Assessment 3: Candidate Ability to Plan Instruction

a. Description of the Assessment:
Candidates enrolled in MTH 4893 Special Methods Mathematics are required to plan a unit that would be suitable for use in a secondary mathematics classroom (grades 7-12). This unit-planning project assesses the candidate's ability to plan instruction. The length of the project will vary depending on the topic, but it should include at least three lesson plans that would take one to two weeks to implement in the classroom. The instructor must approve the project's topic. The planning, activities, assessments, etc. must be original work (created by the candidate), but may include activities from textbooks or supplemental resources. The project's required components include a title page, introduction, rationale, outcomes/standards/evidence alignment table, minimum of three lesson plans, all instructional documents, all assessment plan documents, and a data analysis using a sample set of data (Appendix C).

Candidates are provided with a sample set of data (Appendix C). The candidates must organize, summarize, display and analyze the provided sample set of data. Additionally, they must reflect on the data results and plan intervention strategies for students not meeting proficiency.

The unit is scored with a content specific rubric that is used for this assessment. The instructor of MTH 4893 Special Methods Mathematics applies the rubric. This mathematics faculty member will later serve as the candidates' content supervisor during internship.

b. Alignment of Assessment to the NCTM Standards and Elements:
Please see the Scoring Guide in Part f for a more detailed alignment.

Program Standard	Elements Addressed
Standard 2: Mathematical Practices	2a, 2b, 2c
Standard 3: Content Pedagogy	3a, 3b, 3c, 3f
Standard 4: Mathematical Learning Environment	4b, 4e
Standard 5: Impact on Student Learning	5b, 5c
Standard 6: Professional Knowledge and Skills	6c

c. Analysis of the data findings:

This assessment was revised in the fall of 2013 to better align the 2012 NCTM CAEP Standards. One candidate was enrolled in MTH 4893 in the spring of 2014, and [redacted] candidates were enrolled in the fall of 2014. So the data collected is limited to the performance of [redacted] candidates.

Data table A summarizes the candidates' performance in each rubric criteria and provides evidence supporting proficiency in most of the NCTM CAEP standard sub-elements represents.

One candidate in the spring of 2014 did not meet minimum expectations for rubric criteria 2c.1 and 2.c.2. Both candidates in the fall of 2014 did not meet minimum expectations for rubric criteria 3a.1, 3b, 3f, 5c.1, 5c.2, or 6c. One candidate in the fall of 2014 did not meet minimum expectations for rubric criteria 3a.2.

See Data Table A for the complete data set.

d. Interpretation of how that data provides evidence for meeting standards:

The Unit Planning Project, completed during MTH 4893, in general provides evidence that the candidates can successfully apply their content and pedagogical skills in a planning a unit for the secondary mathematics classroom.

There are clearly issues regarding candidate proficiency for the fall 2014 data set. The fall 2014 data set is comprised of [redacted] candidates. These candidates dropped the MTH 4893 before completing all components of the assessment. In particular, neither candidate completed the data analysis (5c.1, 5c.2) required for the project. The other areas noted above where either unacceptable or not submitted (3b, 6c). These candidates have since changed their majors and are no longer in the program.

e. Assessment Tool:

Overview:

This unit-planning project will demonstrate the candidate's ability to plan instruction. The length of the project will vary depending on the topic, but it should include at least three lesson plans that would take one or two weeks to implement in the classroom. The project's topic must be approved. The planning, activities, assessments, etc. must be original work (created by the candidate), but may include activities from textbooks or supplemental resources. All materials created should be organized in a three-ring binder and kept electronically as well. The following components should be included:

- **Title Page** – Include the title of the project, subject and grade level, the name of the school for which it was developed, your name, and the date.

- **Introduction** – Write a brief informative paragraph giving a basic understanding of the project and its relationship to the overall curriculum for the course. Explain the project's connection to past content. Clarify what students need to know in order to be successful in this project. Explain how you plan to use the results of formative assessments to inform your teaching. You should also indicate how much time is needed for this particular project and provide a brief overview of each day's activities.

- **Rationale** – This narrative focuses on the educational value of the project. Explain:

    - The project's connection to future content.
    - What the project will enable students to do.
    - How it prepares them for real-work performance tasks.
    - How the content enhances analytical or critical thinking skills.
    - How the content prepares students to be more successful in other areas or topics in mathematics.
    - How the content enhances learning in other disciplines.

- **Outcomes/Standards/Evidence Alignment** – Information should be organized in a table as specified below.
    - List the desired student learning outcomes of the project in terms of both general and specific student behaviors. These outcomes should specifically identify what students should know and be able to do as a result of instruction. Explicitly correlate each outcome to the appropriate Common Core Standard(s). Label each student-learning outcome for easy reference, for example: SLO1, SLO2, SLO3.
    - Identify all Common Core Standards that align to each student-learning outcome. Label each standard using the appropriate reference, and *include the full statement of the standard*. If a given outcome corresponds to only a portion of the standard, highlight that portion or strike through the portion that does not apply.
    - How will you know if students have achieved the desired results and satisfied the outcome? What will you accept as evidence of student proficiency? What part of the assessment plan will provide the evidence? Identify what portion of the assessment plan will collect data associated to each student-learning outcome.

Student Learning Outcomes: After completing the project, student will be able to…	Common Core Mathematics Standards:	Evidence: (Identify what portion of the assessment plan will collect this SLO data.)
SLO1		
SLO2		

- **Lesson Plans** – This section consists of individual lesson plans developed for the project. The project must contain at least 3 lessons. Each lesson must use the MTH Lesson Plan template and include ***all*** instructional material. Be sure that the lesson plans give evidence of higher order thinking skills with activities that require critical or creative thinking and/or problem solving skills.

- **Assessment Plan -** must include a variety of types: formal, informal, formative, summative, traditional, performance-based, individual, group projects, etc. Candidate must create and type assessments using correct mathematical notation, graphs, figures and or diagrams. Rubrics for each assessment must be included. At a minimum an assessment plan should include a pre-test, formative assessments and a posttest. All assessment items must be explicitly aligned to the project student learning outcomes (SLO1, SLO2, SLO3, …).

  Assessment Plan must include
  - A variety of strategies focusing on understanding the ways students think about mathematics
  - Varying levels of thinking as designated by the assessment pyramid
  - Varying levels of difficulty as designated by the assessment

  Assessment Plan must allow for

  - Analysis of knowledge prior to the project,
  - Analysis of knowledge during the project, and
  - Analysis of knowledge after the completion of the project.

- **Data Analysis (Evaluation of Teacher's Impact on Student Learning)** – You will be provided with a sample set of student performance results. Using the data set supplied, you will determine if the project's goals were met.
  a) Organize and record the data/results for each assessment by item.
  b) Compile the data results for each ***student learning outcome*** (including the pre-assessment and final assessment) using both a table and a graph. Technology should be used to analyze the data. Report data for each student by student-learning outcome and then ***quantify*** the extent to which the learners achieved that objective/goal.
  c) Summarize what the data tells about students' learning in this project and provide an explanation/analysis of the results. Conclusions drawn from this analysis should be provided in the "Reflection" section.
  d) Provide an intervention plan for students not satisfying the objectives.

f. The Scoring Guide:

Appendix

A MTH 4893 Unit Planning Project Rubric
B MTH Lesson Plan Template
C Sample Data Set

g. Data:

Data Table A Unit Planning Rubric Undergraduate Program Candidates *Each indicator is rated as: target (3), acceptable (2), or unacceptable (1).						
Rubric Criteria (NCTM CAEP Sub-Element Alignment)	**Spring 2014**			**Fall 2014**		
	Mean Criteria Score*	**Number of Candidates**	**% of Candidates Meeting Minimum Expectation (Acceptable better)**	**Mean Criteria Score* and (Range)**	**Number of Candidates**	**% of Candidates Meeting Minimum Expectation (Acceptable better)**
Mathematical Practices – Problem Solving (2a.1)	3	[redacted]	100%	2.5 (2-3)	[redacted]	100%
Mathematical Practices – Problem Solving (2a.2)	2	[redacted]	100%	3.0 (3-3)	[redacted]	100%
Mathematical Practices – Problem Solving (2a.3)	2	[redacted]	100%	2.5 (2-3)	[redacted]	100%
Mathematical Practices – Problem Solving (2a.4)	3	[redacted]	100%	3.0 (3-3)	[redacted]	100%
Mathematical Practices – Reasoning (2b.1)	3	[redacted]	100%	2.0 (2-2)	[redacted]	100%
Mathematical Practices – Reasoning (2b.2)	3	[redacted]	100%	2.5 (2-3)	[redacted]	100%
Mathematical Practices – Reasoning (2b.3)	2	[redacted]	100%	2.0 (2-2)	[redacted]	100%
Mathematical Practices – Reasoning (2b.4)	3	[redacted]	100%	2.0 (2-2)	[redacted]	100%

Data Table A continued *Each indicator is rated as: target (3), acceptable (2), or unacceptable (1).						
Rubric Criteria (NCTM CAEP Sub-Element Alignment)	**Spring 2014**			**Fall 2014**		
	Mean Criteria Score*	**Number of Candidates**	**% of Candidates Meeting Minimum Expectation (Acceptable better)**	**Mean Criteria Score* and (Range)**	**Number of Candidates**	**% of Candidates Meeting Minimum Expectation (Acceptable better)**
Mathematical Practices – Modeling (2c.1)	1	[redacted]	0%	2.5 (2-3)	[redacted]	100%
Mathematical Practices – Modeling (2c.2)	1	[redacted]	0%	2.5 (2-3)	[redacted]	100%
Content Pedagogy – Rationale (3a.1)	2	[redacted]	100%	1.0 (1-1)	[redacted]	0%
Content Pedagogy – Curriculum Standards (3a.2)	3	[redacted]	100%	2.0 (1-3)	[redacted]	50%
Content Pedagogy – Research in Planning (3b, 6c)	2	[redacted]	100%	1.0 (1-1)	[redacted]	0%
Content Pedagogy – Lesson Planning (3c.1)	3	[redacted]	100%	2.5 (2-3)	[redacted]	100%
Content Pedagogy – Lesson Planning (3c.2)	3	[redacted]	100%	3.0 (3-3)	[redacted]	100%
Content Pedagogy – Assessment Plan (3f)	3	[redacted]	100%	1.0 (1-1)	[redacted]	0%
Mathematical Learning Environment – Lesson Planning (4b.1)	3	[redacted]	100%	2.5 (2-3)	[redacted]	100%
Mathematical Learning Environment – Lesson Planning (4b.2, 6c)	3	[redacted]	100%	2.5 (2-3)	[redacted]	100%
Mathematical Learning Environment – Lesson Planning (4b.3)	3	[redacted]	100%	2.0 (2-2)	[redacted]	100%

Data Table A continued *Each indicator is rated as: target (3), acceptable (2), or unacceptable (1).						
Rubric Criteria (NCTM CAEP Sub-Element Alignment)	**Spring 2014**			**Fall 2014**		
	Mean Criteria Score*	**Number of Candidates**	**% of Candidates Meeting Minimum Expectation (Acceptable better)**	**Mean Criteria Score* and (Range)**	**Number of Candidates**	**% of Candidates Meeting Minimum Expectation (Acceptable better)**
Mathematical Learning Environment – Instructional Tools and Mathematics-Specific Technologies (4e.1)	2	[redacted]	100%	2.0 (2-2)	[redacted]	100%
Mathematical Learning Environment – Instructional Tools and Mathematics-Specific Technologies (4e.2)	2	[redacted]	100%	2.0 (2-2)	[redacted]	100%
Impact on Student Learning – Student Engagement (5b.1)	2	[redacted]	100%	2.0 (1-3)	[redacted]	50%
Impact on Student Learning – Student Engagement (5b.2)	3	[redacted]	100%	3.0 (3-3)	[redacted]	100%
Impact on Student Learning – Assessment Results (5c.1)	3	[redacted]	100%	**	[redacted]	0%
Impact on Student Learning – Assessment Results (5c.2)	3	[redacted]	100%	**	[redacted]	0%

** Both candidates dropped the class before completing the data analysis portion on the assessments.

Data Table B Unit Planning Rubric Undergraduate Program Candidates *Each indicator is rated as: target (3), acceptable (2), or unacceptable (1).		
Rubric Criteria (NCTM CAEP Element Alignment)	**Spring 2014**	**Fall 2014**
	Mean Criteria Score*	Mean Criteria Score*
2a	2.50	2.75
2b	2.75	2.13
2c	1.00	2.50
3a	2.50	1.50
3b	2.00	1.00
3c	3.00	2.75
3f	3.00	1.00
4b	3.00	2.33
4e	2.00	2.00
5b	2.50	2.50
5c	3.00	**
6c	2.00	1.75

** Both candidates dropped the class before completing the data analysis portion on the assessments.

(NCTM CAEP Element Alignment)	Target (3)	Acceptable (2)	Unacceptable (1)
Mathematical Practices - Problem Solving. Effective teachers solve problems. Intern can design and use a variety of stimulating curricula that provide experiences that • Use problem solving to develop conceptual understanding, • Make sense of a wide variety of problems and persevere in solving them, • Apply and adapt a variety of strategies in solving problems confronted within the field of mathematics and other contexts. • Formulate and test conjectures in order to frame generalizations.			
2a.1	Mathematical activities and investigations provide students with opportunities to use problem solving to develop conceptual understanding.	Mathematical activities and investigations use problem solving to develop conceptual understanding.	Use of problem solving to develop conceptual understanding is limited or unclear.
2a.2	Unit Plan includes opportunities for students to be engaged in problem solving activities within the field of mathematics and making connections to real-world contexts.	Unit Plan includes opportunities for students to participate in problem solving activities within the field of mathematics. Candidate illustrates (provides) examples of connections to real-world contexts.	Unit Plan does not include opportunities for students to be engaged in problem solving activities or the activities only include context within the field of mathematics.
2a.3	Creates opportunities to showcase a variety of students' problem solving strategies and encourages students to make sense of problems and persevere in solving them.	Encourages a variety of problem solving strategies and encourages students to make sense of problems and persevere in solving them but does not showcase students' strategies.	Communication of problem solving strategies is limited or unclear. Does not encourage students to make sense of problems and persevere in solving them.
2a.4	Unit Plan includes mathematical activities and investigations that allow for students to formulate and test conjectures in order to frame generalizations.	Unit Plan includes experiences that allow for student discovery but lacks the proper foundation for students to frame generalizations.	Does not design experiences that allow for students to formulate and test conjectures in order to frame generalizations.

(NCTM CAEP Element Alignment)	Target (3)	Acceptable (2)	Unacceptable (1)
Mathematical Practices - Reasoning. Effective teachers reason abstractly. Intern can design and use a variety of stimulating curricula that provide experiences that require • Abstract, reflective and quantitative reasoning with attention to units, constructing viable arguments and proofs and critiquing the reasoning of others; • Representing and modeling generalizations using mathematics; recognizing structure and expressing regularity in patterns of mathematical reasoning; • Using multiple representations to model and describe mathematics; and Utilizing appropriate mathematical vocabulary and symbols to communicate mathematical ideas to others.			
2b.1	Reasons abstractly, reflectively and quantitatively with attention to units, constructing viable arguments and proofs.	Communicates mathematical reasoning with clarity, precision, and logical order.	Communicates mathematical reasoning using inappropriate strategies or flawed arguments that are vague or imprecise.
2b.2	Represents and models generalizations using mathematics while providing opportunities for students to recognize patterns of mathematical reasoning.	Represents and models generalizations using mathematics while recognizing patterns of mathematical reasoning.	Neither represents nor models generalizations using mathematics.
2b.3	Communicates mathematical ideas using a variety of representations and recognizes and clarifies the connections between the representations.	Communicates mathematical ideas using more than one type of representation but with no attempt to recognize the connections between the representations.	Communicates mathematical ideas using a single representation.
2b.4	Unit plan uses appropriate vocabulary and symbols to communicate mathematical ideas to others, and clearly communicates to students that they are expected to communicate their reasoning precisely.	Unit Plan uses appropriate vocabulary and symbols to communicate mathematical ideas to others.	Does not use appropriate vocabulary and symbols to communicate mathematical ideas to others.

(NCTM CAEP Element Alignment)	Target (3)	Acceptable (2)	Unacceptable (1)
Mathematical Practices - Modeling. Effective teachers formulate, represent, analyze, and interpret mathematical models derived from real-world contexts or mathematical problems.			
2c.1	Designs experiences that allow students to ***formulate*** and ***represent*** mathematical models derived from variety of real-world contexts to build mathematical understanding.	Motivates or illustrates the ***formulation*** and ***representation*** of mathematical models derived from variety of real-world contexts.	Does not recognize mathematical models derived from variety of real-world contexts.
2c.2	Designs experiences that allow students to ***analyze*** and ***interpret*** mathematical models derived from variety of real-world contexts to build mathematical understanding.	Motivates and illustrates the ***analysis*** and ***interpretation*** of mathematical models derived from variety of real-world contexts.	Does not recognize mathematical models derived from variety of real-world contexts.
Rationale. Narrative focuses on the educational value of the unit plan within the context of curriculum standards for secondary mathematics and their relationship to student learning by addressing each of the following. • The unit's connection to future content. • What the unit will enable students to do. • How it prepares them for real-work performance tasks. • How the content enhances analytical or critical thinking skills. • How the content prepares students to be more successful in other areas or topics in mathematics.			
3a.1	Rationale thoroughly communicates the value of the unit within the context of curriculum standards and across mathematical domains.	Rationale communicates the value of the unit within the context of curriculum standards, but some explanations may not be thoroughly developed across mathematical domains.	Rationale does not clearly communicate the value of the unit.
Content Pedagogy - Curriculum Standards. Effective teachers apply knowledge of curriculum standards for secondary mathematics and their relationship to student learning within and across mathematical domains.			
3a.2	Instruction engages students in developmentally appropriate mathematical *investigations* and clearly communicates student-learning outcomes based on common core standards.	Instruction is developmentally appropriate and clearly communicates student-learning outcomes based on common core standards.	Goals of instruction vague, unclear or not quite appropriate.

(NCTM CAEP Element Alignment)	Target (3)	Acceptable (2)	Unacceptable (1)
Content Pedagogy – Research in Planning. Effective teachers analyze and consider research in planning for and leading students in rich mathematical learning experiences.			
3b, 6c	Unit includes a research article reflection that identifies how the research was used and in what ways the ideas were modified to fit instructional needs.	Unit includes a research article reflection identifying how the research was used but no modifications were made to fit instructional needs.	Unit does not include a research article reflection or included research article reflection does not clearly relate to the unit's student learning outcomes.
Content Pedagogy –Lesson Planning. Effective teachers plan lessons and units that incorporate a variety of strategies, differentiated for diverse populations, and mathematics-specific and instructional technologies in building all students' conceptual understanding and procedural proficiency.			
3c.1	Lesson plans include variety of instructional strategies differentiated for diverse populations.	Lesson plans include more than one instructional strategy that could be differentiated for diverse populations.	Lesson plans does not include a variety of instructional strategies.
3c.2	Lesson plans *appropriately* incorporate mathematics-specific technologies to effectively build ***all*** students' conceptual understanding and procedural proficiency.	Lesson plans *appropriately* incorporate mathematics-specific technology in an attempt to build students' conceptual understanding and procedural proficiency.	Lesson plans *inappropriately* incorporate mathematics-specific technology or fails to build students' conceptual understanding and procedural proficiency.
Content Pedagogy – Assessment Plan. Effective teachers plan select, implement, interpret, and use formative and summative assessments to inform instruction by reflecting on mathematical proficiencies for all students. (All assessments should be intern-created and use precise language and notation.)			
3f	Candidate designs both formative and summative assessments to effectively measure student proficiencies associated to all student-learning outcomes. Assessments include a variety of strategies focusing on understanding the ways students think about mathematics as well as varying levels of thinking and difficulty.	Candidate designs both formative and summative assessments to effectively measure student proficiencies associated to all student-learning outcomes. Assessments focus on understanding the ways student think about mathematics but with limited strategies or skewed with regard to level of thinking or difficulty.	Assessments do not measure student proficiencies associated to the student learning outcomes. OR Assessments focus on student recall of facts and algorithms with no evidence of interest in understanding the ways students think about mathematics and skewed with regard to level of thinking and difficulty.

(NCTM CAEP Element Alignment)	Target (3)	Acceptable (2)	Unacceptable (1)
Mathematical Learning Environment – Lesson Planning. Effective teachers plan and create developmentally appropriate sequential, and challenging learning opportunities grounded in mathematics education research in which students are actively engage in building new knowledge for prior knowledge experiences.			
4b.1	Lesson plans are sequenced to create challenging learning opportunities that are developmentally appropriate.	Lesson plans create learning opportunities that are developmentally appropriate but either too challenging or not challenging enough.	Lesson plans do not create challenging learning opportunities or are not developmentally appropriate.
4b.2, 6c	Instructional strategies are grounded in mathematics education research in which students are actively engaged.	Instructional strategies are grounded in mathematics education research. (5E instruction model, Marzano's Best Practices, etc.)	Lesson plans are not grounded in mathematics education research.
4b.3	Lesson plans actively engage students in building new knowledge from prior knowledge and experiences.	Lesson plans build new knowledge from prior knowledge and experiences.	Lesson plans do not build new knowledge from prior knowledge and experiences.
Mathematical Learning Environment – Instructional Tools and Mathematics-Specific Technologies. Effective teachers apply mathematical content and pedagogical knowledge to select and use instructional tools such as manipulatives and physical models, drawings, virtual environments, spreadsheets, presentation tools, and mathematics-specific technologies (e.g., graphing tools, interactive geometry software, computer algebra systems, and statistical packages); and make sound decisions about when such tools enhance teaching and learning, recognizing both the insights to be gained and possible limitations of such tools.			
4e.1	Unit clearly describes how the ***instructional tools*** will be used to enhance teaching and learning, recognizing both the insights to be gained and possible limitations of such tools.	Unit clearly describes how the ***instructional tools*** will be used to enhance the teaching and learning.	No attempt to use ***instructional tools*** and no reasonable explanation why the limitations of the tools do not enhance learning.
4e.2	Unit clearly describes how the ***mathematics-specific technologies*** will be used to enhance teaching and learning, recognizing both the insights to be gained and possible limitations of technologies.	Unit clearly describes how the ***mathematics-specific technologies*** will be used to enhance teaching and learning, recognizing either the insights to be gained OR possible limitations of technologies.	No attempt to use ***mathematics-specific technologies*** and no reasonable explanation regarding the possible limitations of technologies.

(NCTM CAEP Element Alignment)	Target (3)	Acceptable (2)	Unacceptable (1)
Unit Planning - Student Engagement. Effective teachers show that new student knowledge has been created as a consequence of their ability to engage students in mathematical experiences that are developmentally appropriate, require active engagement, and include mathematics-specific technology.			
5b.1	Unit Plan includes opportunities for students to be engaged in developmentally appropriate mathematical investigations. Documentation includes evidence that • Pacing is appropriate, • Lesson captures perplexity, by following the Three-Act Math Tasks (Dan Meyer)or similar engagement methodology, and Students are given an opportunity for reflection.	Unit Plan includes opportunities for students to be engaged in developmentally appropriate mathematical investigations. Documentation includes evidence that • Pacing is mostly appropriate, • Lesson attempts to capture perplexity but missing a key component, and Students are given an opportunity for reflection.	There is no documentation addressing the engagement of students in developmentally appropriate mathematical investigations.
5b.2	Unit Plan includes opportunities for students to use mathematics-specific technologies appropriate to the learning objective.	Unit Plan includes opportunities for students to use mathematics-specific technologies but it does not connect to the learning objectives in a meaningful way.	Unit Plan does not include opportunities for students to use mathematics-specific technology and explanation for lack of use not based in sound pedagogy.
Unit Planning - Assessment Results. Effective teachers collect, organize, analyze and reflect on diagnostic, formative, and summative assessment evidence and determine the extent to which students' mathematical proficiencies have increased as a result of their instruction.			
Candidates will be given data to analyze for this purpose.			
5c.1	Diagnostic and summative data is clearly displayed and organized by student learning outcomes.	Diagnostic and summative data is included but are not organized by student learning outcomes.	Data is not included or is included but does not relate to student learning outcomes.
Candidates will be given data to analyze for this purpose.			
5c.2	Data analysis accurately interprets assessment results, including a reflection on how the assessment evidence will inform future instruction.	Data analysis accurately interprets assessment results and includes a reflection on the assessment evidence.	Data analysis is not included, inaccurately interprets assessment results, or does not include a description of how the assessment results were reported or will inform future instruction.

MTH Lesson Plan

Intern _____ Cooperating Teacher _____

School _____ University Supervisor [redacted]

Grade _____Subject _____Date _____
(Month/Day/Year)

INSTRUCTION PLAN
Complete and submit 48 hours prior to observation.

1. Place title of lesson here.

Student Learning Outcomes: After completing the unit, student will be able to…	Common Core Standards: Type the standard here using its appropriate reference. Cross out any portion not addressed in lesson plan.	Evidence: (Identify what part of the assessment plan will provide evidence of student proficiency.)

2. METHODS

Identify instructional strategies have you chosen for this lesson.

3. STUDENT GROUPING

How will you group students for instruction? Will student be working cooperatively in groups of 2, groups of 3, groups of 4, independently, etc.? If working in groups, ***specifically*** describe how the groups will be determined.

4. Vocabulary (Include definitions.)

5. Real World Applications that are explored during this lesson. (Capture perplexity.)

Explain what experiences allow students to formulate, represent, analyze and or interpret mathematical models derived from a variety of real-world contexts to build mathematical understanding.

6. Strategic Use of Tools/Technology

Explain how you and the students strategically use mathematics-specific tools during the lesson to enhance or extend the meaning of the mathematics. If no math-specific tools or technologies are used, explain how the limitations of such tools prohibited their use. Tools: Manipulatives, physical models, drawings, virtual manipulatives or representations, etc. Technologies: Graphing calculators, graphing software, interactive geometry software, computer algebra systems, statistical packages, etc.

7. Insert Activity Plan – use template (repeat for each activity)

Name of Activity:

8. ACCOMMODATIONS

What accommodations will be made for children with special needs (i.e. teaching, evaluation)?

9. RESOURCES

• Include a list of any resources used in the development of this lesson. This should be a proper citation of materials used to develop this lesson. Include internet resources, print material in books or journals, and community/school resources. • All resources should be modified in some way to improve them.

Activity Plan

Title of the Activity or Lesson:

Goals of the Activity or Lesson: (What mathematical content and processes do you hope students will learn from their work on this activity? Use correct common core labeling.)

Why do students need to learn this?

- This concept connects to future learning. It is important later in the study of …
- This understanding or skill will enable students to…
- This understanding or skill prepares students for real-work performance tasks of…
- The content enhances analytical or critical thinking skills by…
- The content enhances learning in other disciplines. (Include specifics.)

Setting Up the Mathematical Activity – Engage Phase

A. In what ways does the task build on students' previous knowledge? What definitions, concepts, or ideas do students need to know in order to begin work on the task?

    - Students will need a (geometrical, graphical, algebraic, numerical, …) understanding of ... Specifically, students will need to
        -
        -
        -
        -
    - Students will need to be familiar with ...
    -

B. What are all the ways the investigation can be completed? (What methods do you think your students use? What misconceptions might students have? What errors might students make?)

C. What are your expectations for students as they work on and complete this activity? (What resources will students use? How will students work – independently, small groups, pairs? How will students record and report their work?)

D. How will you introduce students to the activity so as not to reduce the demands of the task? How will you engage students?

➢ Include a narrative here that described what happens during the engage phase of the lesson.

Exploration Phase: As students are working independently or in small groups:

A. What questions will you ask to focus their thinking?

B. What will you see or hear that lets you know how students are thinking about the mathematical ideas?

C. What questions will you ask to assess students' understanding of key mathematical ideas, problem-solving strategies, or the representations? Attach all graphic organizers, exit ticket, …

D. What questions will you ask to advance students' understanding of the mathematical ideas?

E. What questions will you ask to encourage students to share their thinking with others or to assess their understanding of their peers' ideas?

- Include a narrative here that described what happens during the explore phase of the lesson.

Sharing and Discussing the Activity - Explain Phase

A. Which solution paths do you want to have shared during the class discussion in order to accomplish the goals for the lesson? Which will be shared first, second, etc? Why?

B. What will you see or hear that lets you know that students in the class understand the mathematical ideas or problem-solving strategies that are being shared?

C. How will you orchestrate the class discussion so that students:
   Make sense of the mathematical ideas being shared?
   Expand on, debate, and question the solutions being shared?
   Make connections between their solution strategy and the one shared?
   Look for patterns and form generalizations?

D. What extensions to the activity will you pose that will help students look for patterns, make connections, or form a generalization?

- Include a narrative here that described what happens during the explain phase of the lesson.

- Include a narrative here that described what happens during the elaborate phase of the lesson.

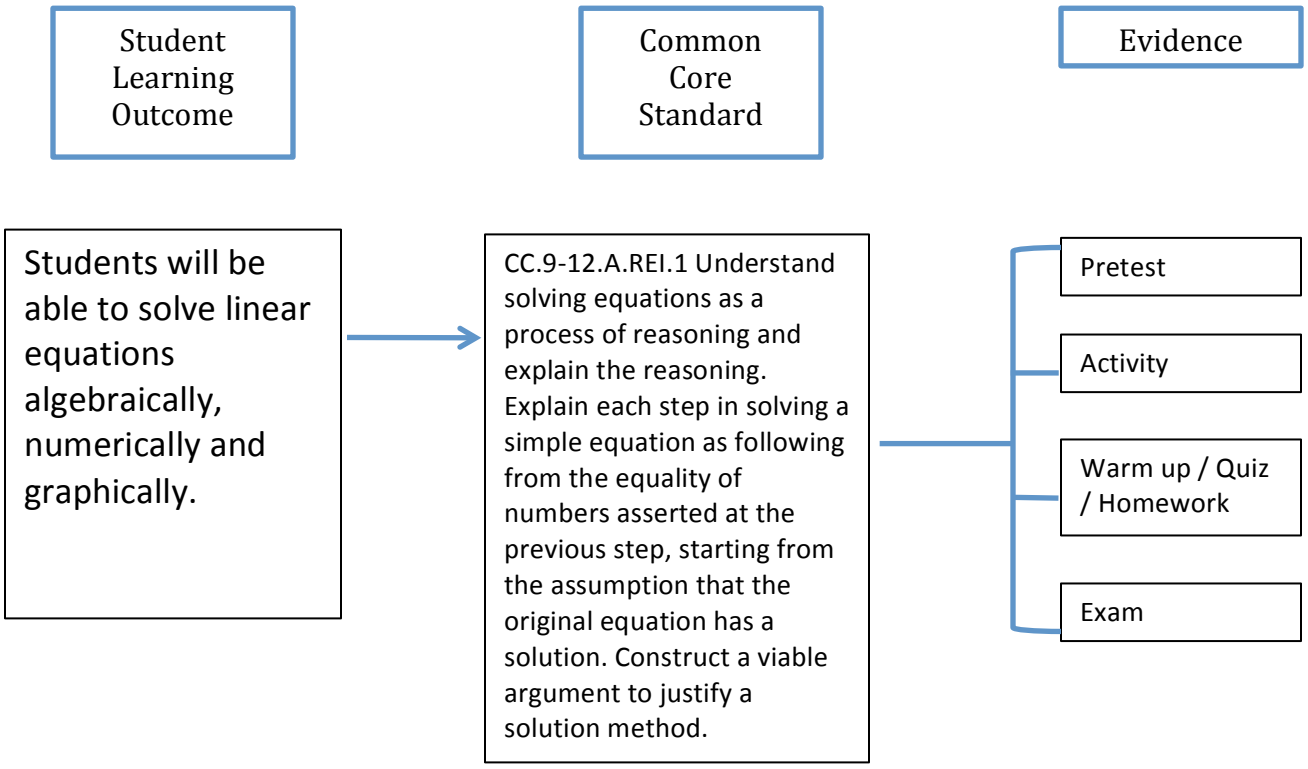
- Explain here how students will summarize their understanding.

Before you begin…

1. Identify instructional ***objectives*** (student learning outcomes) to focus learning and define expectations. Good objectives (SLOs) are SMART:
   Specific & Strategic
   Measurable
   Attainable
   Results-oriented
   Time bound

2. Identify the Common Core ***standard(s)*** necessary to achieve each student-learning outcome.

3. For each student-learning outcome, identify ***assessments*** that will be used to measure student proficiency for that outcome. At least two assessments should be used for each outcome. Collectively assessments should "fill" the assessment pyramid (i.e. correct proportions of skills versus concepts, easy versus hard, and lower level versus higher level).



Guidelines for Using Data

- Use data to create dialogue and understanding, and to promote shared learning.
- Be open – acknowledge and respect various interpretations.
- Search for meaning even when the conclusions are not readily apparent.
- Handle with care.
- Make the best of the data you have.

> It is important that we never reduce students or our profession to numbers, but that we use whatever tools we can to make sure that we are having a positive impact on student learning.

Goal: Improve student's level of performance from below proficient to proficient and advanced.

Performance Categories	Score (Percentage)
Green Advanced	$85 \leq x \leq 100$
Blue Proficient	$70 \leq x < 85$
Yellow Below Proficient	$50 \leq x < 70$
Red Way Below Proficient	$x < 50$

Collect and Organize Data

1. Align each item on both the pre and post assessment to its corresponding student learning outcome. Label each problem or task to its corresponding student learning outcome (SLO1, SLO2, …) on the exam key. Some problems/tasks might align to more than one outcome.

2. For data analysis purposes, it is helpful if each problem is graded using the same rubric. For example, you might choose to use a 4-point rubric to grade each item. In practice, you might grade each problem using the 4-point rubric, record these scores for the data analysis. (Problems might be weighted differently in the grade book.)

3. Record each student's scores in a spreadsheet (Excel, Numbers, …) **for each item**.

4. Find the mean score for each student for each objective (SLO1, SLO2, …). This table should be included in the Impact on Student Learning Project data analysis.

Raw Data Table								
(No names.)	Item 1 Rubric Score	Item 2 Rubric Score	Item 3 Rubric Score	Item 4 Rubric Score	…	Ave Rubric Score SLO1	Ave Rubric Score SLO2	…
Student 1								
Student 2								
…								

5. Translate the average "rubric" score into a percentage.

6. Count how many students in each performance category. The best way to do this is with a COUNTIF formula. For example, =COUNTIF(O2:O21,"<=50") counts the number of students that fall into the red category. While, =COUNTIF(O2:O21,"<70")-COUNTIF(O2:O22,"<=50") counts the number of students falling into the yellow category.

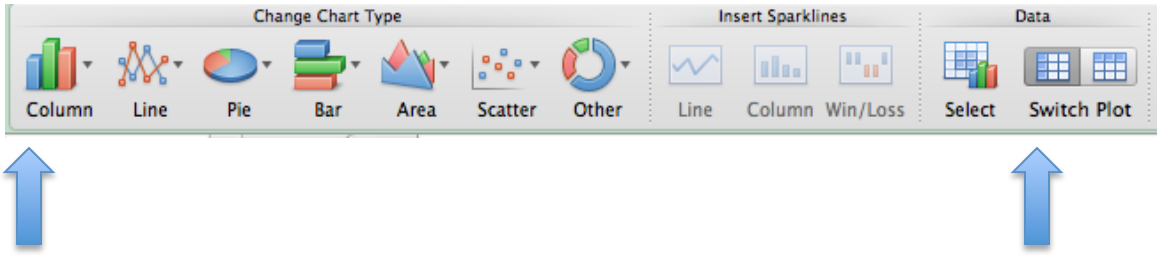
7. Once you have the counts, then find the percentage of students that are in each performance category (green, blue, ...) Do this for both pre and post assessments.

Displaying Data

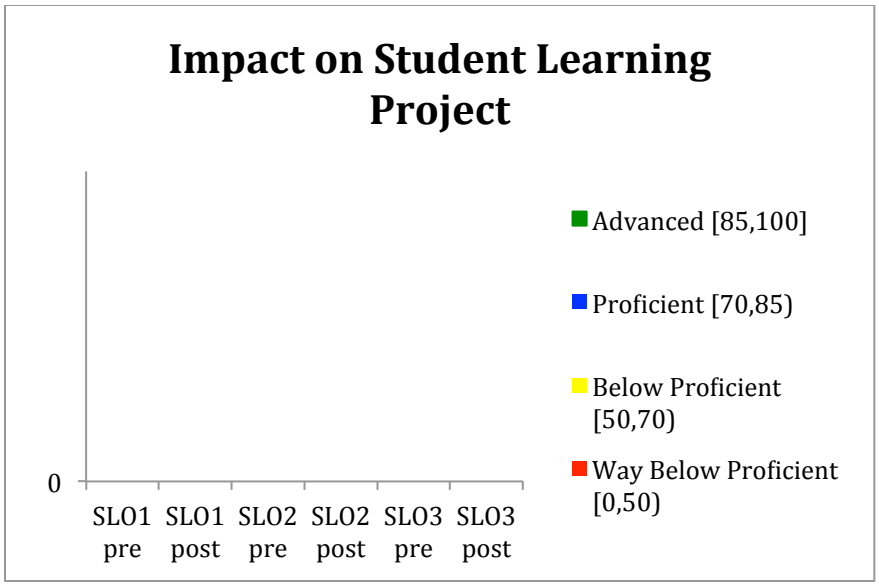
Summary Data Table						
	SLO1 Pre	SLO1 Post	SLO2 Pre	SLO2 Post	SLO3 Pre	SLO3 Post
Performance Category	%	%	%	%	%	%
Advanced Green [85,100]						
Proficient Blue [70,85)						
Below Proficient Yellow [50,70)						
Way Below Proficient Red [0,50)						

- Calculate the percentage of students in each performance category for each student learning outcome SLO.

In Excel, …



1. Select the data along with the row and column headers.
2. Under the charts tab, select Stacked Column.
3. With the chart still selected, choose Switch Plot.
4. Format the chart colors to correspond to the color code names.
5. Title the chart.
6. Copy and paste the excel chart into your Word document.



Student Learning Outcome 1.

Prior to instruction, 35% of the students were proficient in student learning outcome 1. After instruction, more than 65% of with students were proficient in Objective 1. About 35% of the students were in the below proficiency categories and the following intervention strategies have been developed for those students.

Possible strategies

- Extra time on task. (Attach sample tasks.)
- Tutoring in small groups, pairs and / or individual. (Attach sample tasks.)
- Differentiate instruction – In the context of real, relevant & engaging applications have student summarize their understanding with emphasis on multiple representation. (Attach sample tasks.)

Student Learning Outcome 2.

Prior to instruction, none of the students were proficient in student learning outcome 2. After instruction, more than 85% of with students were proficient in student learning outcome 2. Continue analysis as above.

Student Learning Outcome 3.

Prior to instruction, less than ____ of the students were proficient in student learning outcome 3. After instruction, more than ____ of with students were proficient in student learning outcome 3. Continue analysis as above.

Name	1	2	3	4	5	6	7	8	9	10
student 1	0	0	1	1	3	2	0	0	1	0
student 2	1	1	1	2	3	3	0	0	2	0
student 3	0	1	2	2	3	2	0	0	4	1
student 4	1	1	1	2	3	1	0	0	4	1
student 5	0	1	1	2	3	3	0	0	4	0
student 6	1	1	1	2	3	2	0	1	4	1
student 7	1	1	1	2	3	1	0	2	4	0
student 8	1	1	3	2	3	1	1	1	4	0
student 9	1	1	1	2	3	2	2	0	4	1
student 10	1	1	2	2	3	3	1	1	4	1
student 11	1	1	1	2	3	1	1	2	4	0
student 12	1	1	0	2	3	2	2	0	4	0
student 13	0	1	1	2	3	1	1	0	4	1
student 14	1	1	0	2	3	2	1	0	4	0
student 15	0	1	1	2	3	1	0	0	4	1
student 16	0	1	2	1	3	2	0	0	4	1
student 17	0	1	0	0	3	2	0	0	4	1
student 18	0	1	1	1	3	1	0	0	4	1
student 19	1	1	0	3	3	0	0	1	4	1
student 20	1	1	0	2	3	1	0	1	4	1
total possible	4	4	4	4	4	4	4	4	4	4
SLO	SLO1	SLO2	SLO2	SLO3	SLO3	SLO2	SLO3	SLO1	SLO1	SLO2

This sample data set has 3 student learning outcomes, each aligned to the common cor
Align each problem to its corresponding objective.
All assessment items were graded on attached 4 point scale.
Record student scores **for each problem**.
Find an mean score for each student for each student learning outcome.
Translate the mean "rubric" score into a percentage.

Students names are never to be included in a data analysis.
Rubric should always be attached.

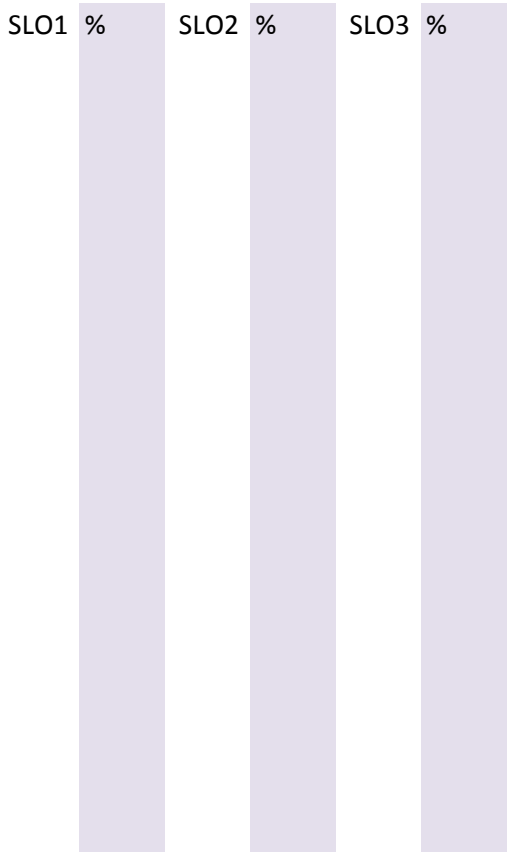
SLO1	%	SLO2	%	SLO3	%
0.333	8	0.75	19	1.333	33
1	25	1.25	31	1.667	42
1.333	33	1.5	38	1.667	42
1.667	42	1	25	1.667	42
1.333	33	1.25	31	1.667	42
2	50	1.25	31	1.667	42
2.333	58	0.75	19	1.667	42
2	50	1.25	31	2	50
1.667	42	1.25	31	2.333	58
2	50	1.75	44	2	50
2.333	58	0.75	19	2	50
1.667	42	0.75	19	2.333	58
1.333	33	1	25	2	50
1.667	42	0.75	19	2	50
1.333	33	1	25	1.667	42
1.333	33	1.5	38	1.333	33
1.333	33	1	25	1	25
1.333	33	1	25	1.333	33
2	50	0.5	13	2	50
2	50	0.75	19	1.667	42
4	100	4	100	4	100
Red	18		20		18
Yellow	2		0		2
Blue	0		0		0
Green	0		0		0
total	20		20		20

Above: These are the total number of students in each category. These were calculated using a COUNTIF formula.

Percentage of students in each performace category for each SLO.

	SLO1	SLO2	SLO3
Red [0,50)	90	100	90
Yellow [50,70)	10	0	10
Blue [70,85)	0	0	0
Green [85,100]	0	0	0

Name	1	2	3	4	5	6	7	8	9	10	11	12
student 1	2	3	2	2	1	2	1	2	1	3	2	4
student 2	3	3	3	2	4	4	2	2	1	2	3	4
student 3	2	3	4	2	4	2	2	2	1	3	4	3
student 4	3	3	3	2	4	4	3	2	1	3	3	4
student 5	2	3	2	2	4	2	4	2	1	4	3	3
student 6	3	3	3	2	4	3	3	2	1	2	2	4
student 7	3	3	4	2	4	3	4	2	1	1	4	4
student 8	1	4	3	2	3	2	3	2	1	3	4	4
student 9	2	2	2	2	2	1	4	2	1	2	4	3
student 10	2	3	3	2	4	2	2	2	1	3	4	2
student 11	2	4	4	2	3	4	4	2	1	2	4	4
student 12	3	3	3	2	3	3	3	2	1	2	4	3
student 13	3	2	2	2	3	1	2	2	1	2	4	2
student 14	4	3	4	2	3	2	3	2	1	3	4	3
student 15	2	4	4	2	3	2	4	2	1	4	1	4
student 16	3	4	4	2	4	2	3	2	1	3	2	2
student 17	4	3	3	2	3	1	2	2	1	4	3	3
student 18	4	2	2	2	3	2	3	2	1	4	3	3
student 19	4	2	4	2	3	3	4	2	1	1	4	4
student 20	4	2	3	2	4	2	3	2	1	3	3	3
total possible	4	4	4	4	4	4	4	4	4	4	4	4
SLO	SLO1	SLO1	SLO2	SLO3	SLO3	SLO2	SLO3	SLO1	SLO3	SLO2	SLO2	SLO1



Red	
Yellow	
Blue	
Green	
total	

Above: These are the total number of students in each category. These were calculated using a COUNTIF formula.

Percentage of students in each performace categc

	SLO1	SLO2
Way Below Proficient [0,50)		
Below Proficient [50,70)		
Proficient [70,85)		
Advanced [85,100]		

	SLO1 pr	LO1 po	LO2 pr	LO2 po	LO3 pr	LO3 post
Way Below Proficient [0,50)						
Below Proficient [50,70)						
Proficient [70,85)						
Advanced [85,100]						
	100	100	100	100	100	100