University of Wisconsin-Milwaukee
Mathematics Placement Examination
2005 Retesting Effort

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Sponsored by the
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In the Spring of 2005 we undertook a project to encourage students admitted to UW Milwaukee to re-take the UW System Mathematics Placement Exam if their initial results indicated that their initial placement was lower than we would have expected based on a combination of their units of high school mathematics and the Mathematics portion of their ACT. We used UW-Whitewater’s placement scheme based on the Math ACT to set triggers for recommending retesting. Details of our algorithm for selecting students are contained in the Appendix to this report.

Overall, we were disappointed in the number of students who elected to retest after they were notified, and heartened by the results for those who did retest. We are also disappointed in the number of MPS students who met our criteria to be contacted. Below is a summary of the results of our effort.

We remind the reader that placement levels 00 and 10 place students into non-credit courses, that levels 20 and 26 indicate that students ought to be ready for a credit course roughly at the level of the third year of mathematics in high school, that scores in the 30’s indicate readiness for some sort of pre-calculus, statistics, finite mathematics, etc, and scores in the 40’s indicate readiness for traditional calculus courses. Any score 30 or higher indicates the student has met the UW-Milwaukee General Education Requirement in Mathematics.

Overall, 1052 new students intending to enroll in Fall 2005 were solicited to take the placement test a second time. 220 of these students did so (20.9%).
Retesting Outcomes by Original Placements

Recommendations

Based on the details below it is our recommendation that a more concerted effort be made to get students to take the placement test a second time, particularly if their original placements were in non-credit courses. Better than 96% of those with original placement level 00 placed higher, and better than 78% of those with original placement level 10 placed higher upon retesting. If possible, we should mandate repeating the placement test if the original placement is into a non-credit course.
Details

Of these 220 students who retested:

- 46 had placements that did not change (20.9%)
- 21 had lower placements (which we did not enforce) (9.5%)
- 153 had higher placements (69.5%)
- Before retesting, 52 of these 220 students met the GER in Mathematics. After retesting, 102 of these 220 students met the GER in Math, a gain of more than 96%. More than 78% of the students with original placement of 26 met the GER in Math after retesting, compared with just under 47% of students with original placement 20.
- Before retesting, only 6 of these 220 students had placement level 40. After retesting an additional 29 students had placement level 40 or 45.
Of the 153 students with higher placements:

- 26 students originally had placement level 00.

96.1% of these students placed higher, with a net gain of 32 courses. Specifically, after retesting:
  - 7 had placement level 20 and were now eligible for credit courses in Mathematics. This represents 2 courses skipped per student, normally 2 semesters of work.
  - 18 had placement level 10
  - Math ACT scores for those who placed higher ranged from 13 to 24. The lone student who did not place higher had a Math ACT score of 14. The Math ACT midrange for the group was 16 to 18.
  - All students with Placement Level 00 should be retested!
• 57 students originally had placement level 10. 78.9% of these students placed higher, with a net gain of 50 courses. Specifically, after retesting:

![Bar chart showing new levels]

- 1 student had placement level 36. This represents 3 courses skipped (Math 095, Math 105 and Math 117), normally 3 semesters of work. This student had now met the GER in Math.
- 1 student had placement level 35. This represents 3 courses skipped (Math 095, Math 105 and Math 116), normally 3 semesters of work. This student had now met the GER in Math.
- 1 student had a placement level of 30. This represents 2 courses skipped (Math 095, Math 105), normally 2 semesters of work. This student had now met the GER in Math.
- 42 students had placement level 20 and were now eligible for credit course in Mathematics, as well as courses in other departments, such as the statistics course in the Department of Africology.
- Math ACT scores for those who placed higher ranged from 16 to 28, while Math ACT scores of the students who did not place higher ranged from 16 to 24. The Math ACT midrange for the whole group was 18 to 21.

- **All students with Placement Level 10 should be retested!**
• 62 students originally had placement level 20. 46.8% of these students placed higher, with a net potential gain of 45 courses.

Specifically, after retesting:
  o 1 student had placement level 40. This represents 3 courses skipped (Math 105, Math 116 and Math 117), normally 2 semesters of work. This student had now met the GER in Math.
  o 6 students had placement level 37. This represents 1 course skipped (Math 105), and a high enough score to enroll in Math 225, Math 116 or Math 117. These students had now met the GER in Math.
  o 12 students had placement level 36. This represents 2 courses skipped (Math 105 and Math 117), normally 2 semesters of work. These students had now met the GER in Math and were one course (Math 116) away from enrolling in Math 231 or Math 341.
  o 2 students had placement level 35. This represents 2 courses skipped (Math 105 and Math 116), normally 2 semesters of work. These students had now met the GER in Math and were one course (Math 117) away from enrolling in Math 231 or Math 341.
  o 8 students had placement level 30. This represents 1 course skipped (Math 105 or Math 106). These students had now met the GER in Math.
23 students originally had placement level 26. 78.3% of these students placed higher, with a net gain of 29 courses. Specifically, after retesting:

- 1 student had placement level 45. This represents 3 courses skipped (Math 105, Math 116 and Math 117), normally 2 semesters of work. This student had now met the GER in Math and was now eligible for Honors Calculus!
- 1 student had placement level 40. This represents 3 courses skipped (Math 105, Math 116 and Math 117), normally 2 semesters of work. This student had now met the GER in Math and was now eligible for Math 231 or Math 341.
- 1 student had placement level 37. This represents 1 course skipped (Math 105), and a high enough score to enroll in Math 225, Math 116 or Math 117. This student had now met the GER in Math.
- 7 students had placement level 36. This represents 2 courses skipped (Math 105 and Math 117), normally 2 semesters of work. These students had now met the GER in Math and were one course (Math 116) away from enrolling in Math 231 or Math 341.
- 8 students had placement level 30. This represents 1 course skipped (Math 105 or Math 106). These students had now met the GER in Math.
12 students originally had placement level 30. 66.7% of these students placed higher, with a net gain of 9 courses. Specifically, after retesting:

- 2 students had placement level 40. This represents 2 course skipped (Math 116 and Math 117). These students were now eligible for Math 231 or Math 341.
- 1 student had placement level 37. This is a high enough score to enroll in Math 225, Math 116 or Math 117.
- 4 students had placement level 36. This represents 1 course skipped (Math 117), normally 2 semesters of work. These students were one course (Math 116) away from enrolling in Math 231 or Math 341.
- 1 student had placement level 35. This represents 1 course skipped (Math 116). This student was one course (Math 117) away from enrolling in Math 231 or Math 341.
12 students originally had placement level 35. 75.0% of these students placed higher, with a net gain of 13 courses. Specifically,

- 3 students had placement level 45. This represents 1 course skipped (Math 117). These students were now eligible for Honors Calculus!
- 9 students had placement level 40. This represents 1 course skipped (Math 117). These students were now eligible for Math 231 and Math 341.
• 16 students originally had placement level 36. 81.3% of these students placed higher, with a net gain of 13 courses. Specifically,

![Bar chart showing New Level, Original Level 36]

- 4 students had placement level 45. This represents 1 course skipped (Math 117). These students were now eligible for Honors Calculus!
- 9 students had placement level 40. This represents 1 course skipped (Math 117). These students were now eligible for Math 231 and Math 341.

• 6 students originally had placement level 37. 33.3% of these students placed higher, with a net gain of 2 courses. Both students retested to level 40.

• 6 students originally had placement level 40. 66.7% of these students placed higher, earning placement into Honors Calculus.
Of the 23 students who had lower placements:

- 9 had original placements into Math 105/106/175, and the new placements indicated Math 095.
- 7 had original placements into Math 116/117/225, and the new placements indicated Math 105/106/175.

Of the 46 whose placement did not change, 24 had placement 20 and the rest were fairly evenly scattered.

A major effort was made to send students copies of the Early Math Placement Test (EMPT). 50 of the 220 students were sent copies of the EMPT when it was suggested to them. Of these students, 26 took the placement test a second time. 16 of these students placed higher (61.5%). Overall, the sample is pretty small, so the comparisons probably don’t mean much. For example, no student with original placement 00 asked for a copy of the EMPT. If we look at improvement by students with original placement at least 10, then 61.5% of those who were sent an EMPT improved compared with 66.7% of those who were not.

**Impact on MPS Students**

The number of MPS students contacted was disappointing. Only 17 MPS students were in the pool of students contacted, and they were primarily from Riverside University High School (7 out of 65 RUHS students in the freshman class), Alexander Hamilton High School (5 out of 32 AHHS students in the freshman class) and Washington High School (3 out of 22 WHS students in the freshman class). Altogether there were 358 MPS high school students in the freshman class, about 8.3% of the total class, yet these students represented about 1.6% of the students contacted. In order to determine the reasons for this we will have to have more data on the MPS enrollees. For example, how many MPS students were still eligible to retest? This question arises because students admitted through AOC take the placement test as part of the admission procedure, and many test first in November or December of the senior year. These students may have then retested in March. Another issue is our screening procedure. Students with three years of high school mathematics were not flagged for retesting unless they had Math ACT scores of 21 or higher for Placement Level 00 and 24 or
higher for Placement Level 10. Perhaps most MPS students only take three years of mathematics in high school.

On the positive side, we did have a higher rate of MPS students who were contacted actually retest. 41.2% of MPS students (7 out of 17) who were advised to retest did so, compared with 20.9% of students in general. Although one would suppose that this effect was geographical (it being relatively convenient for them to come down to UWM to be retested) only one student out of 6 from Shorewood High School and none of the 8 students from Whitefish Bay High School retested. The MPS percentage was comparable to that of Nicolet High School where 38.9% (7 out of 18) students contacted were retested. Outcomes for the 7 students who retested were similar to the general pool. All 4 students who originally had placement level 00 retested to placement level 10. Out of the 3 students with original level 10, one retested to 20, one stayed at 10 and one retested to 0. Overall, 71.4% retested higher, compared with 69.5% of the general pool.

Over the past 4 years UWM has enrolled 355.75 MPS high school graduates per year. It would seem to us that we ought to make a big push to retest students from MPS high schools that send a large number of students to UWM. These would include

- Rufus King IB HS: 49.75/year (4 year average) 13.4%
- Riverside University HS: 52.25/year (4 year average) 12.4%
- Milwaukee HS of the Arts: 22.75/year (4 year average) 8.5%
- Washington HS: 24.5/year (4 year average) 7.6%
- Pulaski HS: 24.5/year (4 year average) 6.7%
- Alexander Hamilton HS: 33.5/year (4 year average) 6.6%
- Harold S. Vincent HS: 19/year (4 year average) 5.6%
- James Madison University HS: 19.5/year (4 year average) 4.5%
- Bay View HS: 18.25/year (4 year average) 4.4%
- John Marshall HS: 10.5/year (4 year average) 4.2%
- South Division HS: 9.5/year (4 year average) 3.8%
- Lynde and Harry Bradley School of Technology and Trade: 13.75/year (4 year average) 3.7%
- South Division HS: 9.5/year (4 year average) 3.8%
- North Division HS: 14 in 2005

A program aimed at the first six schools in this list would be expected to reach more than 58% of MPS high school students who will attend UWM
while reaching schools where better than 6% of the average sophomore class goes on to attend UWM. We recommend that

- A parent letter be sent to all students from these schools who apply to UWM stressing the importance of placement testing in mathematics and English
- An informational meeting for parents be held at each school where the topic would be mathematics placement and its effects on proposed courses of studies. Copies of the EMPT would be made available to parents along with resources for student review and preparation
- A student letter be sent to all students from these schools who apply to UWM stressing the importance of placement testing.

Appendix

Warning Signs of Misplacement in Mathematics Courses (DRAFT 02)

How to use these tables.

First, determine how many units of mathematics are indicated by the student’s high school transcript. We have three categories:

1. 2 units of algebra, 1 unit of geometry, and 3 units total.
2. 2 units of algebra, 1 unit of geometry, and 3.5 units total.
3. 2 units of algebra, 1 unit of geometry, and 4 to 4.5 units total.
4. 2 units of algebra, 1 unit of geometry, and 5 or more units total.

Find the column corresponding to the range into which the student’s ACT score falls.

Find the row in that column corresponding to the student’s math placement code. A “Yes” means that retesting should be recommended to the student immediately, and relevant information should be sent to the student.

A “No” means that no immediate action should be taken.

**Two units of Algebra, 1 unit of Geometry, 3 total units**

<table>
<thead>
<tr>
<th>ACT Score</th>
<th>01-17</th>
<th>18 - 20</th>
<th>21 - 23</th>
<th>24-27</th>
<th>28 - 30</th>
<th>31 - 36</th>
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<td>20, 26</td>
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<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
Two units of Algebra, 1 unit of Geometry, 3.5 total units

Yes means student should be asked to retest. No means retesting should not be suggested without a student conference.

<table>
<thead>
<tr>
<th></th>
<th>01-17</th>
<th>18 - 20</th>
<th>21 - 23</th>
<th>24-27</th>
<th>28 - 30</th>
<th>31 - 36</th>
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<td>NO</td>
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<td>NO</td>
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</tbody>
</table>

Two units of Algebra, 1 unit of Geometry, 4 to 4.5 total units

Yes means student should be asked to retest. No means retesting should not be suggested without a student conference.

<table>
<thead>
<tr>
<th></th>
<th>01-17</th>
<th>18 - 20</th>
<th>21 - 23</th>
<th>24-27</th>
<th>28 - 30</th>
<th>31 - 36</th>
</tr>
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<tr>
<td>20, 26</td>
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<tr>
<td>30,35,36,37</td>
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<tr>
<td>45</td>
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<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Two units of Algebra, 1 unit of Geometry, 5 or more total units

Yes means student should be asked to retest. No means retesting should not be suggested without a student conference.
For reference, we append the following tables are from UW-Whitewater. Course numbers of corresponding UWM courses are inserted for reference. These tables are from the period of time when the students could elect AB or BC parts of the test.

### ACT Math Score

<table>
<thead>
<tr>
<th>ACT Math Score</th>
<th>SAT Math Score</th>
<th>Placement</th>
</tr>
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<tbody>
<tr>
<td>24 and above</td>
<td>570 and above</td>
<td>waived from Math proficiency</td>
</tr>
<tr>
<td>21-23</td>
<td>530-569</td>
<td>760-141 or 760-140</td>
</tr>
<tr>
<td>18-20</td>
<td>460-529</td>
<td>760-041</td>
</tr>
<tr>
<td>01-17</td>
<td>210-459</td>
<td>760-040 (followed by 760-041)</td>
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### Math Placement Test Scores

Conversion table from UW-Whitewater.

<table>
<thead>
<tr>
<th>E-ALG</th>
<th>I-ALG</th>
<th>C-ALG</th>
<th>TRI G</th>
<th>Mathematics Course Options</th>
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</thead>
<tbody>
<tr>
<td>150-534</td>
<td>150-434</td>
<td></td>
<td></td>
<td>040 or 041* (Math 090 or Math 095)</td>
</tr>
<tr>
<td>435-850</td>
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<td></td>
<td>140, 141, or 141b (Math 106, Math 105, or ???)</td>
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<tr>
<td>535-684</td>
<td>150-850</td>
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<td>140, 141, or 141b</td>
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<td>685-850</td>
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<td>140, 141, or 141b</td>
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<td>Waived from University Proficiency Requirement</td>
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<td>150-400</td>
<td>150-369</td>
<td>150-850</td>
<td></td>
<td>040 or 041*</td>
</tr>
<tr>
<td>370-</td>
<td>150-</td>
<td>140, 141, or 141b</td>
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<td>150-850</td>
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<td>Waived from University Proficiency Requirement</td>
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