

**Department of
Mathematical
Sciences**

- Mathematics
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Date: May 9, 2013

To: Prof. Kenneth Bowers, Department Head

From: Prof. Warren Esty, Precalculus Course Supervisor

Re: M-151 Q-Core assessment

Course: M-151 Q Precalculus

Semester: Spring 2013

Instructor(s) and/or supervisor: Prof. Esty, supervisor, several instructors

Assessment done by: Prof. Esty

Number of students in course: c.170

Number of students assessed (at least 6): 87

Description of assignment, problems, and/or questions used for assessment: 6 problems from the final exam, two related to each of three Learning Outcomes.

The goals/learning outcomes of a Core 2.0 Quantitative Reasoning course are stated in the “Q-Core Rationale and Assessment Plan”:¹

“Students completing a Core 2.0 Quantitative Reasoning (Q) course should demonstrate an ability to:

1. Interpret and draw inferences from mathematical models such as formulas, graphs, or tables.
2. Represent mathematical information numerically and visually.
3. Employ quantitative methods such as, arithmetic, algebra, or geometry to solve problems.”

These goals are appropriate for M-121, College Algebra, and other low-level courses that meet the minimum standards for the Q-Core requirement. However, Precalculus is a higher-level course which satisfies the core requirement, not because those goals are particularly appropriate, but because students who meet its entrance requirements and pass the course will be well beyond those goals (as they are after taking Calculus I or II, which also meet the core requirement). Those goals are prerequisites for Precalculus rather than intended outcomes of the course.

Therefore Precalculus exams that evaluate whether students meet the higher-level goals of Precalculus do not have problems that directly address the above low-level goals without simultaneously addressing additional concepts that go beyond them. We selected several problems on the final exam that were closest to those goals, although each also had a significant higher-level component which made it difficult to judge those goals alone. Therefore, instead, we judged whether the higher-level goals of Precalculus had been met or exceeded on those problems.

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http://www.math.montana.edu/Documents/Program_Assessment_Files/QCoreAssessmentFinal.pdf

The goals of Precalculus goals include symbolic representation of mathematical information. In four sections all the scores on six relevant problems were recorded from all 87 students who took the final exam.

Goal #1: Problems 6 and 13: 74% were deemed “acceptable.”

Goal #2: Problems 3 and 19: 57% were deemed “acceptable.”

Goal #3: Problems 1 and 16: 75% were deemed “acceptable.”

These numbers were quite consistent across all sections. The lower percentage for Goal # 2 was because Problem #3 asked students to create a formula. Creating symbolic representations is always harder, but important at the level of Precalculus and Calculus.

All three goals were met at the “acceptable” level by 46% of the students. We are well aware that the reading and writing skills tested in these and the other problems are not well-mastered by many students. The course grades reflect that. We think this is because, in spite of our emphasis on learning to communicate mathematically, many students simply decline to read mathematics. Many rely entirely upon active instruction and some do not participate much, or at all, which results in many lacking the ability to read and write mathematics at the level of Precalculus.

Comments and ideas for better aligning the course or the assignments with the Q-core rationale:

I could have devoted a few problems on the final exam to the assessment of the Q-Core outcomes as described. This would have been a waste of time because they are prerequisites for, not goals of, of the course. I am sure that “acceptable” responses would have been well above 80 percent and perhaps above 90 percent.

Comments and ideas for improving the process of assessment:

I believe that students who meet the SAT/ACT prerequisites for Precalculus, Calculus I, and Calculus II, have already demonstrated Q-Core competence. If we want to evaluate Precalculus, it should be evaluated with regard to its own goals. If we want to evaluate Q-core competence, we should accept ACT/SAT scores.