above the 80% EEOC Guideline.

<table>
<thead>
<tr>
<th></th>
<th>MATH 2</th>
<th>MATH 22</th>
<th>MATH 23</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female</strong></td>
<td>200</td>
<td>24</td>
<td>84</td>
<td>308</td>
</tr>
<tr>
<td></td>
<td>64.9%</td>
<td>7.8%</td>
<td>27.3%</td>
<td></td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>290</td>
<td>42</td>
<td>143</td>
<td>475</td>
</tr>
<tr>
<td></td>
<td>61.1%</td>
<td>8.8%</td>
<td>30.1%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>490</td>
<td>66</td>
<td>227</td>
<td>783</td>
</tr>
<tr>
<td><strong>EEOC 80% Guideline</strong></td>
<td>&gt; 48.8%</td>
<td>&gt; 7.1%</td>
<td>&gt; 24.1%</td>
<td></td>
</tr>
</tbody>
</table>

Disproportionate Impact by Ethnicity
As Table 5 suggests, disproportionate impact by race/ethnicity exists for Asian students in Math 22 (College Algebra for Social Sciences). Following the 80% Guideline, one would expect that at a minimum, 7.0% of students should place at that level. Given the small difference which corresponds to 1.5%, and the fact that most Asian students place into higher-level courses, this disproportionate impact is not considered a serious violation and thus there is no need for action at this time. At Santa Monica College all students placing into higher-level courses may exercise the option to enroll into lower-level courses.

<table>
<thead>
<tr>
<th></th>
<th>MATH 2</th>
<th>MATH 22</th>
<th>MATH 23</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minority 1:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American:</td>
<td>21</td>
<td>3</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>American Indian:</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Filipino:</td>
<td>7</td>
<td>3</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Latino:</td>
<td>40</td>
<td>6</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Pacific Islander:</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Minority 2:</strong></td>
<td>206</td>
<td>17</td>
<td>87</td>
<td>310</td>
</tr>
<tr>
<td>Asian:</td>
<td>66.5%</td>
<td>5.5%</td>
<td>28.1%</td>
<td></td>
</tr>
<tr>
<td><strong>Majority:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White:</td>
<td>107</td>
<td>23</td>
<td>59</td>
<td>189</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>385</td>
<td>53</td>
<td>199</td>
<td>637</td>
</tr>
<tr>
<td><strong>EEOC 80% Guideline</strong></td>
<td>&gt; 48.9%</td>
<td>&gt; 7.0%</td>
<td>&gt; 24.1%</td>
<td></td>
</tr>
</tbody>
</table>
Disproportionate Impact by Age
As seen in Table 6, disproportionate impact was not observed based on students’ age.

<table>
<thead>
<tr>
<th></th>
<th>MATH 2</th>
<th>MATH 22</th>
<th>MATH 23</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minority</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 25 Years of Age</td>
<td>29</td>
<td>3</td>
<td>10</td>
<td>42</td>
</tr>
<tr>
<td>Majority</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 25 Years of Age</td>
<td>461</td>
<td>63</td>
<td>222</td>
<td>746</td>
</tr>
<tr>
<td>Total</td>
<td>490</td>
<td>66</td>
<td>158</td>
<td>788</td>
</tr>
<tr>
<td>EEOC 80% Guideline</td>
<td>&gt; 49.4%</td>
<td>&gt; 6.8%</td>
<td>&gt; 23.8%</td>
<td></td>
</tr>
</tbody>
</table>
ADA Accommodations

In compliance with the Americans with Disabilities Act, Santa Monica College provides testing accommodations for students with disabilities. These are largely based on the type and degree of disability. The Assessment Center in collaboration with the Center for Students with Disabilities (CSS) arranges for these accommodations on a case-by-case basis. In some cases, students come directly to the Assessment Center for testing and request specific adjustments. If these are within our scope, we will provide them. For example, among accommodations normally provided directly by the Center are the following:

- use one of our stations with a 21” monitor;
- allow for the use of ZoomText to magnify specific areas of the screen;
- provide larger magnification by using a projector
- use of trackball mouse.

Given the student’s disability, we often refer them directly to CSS for testing. For example, blind students are provided there with access to readers, proctors, scribes and to text-to-speech software programs.
Math 22: College Algebra for Business and Social Science

Description: An intensive study of algebraic, exponential and logarithmic functions and their graphical representations and applications, systems of linear inequalities, matrix solutions of systems of linear equations, geometric sequences and series, and the binomial theorem.

Prerequisites: Math 20 or placement

Entry Level Skills:
- Perform all of the routine elementary algebraic operations.
- Solve linear or quadratic equations/inequalities involving one variable and express the answer in interval notation.
- Perform fundamental operations on polynomials and rational expressions.
- Solve applications problems involving polynomial or rational expressions.
- Set up and solve systems of equations in two or three unknowns (with a unique solution) using substitution, elimination, or matrices.
- Evaluate simple expressions involving sigma notation.
- Find domain of functions.
- Perform fundamental operations on functions.
- Graph linear, quadratic, absolute value functions.
- Demonstrate the relationship between exponential and logarithmic functions.
- Solve elementary exponential and logarithmic equations.

Course Objectives
- Factor polynomials of degree greater than or equal to three using rational roots.
- Solve polynomial, rational, radical, exponential and logarithmic equations.
- Write algebraic expressions to solve application problems.
- Use the language and notation of the algebra of functions.
- Determine the composition of functions including the domain.
- Use interval and set builder notation to state the domain and range of functions.
• Graph polynomial, absolute value, rational, radical, exponential, logarithmic, piecewise-defined functions. (Graphs to include intercepts and vertical, horizontal or oblique asymptotes if any, with reference to the limit of a function)

• Use algebraic principles of graphing (including translations, reflections, dilations, expansions and contractions).

• Solve nonlinear inequalities in one variable.

• Solve linear programming problems by the graphical method.

• State and apply the properties of geometric sequences and series to compute a given term or sum.

• Solve systems of linear equations using matrices including systems with infinite or no solution and express infinite solutions using parameters.

• Apply the Binomial Theorem to expand a binomial and find any intermediate term.

• Use a scientific calculator to support computations for application problems.

• Set up and solve application problems from business and the social sciences.
Math 23: Calculus 1—Business and Social Science

Description: Topics include functions, matrix algebra, linear programming including the simplex method, differential calculus of one variable, including exponential and logarithmic functions, introduction to integral calculus and mathematics of finance. *Maximum credit is allowed for only one series, either Math 7, 8 or Math 23, 24.

Prerequisites: Math 22 or placement

Entry Level Skills

- Solve and graph linear/quadratic equations and inequalities.
- Solve systems of linear equations and inequalities.
- Perform basic operations on functions.
- Solve exponential and logarithmic equations.
- Perform operations on polynomials.
- Use matrices to solve linear systems.
- Write algebraic expressions to use in solving application problems.
- Solve rational equations and inequalities.
- Factor algebraic expressions.
- Perform operations with exponential terms.
- Use calculator to perform operations (basic, exponential and logarithmic).
- Read and understand written text equivalent to English

Course Objectives

- Understand business terms.
- Use algebraic skills to solve business problems.
- Solve problems using more advanced matrix operations.
- Solve optimization problems using graphical method.
- Solve optimization problems using Simplex method.
- Solve finance problems.
- Graph functions by identifying important features (using derivatives).
- Finding limits of functions.
- Finding derivatives and using these concepts to solve basic business and economic problems.
- Solve simple optimization problems using derivatives.
- Applying integral to solve basic area, business and economics.
Math 2: Precalculus

Description: An intensive preparation for calculus. This course is intended for computer science, engineering, mathematics and natural science majors. Topics include algebraic, exponential, logarithmic and trigonometric functions and their inverses and identities, conic sections, sequences, series, the binomial theorem, and mathematical induction.

Prerequisites Math 20 and Math 32 or placement

Entry Level Skills

- Simplify advanced numerical and algebraic expressions involving multiple operations.
- Perform operations on polynomials.
- Solve literal equations for a designated variable.
- Solve and graph inequalities involving absolute value.
- Solve polynomial equations by factoring.
- Solve quadratic equations by using quadratic formula and completing the square.
- Complete the square.
- Solve rational and radical equations.
- Use interval notation to express the solution to a linear, quadratic or rational inequality.
- Solve application problems using equations.
- Find the domain and range of linear, quadratic and absolute value relations.
- Find domain of rational and square root functions.
- Perform operations on functions including composition of functions.
- Determine the inverse of a function
- Perform operations on complex numbers.
- Convert between exponential and logarithmic forms.
- Evaluate and graph exponential and logarithmic functions.
- Solve elementary logarithmic and exponential equations.
- Graph parabolas and circles by completing the square.
- Solve systems of linear equations in three variables by elimination and matrices.
- Graph systems of linear and quadratic inequalities.
- Evaluate simple expressions involving sigma notation.
- Graph simple functions by vertical and horizontal translation.
- Define basic geometric terms.
- Distinguish between hypothesis and conclusion.
• Describe the relationship between a theorem and its converse, inverse and contrapositive.
• Set up and complete simple direct and indirect proofs.
• Perform basic geometric constructions.
• Apply geometric theorems involving similar and congruent triangle; parallel lines; parallelograms and their properties; lines and circles and their properties; lines and circles and their relationships; right triangles (Pythagorean theorem).

Course Objectives
• Determine domain, range, symmetry and inverse, if it exists, of a relation.
• Analyze and graph a given function, including but not limited to piecewise defined, polynomial, rational, exponential, logarithmic, trigonometric, and inverse trigonometric functions.
• Use transformation techniques including vertical and horizontal shifts, compression, stretching, and reflection over the x- or y-axis to sketch the graph of a function.
• Use the language and standard mathematical notation of the algebra of functions.
• Determine algebraic combinations and compositions of functions and state their domains.
• State and apply the unit-circle and right-triangle definitions of trigonometric functions and their inverses.
• State and apply fundamental trigonometric identities and the sum, difference, double-angle and half-angle identities.
• Factor polynomials using rational and complex zeros.
• Solve polynomial, rational, exponential, logarithmic, trigonometric and inverse trigonometric equations.
• Write algebraic and trigonometric relationships to solve application problems, including solution of triangles.
• Prove trigonometric identities.
• Classify, analyze and graph conic sections given any quadratic equation in two variables. (Excludes rotation)
• Solve systems of nonlinear equations.
• Prove statements using mathematical induction.
• Apply the binomial theorem to expand a binomial and find required intermediate term.
• Use the language and notation of sequences and series. Determine any term in a sequence.
• Evaluate, manipulate and interpret summation notation.
• Solve problems involving work and other applications of vectors (if time permits).
APPENDIX B

Chancellor’s Office
California Community Colleges

Request for Approval for the Use or Renewal of a Performance Assessment or Locally Constructed or Managed Test

Directions: Provide all requested information. Attach additional pages as needed. Note that this form is to be signed by the identified individuals of the college and submitted with supporting material. When requested, indicate which Standards’ areas have been investigated or addressed and those areas not as yet addressed. **Note:** Studies addressing all of the Standards’ areas need not be completed in order to request approval of an instrument. The minimum requirements are that you provide at least one type of validity evidence and that the test bias standard be addressed. If information exists in a technical report or other sources, summarize the information for this report and **draw conclusions** from the information on whether you feel a specific standard has been met at a minimal level for your instrument. Submission of extended reports or exhaustive documentation evidence to support your claims is not required or desired for review of this request.

1. Identify the test with its complete title: **COMPASS College Algebra and COMPASS Geometry**

2. For which course(s) is this test used to assist with the placement of students? Please identify:

   ___ COMPASS College Algebra: Math 22—College Algebra for Business & Social & Behavioral Sciences
   Math 23: Calculus 1 for Business & Social Science
   ___ COMPASS Geometry: Used as a screening test for Math 2—Precalculus

3. Have there been investigations of the validity of the use of scores obtained from this test? (If your response is no to this question, do not submit this request until some validity evidence is available.)

   ___ X YES, all required studies have been completed. Attach a brief narrative that summarizes the procedures and findings from all such investigations.

   _____ YES, but not all required studies have been completed. Attach a brief narrative that summarizes the procedures and findings from all such investigations.

   _____ Projected completion date for required studies not completed: __________

4. Have there been investigations of the reliability of scores obtained from this test?

   ___ X YES Attach a brief narrative that summarizes the procedures and findings from all such investigations. **Note:** not required for renewal

   _____ NO. Projected completion date: ________
5. Have there been investigations of test bias? (If your response is no to this question, do not submit this request until some test bias evidence is available.) Note also that the required evidence may be different depending on whether this is an initial or renewal request for an instrument.

_____ X YES. Attach a brief narrative that summarizes the procedures and findings from all such investigations. **Note: not required for renewal**

6. Have there been investigations of the adequacy of the cut or placement score(s) used with this test?

_____ X YES. Attach a brief narrative that summarizes the procedures and findings from all such investigations.

_____ NO. Projected completion date: __________

7. Have there been investigations planned (for first-time submissions) or conducted (for renewal) of disproportionate impact in those courses that rely on this test to assist in placement decisions?

_____ X YES. Attach a brief narrative that summarizes the procedures and findings from all such investigations.

_____ NO. Projected completion date: __________

There is documented evidence in the appropriate college or district office to support the adequacy, suitability and usefulness of this test to provide fair and equitable course placement information to our students as described in the California Community College Standards. At a minimum, evidence from at least one validity study (content, criterion-related or consequential) and bias study must be sufficient to support the continued use of the instrument for placement advisement.

*NOTICE: Locally Managing a Second Party Test*
The California Community Colleges Chancellor's Office assumes that the local college has received authorization from the publisher for use of this test as a locally managed, second party test.

__________________________________________  ______________
College Superintendent/President   Date

__________________________________________  ______________
College Assessment Officer    Date

__________________________________________  ______________
College Research Officer    Date

__________________________________________  ______________
College Subject Discipline Faculty/Chair  Date

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