

## Core Competencies Assessment 2007-2008: Area II Courses

New Mexico Institution Name

Mathematics – Algebra Competencies

State Competencies (Learning Outcomes Being Measured)	Assessment Procedures Course Name and NMCCN (Process/Instrument named or described – rubric attached)	Assessment Results	How Results Will Be Used To Make Improvements	(Optional) Recommendations/Goals/ Priorities								
<p><b>1. Students will graph functions</b> Students should:</p> <p>a. Sketch the graphs of linear, higher-order polynomial, rational, absolute value, exponential, logarithmic, and radical functions.</p> <p>b. Sketch a graph using point plotting and analysis techniques, including basic transformations of functions such as horizontal and vertical shifts, reflections, stretches, and compressions.</p> <p>c. Determine the vertex, axis of symmetry, maximum or minimum, and intercepts of a quadratic equation.</p>	<p>Math 190. We designed a question for the final exam of Math 190 which tests the learning outcome. Instructors met near the end of the semester to discuss how to apply the assessment rubric. We randomly chose about 40 students to assess, and each question was assessed by two people.</p> <p>To assess a student paper, each was given a rating of 0, 1, or 2, according to the following general rubric:</p> <p>0. student shows little or no ability to work a problem.                      1. student shows moderate ability to work a problem, but with some moderate mistakes.                      2. student shows good ability to work a problem, with little or no mistakes.</p> <p>Once the question to be assessed was determined, instructors met to discuss how to apply the rubric. They also calibrated their assessment in order that different instructors would rate a paper the same.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Score</th> <th style="text-align: center;">Number of Students</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">20</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">19</td> </tr> </tbody> </table>	Score	Number of Students	0	3	1	20	2	19	<p>Based on this data, the assessment committee recommended that no changes in our courses are needed at this point in order for students to be proficient at problem solving.</p> <p>Part of our justification to make no changes at this point based on the data is that we have been making major changes in our courses in the past few years. We redesigned our precalculus courses, of which Math 190 is one. The assessment data above represents a small amount of information we have about the performance of our classes.</p> <p>Because problem solving is so important for mathematics, our assessment committee recommended last year that, when we assess the other four competencies, that we choose questions which also involve problem solving. Doing so will allow us to look at several years of assessment data in order get a better idea of how our courses address problem solving. We will then be in a better position to recommend changes to our classes to improve students' problem solving ability.</p>	
Score	Number of Students											
0	3											
1	20											
2	19											

**2. Students will solve various kinds of equations.**

Students should:

- a. Solve quadratic equations using factoring, completing the squares, the square root method, and quadratic formula.
- b. Solve exponential and logarithmic equations.
- c. Solve systems of two or three linear equations.

(Continued)

**Core Competencies Assessment 2007-2008: Area II Courses**

New Mexico Institution Name

Mathematics – Algebra Competencies, cont.

<u>State Competencies</u> (Learning Outcomes Being Measured)	<u>Assessment Procedures</u> Course Name and NMCCN (Process/Instrument named or described – rubric attached)	<u>Assessment Results</u>	<u>How Results Will Be Used To Make Improvements</u>	<u>(Optional)</u> Recommendations/Goals/Priorities
2. Students will solve various kinds of equations.				
3. Students will demonstrate the use of function notation and perform operations on functions.				
4. Students will model/solve real-world problems. End – Area II - Algebra				

Area II-Algebra Assessment completed by \_\_\_\_\_

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 Signature

Patrick Morandi  
 Printed Name

9/21/09  
 Date

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**Core Competencies Assessment 2007-2008: Area II Courses**

**New Mexico Institution Name**

**Mathematics - Calculus I Competencies**

<p><b><u>State Competencies</u></b> (Learning Outcomes Being Measured)</p>	<p><b><u>Assessment Procedures</u></b> Course Name and NMCCN (Process/Instrument named or described – rubric attached)</p>	<p><b><u>Assessment Results</u></b></p>	<p><b><u>How Results Will Be Used To Make Improvements</u></b></p>	<p><b><u>(Optional)</u></b> Recommendations/Goals/Priorities</p>
<p><b>1. Students will demonstrate an understanding of the theoretical, geometrical underpinnings of the calculus.</b> Students should: Algebraically and graphically demonstrate an understanding of: a. Limit b. Tangent line c. Difference quotient d. Fundamental theorem of calculus e. Riemann sums</p>				
<p><b>2. Students will use concepts of function, limit, continuity, derivative, and integral.</b> Students should: Apply the theory of calculus through manipulations involving: a. The finding of limits. b. Using differentiation techniques. c. Working with transcendental &amp; trigonometric functions. d. Determining points of discontinuity and intervals of continuity.</p> <p align="right">(Continued)</p>				

**Core Competencies Assessment 2007-2008: Area II Courses**

**New Mexico Institution Name**

**Mathematics – Calculus I Competencies, cont.**

<p><b>State Competencies</b> (Learning Outcomes Being Measured)</p>	<p><b>Assessment Procedures</b> Course Name and NMCCN (Process/Instrument named or described – rubric attached)</p>	<p><b>Assessment Results</b></p>	<p><b>How Results Will Be Used To Make Improvements</b></p>	<p><b>(Optional)</b> Recommendations/Goals/Priorities</p>								
<p>3. Students will apply methods of calculus to optimization, graphing, and approximation. Students should be able to:</p> <ol style="list-style-type: none"> <li>Find extreme points.</li> <li>Understand the graphs of a function and its 1<sup>st</sup> and 2<sup>nd</sup> derivatives and how they relate.</li> <li>Apply Newton's method.</li> <li>Use differentials to approximate functions.</li> </ol>	<p>Math 191. We designed a question on a group project in Math 191 which tests the learning outcome. Instructors met near the end of the semester to discuss how to apply the assessment rubric. We randomly chose about 30 papers to assess, and each question was assessed by two people.</p> <p>To assess a student paper, each was given a rating of 0, 1, or 2, according to the following general rubric:</p> <ol style="list-style-type: none"> <li>student shows little or no ability to work a problem.</li> <li>student shows moderate ability to work a problem, but with some moderate mistakes.</li> <li>student shows good ability to work a problem, with little or no mistakes.</li> </ol> <p>Once the question to be assessed was determined, instructors met to discuss how to apply the rubric. They also calibrated their assessment in order that different instructors would rate a paper the same.</p>	<table border="1"> <thead> <tr> <th>Score</th> <th>Number of Students</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>7</td> </tr> <tr> <td>1</td> <td>17</td> </tr> <tr> <td>2</td> <td>7</td> </tr> </tbody> </table>	Score	Number of Students	0	7	1	17	2	7	<p>Based on this data, the assessment committee recommended that no changes in our courses are needed at this point in order for students to be proficient at problem solving. The question assessed in Math 191 was quite involved for students at the stage of their mathematics program, and required substantial sophistication to answer it fully. We thus feel that the assessment results are reasonable. The question assessed in Math 190 was, perhaps, at a more reasonable level.</p> <p>Part of our justification to make no changes at this point based on the data is that we have been making major changes in our courses in the past few years. We redesigned our precalculus courses, of which Math 190 is one. A couple years ago, after considering student performance in calculus, we added 1 credit recitation sections to Math 191 and Math 192. The assessment data above represents a small amount of information we have about the performance of our classes.</p>	
Score	Number of Students											
0	7											
1	17											
2	7											

<p>4. Students will apply differential and integral calculus to problems in geometry, physics, and other fields.</p> <p>Students should:</p> <ol style="list-style-type: none"> <li>Understand that calculus has many uses in science, business, and other fields.</li> <li>Students should be able to solve application problems involving rates of change, optimization, related rates, and acceleration/velocity.</li> </ol>			<p>Because problem solving is so important for mathematics, the committee recommended last year that, when we assess the other four competencies, that we choose questions which also involve problem solving. Doing so will allow us to look at several years of assessment data in order get a better idea of how our courses address problem solving. We will then be in a better position to recommend changes to our classes to improve students' problem solving ability. The problem assessed in Math 191 was perhaps an extreme example of needing problem solving to address it.</p>	
<p>End Area II – Calculus I</p>				

End Area II – Calculus I

Area II-Calculus Assessment completed by

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Signature

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Printed Name

9/21/09  
Date

**Core Competencies Assessment 2007-2008: Area II Courses**

**New Mexico Institution Name**

**Mathematics – Other College-Level Mathematics Competencies**

<b>State Competencies</b> (Learning Outcomes Being Measured)	<b>Assessment Procedures</b> Course Name and NMCCN (Process/Instrument named or described – rubric attached)	<b>Assessment Results</b>	<b>How Results Will Be Used To Make Improvements</b>	<b>(Optional)</b> Recommendations/Goals/Priorities
<p><b>1. Students will display, analyze, and interpret data.</b>                      Students should:</p> <ul style="list-style-type: none"> <li>a. Discriminate among different types of data displays for the most effective presentation.</li> <li>b. Draw conclusions from the data presented.</li> <li>c. Analyze the implication of the conclusion to real life situations.</li> </ul>				
<p><b>2. Students will demonstrate knowledge of problem-solving strategies.</b>                      Students should:</p> <ul style="list-style-type: none"> <li>a. For a given problem, gather and organize relevant information.</li> <li>b. Choose an effective strategy to solve the problem</li> <li>c. Express and reflect on the reasonableness of the solution to the problem.</li> </ul>				

(Continued)

**Core Competencies Assessment 2007-2008: Area II Courses**

Mathematics – Other College-Level Mathematics Competencies, cont.

New Mexico Institution Name

<b>State Competencies</b> (Learning Outcomes Being Measured)	<b>Assessment Procedures</b> Course Name and NMCCN (Process/Instrument named or described – rubric attached)	<b>Assessment Results</b>	<b>How Results Will Be Used To Make Improvements</b>	<b>(Optional)</b> Recommendations/Goals/Priorities
3. Students will construct valid mathematical explanations. Students should: Use mathematics to model and explain real life problems.				
4. Students will display an understanding of the development of mathematics. Students should: Recognize that math has evolved over centuries and that our current body of knowledge has been built upon contributions of many people and cultures over time.				
5. Students will demonstrate an appreciation for the extent, application, and beauty of mathematics. Students should: Recognize the inherent value of mathematical concepts, their connection to structures in nature, and their implications for everyday life.				

End -- Area II Other Math

Area II-Other Math Assessment completed by

Phone number 646-3901

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