Eastern West Virginia Community and Technical College
COURSE ASSESSMENT REPORT

Course Title and Number: MTH 102 Math for Elementary Teachers	**Academic Term and Year of Assessment Activity (Ex: Fall, 2014)** Fall 2015
Report Submitted By: Andrea Williams	**Number of Students Assessed:** 6
Date Report Submitted: 1/27/16	**Number of Sections Included:** 1
Course Delivery Format (list all modalities used in sections assessed. Ex: web based, VDL, traditional section, hybrid course, etc.): 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 102 is a technical core course for the Shepherd University 2 + 2 Agreement for Elementary Education. This course does not satisfy the general education requirements for college-level math.

Assessment Methods

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

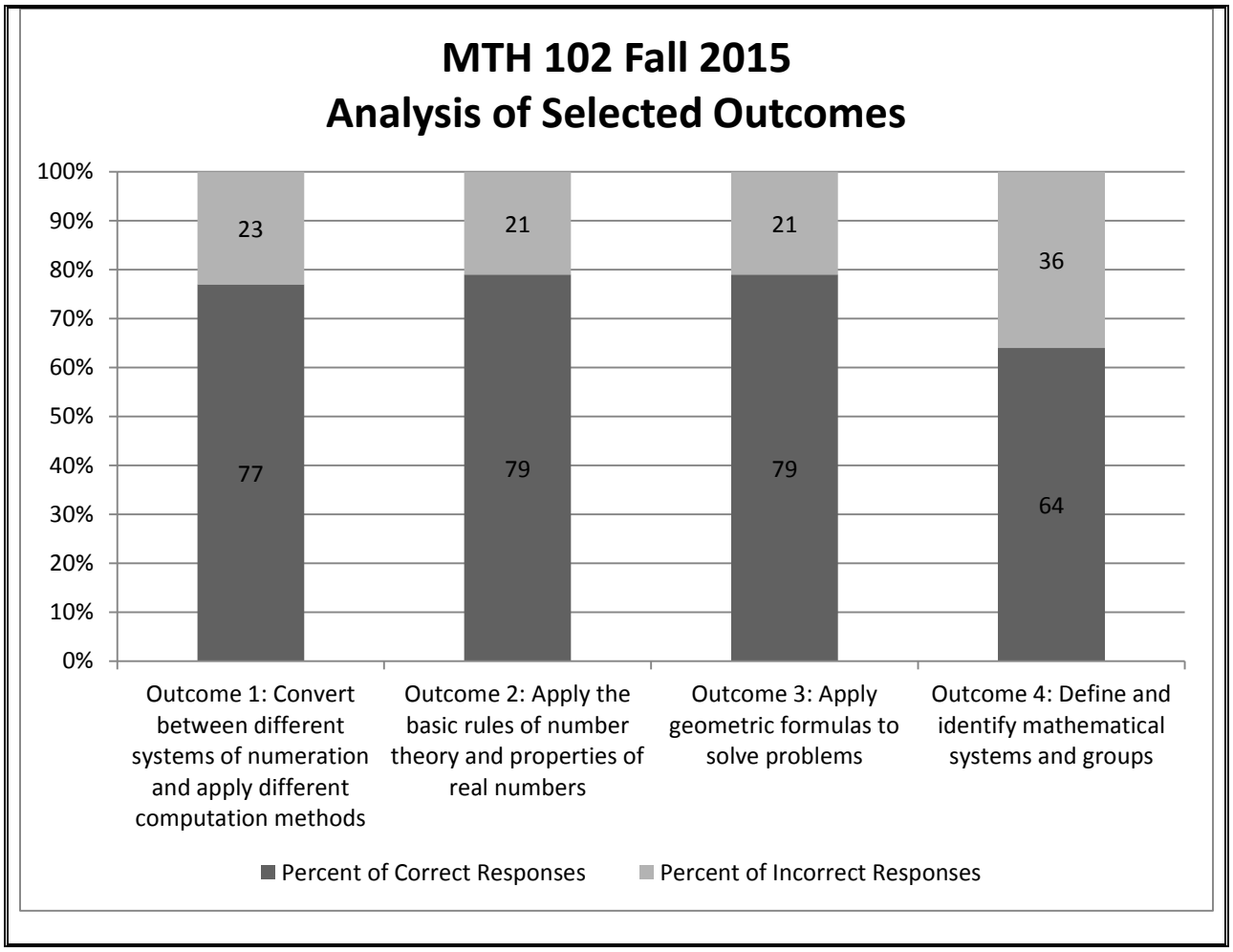
Final exam questions are used as a basis for this assessment. The final was a paper exam given in two parts on two days. Students were allowed to use a scientific calculator and a 3x5 index card of notes they created. The students were also provided with the systems of numeration symbols, geometry formulas, and a z-score table on the appropriate day. 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 two weeks prior to the final exam with similar questions that they were required to complete for 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.

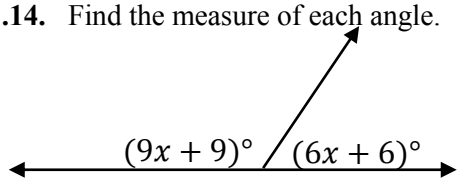
Assessment Results

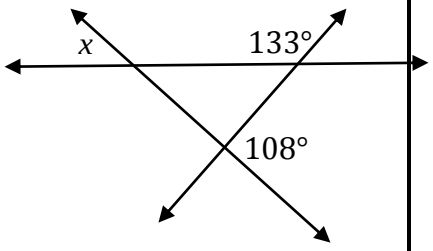
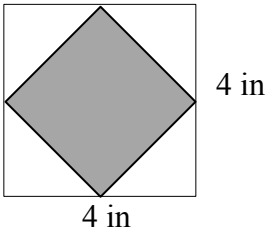
Provide a summary of results including tables/charts. Incorporate information from previous assessments as appropriate. Append additional pages if necessary. If appending, include notation in box to "See attached".

Four outcomes were analyzed, and three out of the four met the 75% correct criterion. More details about the outcomes and the assessed questions are included in the action plan.



Course Level Assessment Summary of Outcomes, Indicators and Results **Course Title and Number: MTH 102 – Math for Elementary Teachers – Fall 2015** **Number of students in assessment sample = 6** **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: Convert between different systems of numeration and apply different computation methods	**1.4.** Write 239 as a Roman numeral. **1.5.** Write the following Babylonian numeral as a Hindu-Arabic numeral:  **1.6.** Convert 215 to base six. **1.7.** Add in the indicated base:	77%	23%	Yes

	$1002_3 + 1022_3$. **1.8.** Use lattice multiplication to find 161×798.			
Outcome 2: Apply the basic rules of number theory and properties of real numbers	**1.1.** Convert $0.\overline{2}$ to a fraction. **1.2.** Evaluate $\left(\frac{1}{3} \cdot \frac{12}{25}\right) + \frac{1}{2}$. **1.9.** Find the least common multiple of 195 and 351. **1.10.** Convert $\frac{1}{20}$ to a decimal. **1.11.** Fill in each blank with the property illustrated at that step. Choices are commutative property of addition, commutative property of multiplication, associative property of addition, associative property of multiplication, and distributive property. $8(x+6)+3x = (8x+48)+3x$ ___ $= 8x+(48+3x)$ ___ $= 8x+(3x+48)$ ___ $= (8x+3x)+48$ ___ $= 11x+48$ **1.12.** Write an expression for the general term a_n for the arithmetic sequence 1, 5, 9, 13, … **1.13.** Find the sum of the first 6 terms of the geometric sequence with $a_1 = -3$ and $r = 3$.	79%	21%	Yes
Outcome 3: Apply geometric formulas to solve problems	**1.14.** Find the measure of each angle.  	79%	21%	Yes

	1.15. Find the measure of angle x:  **1.16.** Find the area of the shaded region. Round to the nearest tenth if necessary.  **1.17.** Find (a) the circumference and (b) the area of a circle with diameter 20 ft. Use the π key on your calculator and round your answers to the nearest hundredth. **1.18.** Right triangle *ABC* has one leg of length 7 in and a hypotenuse of length 25 in. Determine the length of the missing leg, rounded to the nearest tenth if necessary. **1.19.** Determine the surface area of a cylinder with a radius of 3 in and a height of 14 in. Use the π key on your calculator and round your answer to the nearest hundredth. **1.20.** Determine the volume of a pyramid with a rectangular base of length 9 m and width 6 m and a height of 7 m.			
Outcome 4: Define and identify mathematical systems and groups	**2.1.** Is the set of positive integers a group under the operation of addition? If not, why not? Check all that apply. □ Yes, it is a group. □ No, it is not a group. The set of positive integers is not closed under addition.	64%	36%	No

□ No, it is not a group. There is no identity element.

□ No, it is not a group. There is at least one element that does not have an inverse.

□ No, it is not a group. The associative property does not hold.

2.2. Determine $7 - 8$ in clock 12 arithmetic.

2.3. Consider the mathematical system defined by the following table. Assume that the associative property holds for the given operation.

✖	y	x	z	w
y	z	w	y	x
x	w	y	x	z
z	y	x	z	w
w	x	z	w	y

a. What are the elements of the set in this mathematical system?
b. What is the binary operation?
c. Is the system closed? How do you know?
d. Is there an identity element for the system under the given operation? If so, what is it?
e. Does every element in the system have an inverse? If so, give each element and its corresponding inverse.
f. Give an example to illustrate the associative property.
g. Is the system commutative? How do you know? If it is commutative, give an example to illustrate the commutative property.
h. Is the mathematical system a commutative group?

2.4. Give the modulo class for 73, mod 9.

2.5. Find all replacements between 0 and the modulus for the question mark in the equation $6+? \equiv 4 (\mathrm{mod}\ 7)$.

2.6. If today is a Saturday, what day of the week will it be 106 days from now?

* Please note if using a different minimum performance standard.
+See Attachment 1 for further analysis of performance by question.

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".**
Overall, this group of students did very well with this course. However, it was a small and highly motivated group and may not be indicative of performance of future sections. Because three out of four of the assessed outcomes were met, few adjustments need to be made to the course at this time (see the Action Plan below).

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: Convert between different systems of numeration and apply different computation methods The question with the least number of correct responses under this outcome on the final exam was where the students had to convert a number in base ten to base six. Two of the three students who missed this problem had the correct approach but had one too many steps. No adjustment in instruction for this outcome is recommended at this time. Outcome 2: Apply the basic rules of number theory and properties of real numbers The students did very well with this unit despite being required to do several of the topics without a calculator. The question under this outcome that received the greatest number of incorrect responses on the final exam was where the students had to convert a repeating decimal to a fraction. One student just made a simple multiplication error, but two others did not approach the problem correctly. More of this type of problem will be assigned for homework the next time the course is offered. Outcome 3: Apply geometric formulas to solve problems Only one student correctly solved the problem of finding the area of a shaded square within a square. The others made incorrect assumptions about the figure they were given. Although there were multiple approaches that could have been used to solve this problem, it was more difficult than the similar problem they had on the final exam review. In the future, a different problem will be used to test this topic on the final exam. Outcome 4: Define and identify mathematical systems and groups

This outcome was undoubtedly the most abstract topic of the course and the one with which the students likely had no exposure prior to taking this course. Specifically, the students struggled with the sub-outcomes which involved identifying groups and their properties. They did much better with the topics involving modular arithmetic, a much more applicable concept. Further consideration will be given to how much exposure to group theory these students really need. Perhaps time would be better spent giving just a synopsis of the topic and then focusing on modular arithmetic for the bulk of the unit. If it is decided that groups need to continue to be covered thoroughly, more in-class examples and more homework problems will be added.

Proposed date for the next assessment is Fall 2017.

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

Ξ Approved as presented
□ Approved with recommendations for future reports (Explanation Required)
□ Resubmission Required. Reason for Resubmission:

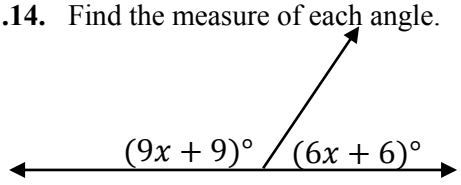
Date: 3/23/16

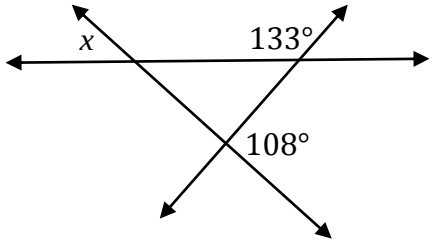
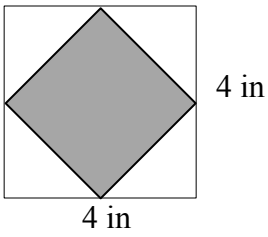
LOT Recommendation/Approval
(To be posted by Assessment Committee Chair)

Ξ Approved as presented
□ Approved with recommendations for future reports (Explanation Required)
□ Resubmission Required (Revision must be submitted to Assessment Committee before resubmitting to LOT). Reason for Resubmission:

Date: 4/18/16

Attachment 1: Performance by Question

Question	Percent of Correct Responses
1.4. Write 239 as a Roman numeral.	67%
1.5. Write the following Babylonian numeral as a Hindu-Arabic numeral: 	83%
1.6. Convert 215 to base six.	50%
1.7. Add in the indicated base: $1002_3 + 1022_3$.	100%
1.8. Use lattice multiplication to find 161×798.	83%
1.1. Convert $0.\overline{2}$ to a fraction.	50%
1.2. Evaluate $\left(\frac{1}{3} \cdot \frac{12}{25}\right) + \frac{1}{2}$.	83%
1.9. Find the least common multiple of 195 and 351.	83%
1.10. Convert $\frac{1}{20}$ to a decimal.	100%
1.11. Fill in each blank with the property illustrated at that step. Choices are commutative property of addition, commutative property of multiplication, associative property of addition, associative property of multiplication, and distributive property. $8(x+6)+3x = (8x+48)+3x$ ___ $= 8x+(48+3x)$ ___ $= 8x+(3x+48)$ ___ $= (8x+3x)+48$ ___ $= 11x+48$	83%
1.12. Write an expression for the general term a_n for the arithmetic sequence 1, 5, 9, 13, …	83%
1.13. Find the sum of the first 6 terms of the geometric sequence with $a_1 = -3$ and $r = 3$.	67%
1.14. Find the measure of each angle. 	67%

1.15. Find the measure of angle x:  	83%
1.16. Find the area of the shaded region. Round to the nearest tenth if necessary.  	17%
1.17. Find (a) the circumference and (b) the area of a circle with diameter 20 ft. Use the π key on your calculator and round your answers to the nearest hundredth.	100%
1.18. Right triangle *ABC* has one leg of length 7 in and a hypotenuse of length 25 in. Determine the length of the missing leg, rounded to the nearest tenth if necessary.	100%
1.19. Determine the surface area of a cylinder with a radius of 3 in and a height of 14 in. Use the π key on your calculator and round your answer to the nearest hundredth.	83%
1.20. Determine the volume of a pyramid with a rectangular base of length 9 m and width 6 m and a height of 7 m.	100%
2.1. Is the set of positive integers a group under the operation of addition? If not, why not? Check all that apply. □ Yes, it is a group. □ No, it is not a group. The set of positive integers is not closed under addition. □ No, it is not a group. There is no identity element. □ No, it is not a group. There is at least one element that does not have an inverse. □ No, it is not a group. The associative property does not hold.	17%
2.2. Determine $7 - 8$ in clock 12 arithmetic.	67%
2.3. Consider the mathematical system defined by the following table. Assume that the associative property holds for the given operation.	33%

✖	y	x	z	w
y	z	w	y	x
x	w	y	x	z
z	y	x	z	w
w	x	z	w	y

a. What are the elements of the set in this mathematical system? **b.** What is the binary operation? **c.** Is the system closed? How do you know? **d.** Is there an identity element for the system under the given operation? If so, what is it? **e.** Does every element in the system have an inverse? If so, give each element and its corresponding inverse. **f.** Give an example to illustrate the associative property. **g.** Is the system commutative? How do you know? If it is commutative, give an example to illustrate the commutative property. **h.** Is the mathematical system a commutative group?	
2.4. Give the modulo class for 73, mod 9.	67%
2.5. Find all replacements between 0 and the modulus for the question mark in the equation $6+? \equiv 4 (\mathrm{mod}\ 7)$.	100%
2.6. If today is a Saturday, what day of the week will it be 106 days from now?	100%