

**Eastern West Virginia Community and Technical College  
COURSE ASSESSMENT REPORT**

<b>Course Title and Number:</b> MTH 126 – Trigonometry	<b>Academic Term and Year of Assessment Activity (Ex: Fall, 2014)</b> Spring 2016
<b>Report Submitted By:</b> Andrea Williams	<b>Number of Students Assessed:</b> 7
<b>Date Report Submitted:</b> 5/24/16	<b>Number of Sections Included:</b> 1
<b>Course Delivery Format (list all modalities used in sections assessed. Ex: web based, VDL, traditional section, hybrid course, etc.):</b> Traditional section	

**Course Role in the Curriculum**

**Provide a description of the role the course serves in the curriculum (i.e. general education requirement, program technical core, restricted elective, etc.). Note all as appropriate.**

MTH 126 is a transferrable general education course taken primarily by students seeking an Associate of Science degree or by those who will transfer to a four-year program of study requiring Trigonometry and/or Calculus. At Eastern, MTH 123 Intermediate Algebra or satisfactory placement scores are prerequisites to MTH 126.

**Assessment Methods**

**Provide a description of the assessment process used. Include description of instrument and performance standards in description. Note all methods.**

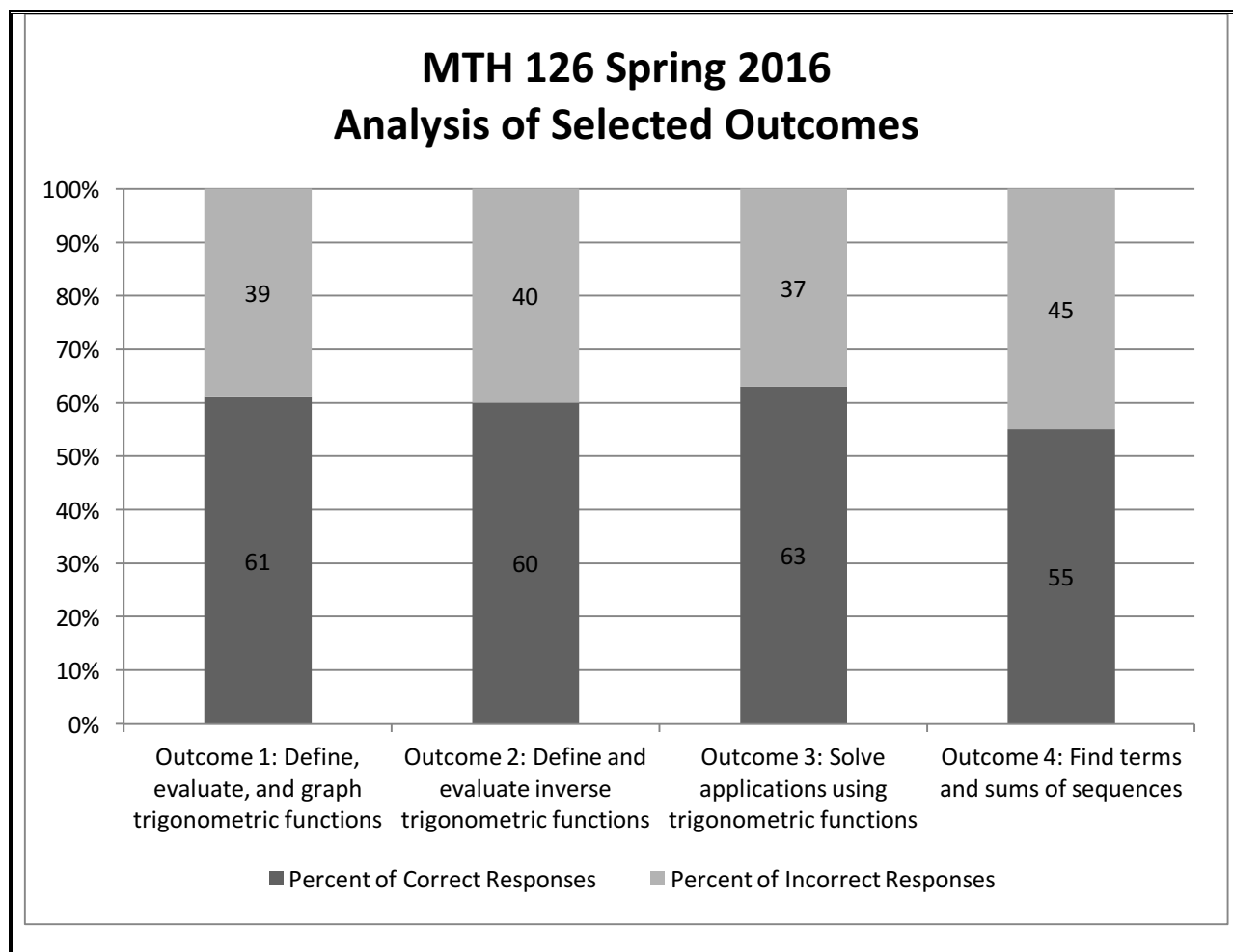
Final exam questions are used as a basis for this assessment. The final was a paper exam given in two parts on two days. Students were allowed to use a graphing calculator and a 3x5 index card of notes they created. The students were also provided with the same formulas they were given throughout the semester on the chapter tests. Students were given partial credit based on the work they showed on their test paper, but for purposes of this analysis, only questions receiving full credit are considered correct. Students were given a review assignment in MyMathLab two weeks prior to the final exam with similar questions. The review assignment counted as a test grade.

Multiple questions are included in each outcome for analysis. A minimum satisfactory percent of correct responses for each outcome is 75%. Those failing to meet the standard are reviewed on an outcome-by-outcome basis.

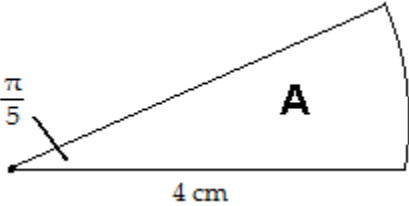
**Assessment Results**

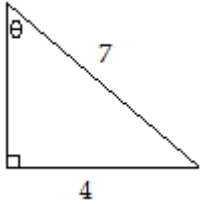
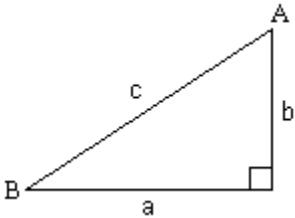
**Provide a summary of results including tables/charts. Incorporate information from previous assessments as appropriate. Append additional pages if necessary. If appending, include notation in box to "See attached".**

Four outcomes were analyzed, and none of the four met the 75% correct criterion. More details about the outcomes and the assessed questions are included in the action plan.



<b>Course Level Assessment Summary of Outcomes, Indicators and Results</b> Course Title and Number: MTH 126 - Trigonometry Number of students in assessment sample = 7 Number of Sections in Assessment = 1 Add additional rows to table if necessary				
Learning Outcomes (Insert learning outcomes assessed during this cycle)	Indicator (Insert indicators used for each outcome: exam question, scoring rubric, etc. Be specific)	Percent of Correct Responses	Percent of Incorrect Responses	Performance Standard Met (75%)* (yes or no)
Outcome 1: Define, evaluate, and graph trigonometric	1.1. Convert $6^\circ$ to radians. Express your answer as a (reduced) multiple of $\pi$ . 1.2. Convert $\frac{8\pi}{5}$ to degrees. 1.3. Find the area $A$ . Round your answer to	61%	39%	No

functions	<p>three decimal places.</p>  <p><b>1.4.</b> If the terminal side of <math>\theta</math> passes through <math>(-3, -4)</math>, find the exact values of the six trigonometric functions of <math>\theta</math>.</p> <p><math>\sin \theta =</math> _____      <math>\csc \theta =</math> _____</p> <p><math>\cos \theta =</math> _____      <math>\sec \theta =</math> _____</p> <p><math>\tan \theta =</math> _____      <math>\cot \theta =</math> _____</p> <p><i>For questions 5-6, give the exact value of each expression. Some may be undefined.</i></p> <p><b>1.5.</b> <math>\cos\left(\frac{\pi}{2}\right)</math></p> <p><b>1.6.</b> <math>\csc 30^\circ</math></p> <p><b>1.7.</b> Use your calculator to find the approximate value of <math>\tan \frac{\pi}{5}</math> rounded to two decimal places.</p> <p><b>1.8.</b> If <math>\tan \theta &lt; 0</math> and <math>\sin \theta &lt; 0</math>, name the quadrant in which <math>\theta</math> lies.</p> <p><b>1.9.</b> Give the amplitude, period, and phase shift of <math>y = 5 \sin(2x - \pi)</math>. Then use this information to graph the function. Show at least two periods. Clearly indicate the scale used on the <math>x</math>- and <math>y</math>-axes. Then give the domain and range of the function.</p> <p><i>For questions 18-19, find the exact value of each expression.</i></p> <p><b>1.18.</b> <math>\sin \frac{13\pi}{12}</math></p> <p><b>1.19.</b> <math>\cos 22.5^\circ</math></p> <p><b>1.20.</b> Find the exact values of the six trigonometric functions of the angle <math>\theta</math> in the</p>			
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	<p>figure.</p>  <p> <math>\sin \theta = \underline{\hspace{2cm}}</math>      <math>\csc \theta = \underline{\hspace{2cm}}</math>  <math>\cos \theta = \underline{\hspace{2cm}}</math>      <math>\sec \theta = \underline{\hspace{2cm}}</math>  <math>\tan \theta = \underline{\hspace{2cm}}</math>      <math>\cot \theta = \underline{\hspace{2cm}}</math> </p>			
<p>Outcome 2: Define and evaluate inverse trigonometric functions</p>	<p><i>For questions 10-11, find the exact value of each expression.</i></p> <p><b>1.10.</b> <math>\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)</math></p> <p><b>1.11.</b> <math>\tan^{-1} 1</math></p> <p><b>1.12.</b> Use a calculator to find the value of <math>\sin^{-1}\left(-\frac{1}{5}\right)</math> rounded to two decimal places.</p> <p><i>For questions 13-14, find the exact value of each expression.</i></p> <p><b>1.13.</b> <math>\sin^{-1}\left(\sin \frac{7\pi}{6}\right)</math></p> <p><b>1.14.</b> <math>\cos\left[\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)\right]</math></p>	<p>60%</p>	<p>40%</p>	<p>No</p>
<p>Outcome 3: Solve application using trigonometric functions</p>	<p><b>1.21.</b> Solve the right triangle using the information given: <math>a = 7, b = 3</math>. Find <math>c, A,</math> and <math>B</math>. Round answers to the nearest hundredth if necessary.</p>  <p><i>For questions 22-23, solve the triangle(s) with the given sides and/or angles. Round all</i></p>	<p>63%</p>	<p>37%</p>	<p>No</p>

	<p><i>answers to the nearest hundredth as necessary.</i></p> <p><b>1.22.</b> <math>A = 60^\circ, B = 40^\circ, a = 2</math></p> <p><b>1.23.</b> <math>a = 6, b = 8, C = 70^\circ</math></p> <p><b>1.24.</b> An airplane is sighted at the same time by two ground observers who are 3 miles apart and both directly west of the airplane. They report the angles of elevation as <math>14^\circ</math> and <math>25^\circ</math>. How high is the airplane? Round your answer to the nearest tenth of a mile.</p> <p><b>1.25.</b> Find the area of triangle with <math>A = 20^\circ, b = 12, c = 5</math>. Round your answer to the nearest hundredth if necessary.</p>			
Outcome 4: Find terms and sums of sequences	<p><b>1.17.</b> The pattern continues:  <math>\frac{1}{1 \cdot 3}, \frac{1}{2 \cdot 4}, \frac{1}{3 \cdot 5}, \frac{1}{4 \cdot 6}, \dots</math> Write a formula <math>a_n</math> for the <math>n^{\text{th}}</math> term of the sequence.</p> <p><b>1.18.</b> Find the sum of the sequence:  <math>\sum_{k=2}^4 k(k+4)</math>.</p> <p><b>1.19.</b> Write a formula <math>a_n</math> for the <math>n^{\text{th}}</math> term of the arithmetic sequence with initial term <math>a_1 = 6</math> and common difference <math>d = -2</math>.</p> <p><b>1.20.</b> Find the sum of the arithmetic sequence  <math>3 + 6 + 9 + \dots + 294</math>.</p> <p><b>1.21.</b> Write a formula <math>a_n</math> for the <math>n^{\text{th}}</math> term of the geometric sequence with initial term <math>a_1 = 3</math> and common ratio <math>a = 2</math>.</p> <p><b>1.22.</b> Find the sum of the geometric sequence  <math>\sum_{k=1}^9 \frac{1}{4}(-2)^{k-1}</math>.</p> <p><b>1.23.</b> Determine whether the infinite series converges or diverges. If it converges, find its sum. <math>12 + 6 + 3 + \frac{3}{2} + \dots</math></p>	55%	45%	No

\* Please note if using a different minimum performance standard.

### Conclusions

**Provide a brief summary of conclusions derived based on analysis of data. Append additional pages if necessary. If appending, include notation in box to “See attached”.**

While none of the outcomes were met at the 75% standard, the small sample size provides limited information. With the exception of a few specific areas discussed in the Action Plan below, the majority of the students did well with the course and are prepared to go on to take higher-level math courses if they so choose.

### Previous Assessment Reports and Results

**Date of Previous Assessment: N/A**

**List of Outcomes Not Met:**

**Summary of Actions Taken to Address Unmet Learning Outcomes: Append additional pages if necessary. If appending, include notation in box to “See attached”.**

### Action Plan and Date for Reassessment

**Identify action plan for improvement or maintaining current performance levels including outcomes identified for re-assessment, curriculum revision, LOT proposal, new or revised course activities to reinforce learning outcomes, etc. Append additional pages if necessary. If appending, include notation in box to “See attached”.**

Outcome 1: Define, evaluate, and graph trigonometric functions

The graphing part was by far the greatest problem area for this outcome, both on the final exam and when the topic was initially covered in the course. In the future the focus will be on graphing just the sine and cosine functions; the other four graphs and their properties will be discussed, but the students will not be required to graph them on their own. Focusing on less should improve performance in this particular area. The other two problems missed by the majority of the students were the ones requiring use of a sum or difference formula and a half-angle formula to evaluate a trig expression. The students were given the formulas but did not recognize that these were the problems where they needed to use those formulas. More of these types of problems will be added to the final exam review.

Outcome 2: Define and evaluate inverse trigonometric functions

The students did well with this outcome with the exception of the problems where they had to evaluate a composition of functions. In particular, the confusion seemed to be over the restrictions on the range of answers they could give. One student mentioned that for a similar problem on the review assignment, MyMathLab accepted two answers when only one should be correct. The instructor will investigate to see whether this is truly the case, and replace the problem in the assignment if necessary.

Outcome 3: Solve applications using trigonometric functions

The most commonly missed question under this outcome was the word problem; few students drew the picture correctly. In the future, the students will be given the sketch of the situation; their responsibility will then be to set up and solve the problem.

Outcome 4: Find terms and sums of sequences

Finding the sum of a sequence was the greatest problem with this outcome; specifically, students did not use the correct formula for the type of sequence. In the future, more in-class examples will be given and

more homework problems will be assigned on this particular topic.

Other recommendations to consider the next time the course is offered:

- Give a midterm exam on the first three chapters and a final exam on the last three chapters rather than a cumulative exam on all six chapters. Students will be given a review assignment for both the midterm and the final exam, each worth a test grade.
- Incorporate more quizzes into the course. This proved to be a very effective way for the students to learn the unit circle; perhaps it would help with other topics as well.
- Utilize the interactive multimedia assignments in MyMathLab as an extra tool for helping the students learn the material.
- Incorporate more vocabulary-type questions in MyMathLab and on tests to ensure students are understanding the language of the course.

Proposed date for the next assessment is Spring 2018.

**Assessment Committee Recommendation/Approval  
(To be posted by Assessment Committee Chair)**

Approved as presented

Approved with recommendations for future reports (Explanation Required)

Resubmission Required. Reason for Resubmission:

**Date: 8-25-16**