

The topic for my unit is Mathematics specifically in the realm of Geometry. I will teach how to break down a complex figure into basic shapes and apply what we know about finding area, to the more complex. It is important to teach the concepts of area because they are applicable to real life situations and will be a building block for future Geometry concepts such as surface area and volume. This unit will incorporate the use of visuals, hands-on activities, technology (Web 2.0 tools), and various strategies we have discussed in this course.

(In our district resource math classes cover 70% of the GLCE's. Our curriculum map sequence is similar to the general education classes. We have additional time to go at a slower pace, focus on foundational skills as necessary, and do more hands on activities and projects.)

Michigan Grade Level Content Expectations that will be addressed in this Unit:

The following GLCE's relate to the topic of finding area of complex figures because the understanding and execution of GLCE's G.GS.08.01 and G.SR.08.03, is essential for the accurate application of GLCE's G.SR.08.04 and G.SR.08.05. I have also included some ELA speaking convention GLCE's as these will tie into the alternate form of assessment, which will be presenting a Glog (an online interactive poster).

GEOMETRY:

Understand and use the Pythagorean Theorem

- **G.GS.08.01** Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problems.

Solve problems about geometric figures

- **G.SR.08.03** Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.
- **G.SR.08.04** Find area and perimeter of complex figures by sub-dividing them into basic shapes (quadrilaterals, triangles, circles).
- **G.SR.08.05** Solve applied problems involving areas of triangles, quadrilaterals, and circle.

(Our district has not yet begun to implement the Common Core State Standards, however from browsing the CCSS website, it looks as if this content will be moving to grade 7: "Solve real-world mathematical problems involving area, surface area, and volume.")

ENGLISH LANGUAGE ARTS:

Speaking: Conventions

- **S.CN.08.01** adjust their use of language to communicate effectively with a variety of audiences and for different purposes by using enunciation to emphasize key ideas and concepts when presenting.
- **S.CN.08.02** speak effectively using body language including gestures, posture, facial expressions, tone of voice, and pace of speaking to enhance meaning and influence interpretation in narrative and informational presentations.

This Unit Plan was designed for my 8th grade resource math class. This is a very diverse group of learners with varying needs both academically, socially, and emotionally. I have ten students total. Below you will see their special education area of eligibility as well as the strengths and characteristics that they bring to the classroom.

Student Name (due to FERPA, pseudonyms have been used)	Eligibility	Strengths/Characteristics
Donovan	LD in basic reading skills, and math problem solving	*Strong leadership skills *Critical thinker
Bruce	LD in math problem solving and calculation	*Very strong verbal skills *Often has lead roles in school musicals and plays
Victor	LD in basic reading skills, written expression, and mathematics problem solving	*Strong mathematics calculation skills *Always on task and works diligently
Alex	LD in math problem solving and calculation	*Enjoys volunteering to solve problems at the board *Strong computer skills
Sidney	Cognitively Impaired	*Kind & compassionate to her peers *Once she understands a concept, she enjoys teaching it to others
Christopher	Autism Spectrum Disorder	*Loves any and all technology-can tell you what it does, how it was made, and how it ranks to other similar technology gadgets or programs
Kennan	LD in basic reading skills, reading comprehension, math reasoning, and written expression	*Great athlete *Strong work ethic *Willing to help others
Lucas	LD in math problem solving and calculation	*Video game enthusiast *Great at understanding and applying vocabulary
Trevor	504 Plan, (did not qualify for SE services because IQ is not low enough to qualify for CI, and no discrepancy for LD)	*Leader in class, first to volunteer to help anyone or do anything *Sense of humor
Kelsey	LD in basic reading skills, math problem solving, and written expression	*Dedication to school *Willingness to help others

LESSON ONE

(a) Instructional goal for the day:

TLW (the learners will) be introduced to complex figures and will show how to break them into basic figures.

(b) Materials to be used to achieve the goal:

- ✓ SMART cart (this includes a computer, projector, and document camera)
- ✓ SMART board
- ✓ Popsicle sticks with student names
- ✓ Construction Paper Cut-Outs (see handout 1 below)
- ✓ Scissors
- ✓ Index cards
- ✓ Calculator
- ✓ Pencils
- ✓ Math Journals (Spiral bound graph paper)

(c) Outline of instructional activities that will take place to achieve the instructional goal:

1. Class will begin with 3-5 minutes of Donovan leading Good Things-he will call on student volunteers and ask each student a follow up question related to what they have shared (We are a [Capturing Kids' Hearts](#) trained district and each class begins with a few students volunteering to share something good, new or exciting that is going on in their life-this sets the tone for the class period and creates a comfortable and safe environment).
2. Students will then complete a daily warm-up. On the board students will be given an area problem, as we have previously learned the formulas and how to solve for area of a rectangle, triangle, trapezoid, and a circle. Students may use a calculator and their formula sheet to complete the warm-up. After students finish, choose a stick, to have a student come up and show how they solved the warm-up.
3. Next, review on the SMART board, different shapes (square, rectangle, trapezoid, triangle, and circle), have students volunteer to share the shape's name, how they could identify them, (i.e. it is a circle because it has no sides, or it is a square because it has four 90 degree angles and all of the sides are the same length), and what formula would be used to find the area. End with a picture of a complex figure and see if students can provide a name for this shape.
4. Explain to students that this is a complex figure because it does not have a name it is more "complex." It is a figure created by two or more basic shapes that are connected together. Have students record this definition in their math journal.
5. Next, have students discuss with their tablemate possible basic shapes that they can identify within the complex shape.
6. Copy and paste the complex figure so that it is shown twice and draw a stick for a student volunteer to come up to the SMART board and show what shapes they found in the complex figure by drawing lines to separate where the shapes are.

7. Ask if anyone divided the shape in another way. Have a student volunteer come up to the board and on the second complex figure show how they sub-divided the figure in a different way.
8. Explain to students that sometimes in complex figures you will see it divided up in different ways than someone else and that is ok. They will see how it is still the same shape because it will have the same area and we will prove this tomorrow.
9. Distribute to each student a construction paper cutout of a complex figure and a pair of scissors (see handout 1 below). Each table group will be given a different complex figure. Students will cut the complex figure into three recognizable shapes.
10. Students will then share with their tablemate how they sub-divided their complex figure.
11. All table groups will share with the class what their complex figure was and how each of them divided it into basic shapes (some will have done it the same, some different, this is expected and acceptable).
12. After everyone has shared, provide each student with an index card. This will be their exit card--in order to exit class they must complete the task and hand it in. Students have a choice, they may either create a complex figure of their own then show how to sub-divide it into basic shapes OR they could write in their own words what a complex figure is.
13. Have students return materials and turn in their index card before being dismissed.

(d) Evaluating students on what they have learned that day:

Asking questions throughout the lesson and seeing how students respond to the activities throughout will provide a good understanding as to how they are interpreting the given information. Also with the use of the exit cards I am able to check each individual students' understanding prior to the next day's lesson and see if any re-teaching or explaining is needed prior to moving on.

LESSON TWO

(a) Instructional goal for the day:

TLW sub-divide complex figures into basic shapes, find each area, and add them together to find the total area of the complex figure.

(b) Materials to be used to achieve the goal:

- ✓ SMART board
- ✓ SMART cart
- ✓ BBC website activity (<http://www.bbc.co.uk/schools/ks3bitesize/maths/measures/area/activity.shtml>)
- ✓ Popsicle sticks with student names
- ✓ Student response system (students have clickers that they can use to respond to multiple choice questions with by pushing the corresponding letter on the voter-results show on the SMART board after all students have voted)
- ✓ Pencils
- ✓ Math Journals (Spiral bound graph paper)
- ✓ Calculators
- ✓ Graphic Organizer (see handout 2 below)

(c) Outline of instructional activities that will take place to achieve the instructional goals:

1. Begin the hour with 3-5 minutes of Good Things led by Trevor.
2. Next have students open their math journals and work on the daily warm-up. This will be a review of yesterday's material-asking students to define what a complex figure is and show how to break a given example into basic shapes. Draw a stick to have a student come up to the board and go over the warm-up.
3. Tell students that today we are going to continue working with complex figures but we are going to take it one step further and find the area of complex figures. Begin by reviewing different area formulas. There is a formula for area of a square, triangle, trapezoid, and circle, as we saw in the lessons prior to this unit. However, there is NOT a formula for a complex figure as they all vary.
4. Using the SMART board bring up the [BBC game/activity for area](#) (I played the audio that went along with it. You may also opt. to show subtitles if it fits the need of your group). This activity begins with area of basic shapes and leads into area of a complex figure (this activity refers to them as compound shapes. Explain to students that this is the same idea, just different terminology). The activity then goes through the two methods of solving the area of a complex figure. Explain to students that we will be focusing on the first method.
5. As a whole group, go through the examples and solve, taking turns for students to share their answers.
6. Next, pass out the graphic organizer (see handout 2 below). Use the document camera and an example to show students how to use the GO to find the area of a complex figure step-by-step.
7. Once the graphic organizer is completed, model how to use the organizer to solve a problem by talking through the thought process and show what it looks like.

8. Next, referring back to the BBC website activity, find below the activity where it reads "More from Area:" below this [click the test](#). Work through the first problem again modeling out loud the thought process and use of the GO and then allow students to try the next one with their table mate and then one on their own.
9. Go over all of the answers as a large group one by one and have the students share their answers simultaneously while using the student voters. Choose sticks for student input and checking for understanding as necessary.

(d) Evaluating students on what they have learned that day:

Students will be evaluated based on how involved they were in the lesson, the classroom discussion, the conversation they had with their tablemates as I listened while circulating the room, and lastly how students did during independent practice—the responses using the student response system.

LESSON THREE

(a) Instructional goal for the day:

TLW apply their knowledge of finding area of a complex figure and use it to solve a real life problem using Google Earth.

(b) Materials to be used to achieve the goal:

- ✓ SMART board
- ✓ SMART cart
- ✓ Popsicle sticks with student names
- ✓ Student Laptops with Google Earth downloaded and internet access, have a USB computer mouse or two available for students that navigate better with one
- ✓ Area of Complex Figures Graphic Organizer
- ✓ Pencil
- ✓ Activity Hand out (see handout 3 below)
- ✓ Calculator

(c) Outline of instructional activities that will take place to achieve the instructional goals:

1. Begin the hour with 3-5 minutes of Good Things led by Bruce.
2. For today's daily warm-up students will start where they left off yesterday by solving a problem that asks them to find the area of a complex figure (students will be encouraged to use their graphic organizer and formula sheet to help them). Choose a stick to decide what student will come to the board to show how they solved the problem. Go over student's response and make changes as needed, affirm their efforts and take any other student questions.
3. Today students will see how this concept can apply to situations outside of the school walls. We will be using Google Earth to apply this concept and see how it applies to farmers.
4. Next, pass out the activity handout (see handout 3 below) and model the directions using the handout and the [website](#) pulled up on the SMART board to show students what they will be doing.
5. Students will then be directed to logon to a laptop and get started.
6. Some students will be working with their peer tutors (PALS) on this assignment as I have some students that are strong with technology but struggle with math and vice versa.

(d) Evaluating students on what they have learned that day:

Evaluating students will be done throughout the lesson as I ask and answer student questions and observe how students engage in the activity. I will also get a feel for student understanding as I see how they complete the handout which accompanies the activity.

LESSON FOUR

(a) Instructional goal for the day:

TLW show their comprehension and understanding of the concept of area by creating a Glog (Online Interactive Poster).

(b) Materials to be used to achieve the goal:

- ✓ SMART board
(to show the following website, <http://www.xpmath.com/careers/topicsresult.php?subjectID=3&topicID=13> and the [example Glog](#))
- ✓ SMART cart
- ✓ Popsicle sticks with student names
- ✓ Student Laptops with USB mouse availability and internet access
- ✓ Tic-Tac-Toe Menu (see handout 4 below)
- ✓ Graphic Organizer and Formula sheet (from prior lessons)
- ✓ Pencil
- ✓ Calculator

(c) Outline of instructional activities that will take place to achieve the instructional goals:

1. Begin the class with 3-5 minutes of Good Things led by Alex.
2. No daily warm-up today to provide adequate time for the activity.
3. Explain to students that instead of a quiz over area, area formulas, and finding the area of a complex figure, they will be creating an interactive poster online, a [Glog](#), to show what they have learned and putting all of the concepts together.
4. Pass out the student tic-tac-toe menu (see handout 4 below) and read aloud to students as they follow along.
5. Because all students are required to do the center space, show students the [website](#). Here they will see that there are 108 jobs that use area. They are each required to choose one of these jobs and the description to put on their Glog. This adds relevancy to the topic so they are able to see that it matters beyond the classroom, and beyond farming, area is a fundamental concept.
6. Next, show students an [example](#) so they are able to see what the end product will look like (note that I did not use a combination that students can use to omit the possibility that a student creates a duplicate of my example).
7. Each student will then grab a lap top, sit by their PAL, and begin.

(d) Evaluating students on what they have learned that day:

Students will be evaluated on what activities they have chosen from the tic-tac-toe menu and how well they are able to execute those activities onto their Glog. I will also be wandering around from group to group to assess student progress and answer any questions that they may have and re-direct if/when necessary.

LESSON FIVE

(a) Instructional goal for the day:

TLW present their Glog to the class and use it as a visual reference in their verbal comprehensive presentation on how to find area of a complex figure.

(b) Materials to be used to achieve the goal:

- ✓ SMART board
- ✓ SMART cart
- ✓ Popsicle sticks with student names
- ✓ Student Laptops
- ✓ Pencil
- ✓ Tic-Tac-Toe Menu
- ✓ Index Cards

(c) Outline of instructional activities that will take place to achieve the instructional goals:

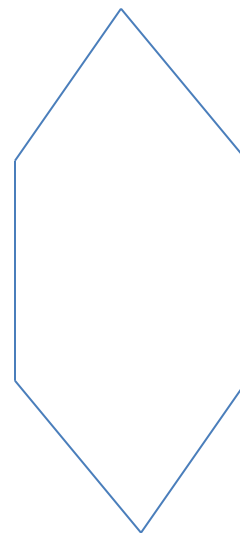
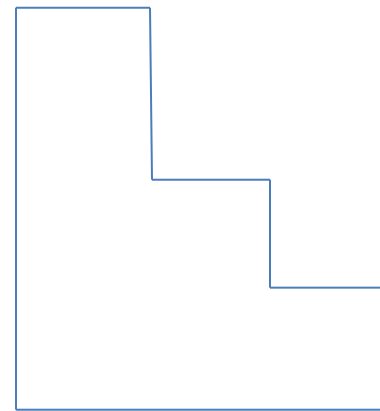
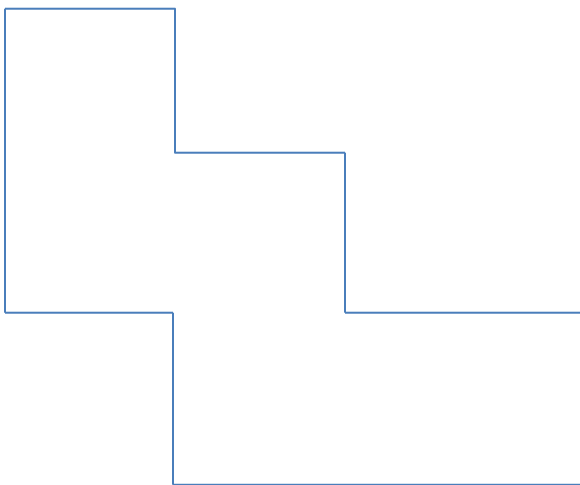
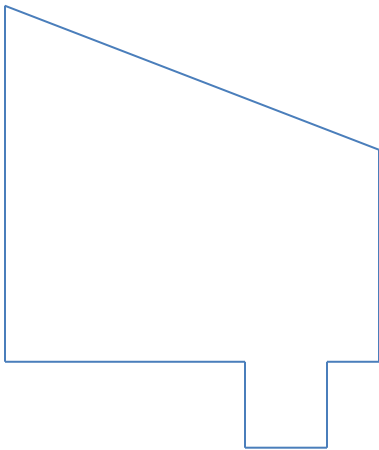
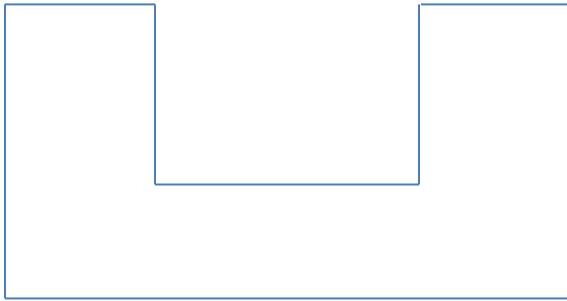
1. Begin the hour with 3-5 minutes of Good Things led by Kennan.
2. No daily quiz so students can have the first 20 minutes to look over their menu and Glog and make any last minute changes, additions, or look over their tablemates.
3. Ask for a student volunteer to go first, and a support chair. The support chair is someone that is also in the front of the class to take some stress off of the presenter and is then next to go. When that student presents a student then takes the spot of the support chair. If no one is in the support chair, a stick is pulled and that student will take the chair if they have not yet gone. When it comes to the last presenter, there is still a support chair.
4. When a student presents they will hand in their tic-tac-toe menu for grading purposes.
5. While students present other students are being appropriate listeners and for each student they write an affirmation, something that they enjoyed about their presentation. When students get their rubric back with their grade they will also have a sheet of affirmations from their peers to affirm their hard work and presentation.

(d) Evaluating students on what they have learned that day:


Students chose topics off of the tic-tac-toe menu that matched their strengths, students will evaluate each other's presentations by affirming what they enjoyed, and I will also evaluate students based on their Glog and presentation using their tic-tac-toe menu.

Handout 1



**Shapes to be printed onto Construction paper, be cut out, and passed out to students (each pair of students at a table will be given the same shape—5 pairs, 10 students, make two copies).





Handout 2

Finding Area of a Complex Figure
Graphic Organizer



Example: Find the Area of the complex figure (sketch the complex figure here).



Step One: Divide the figure into basic shapes.

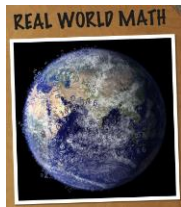


Step Two: Use the correct formula to find the area of each basic shape.



Step Three: Add all of the areas together to find the total area of the complex figure.

Handout 3



Finding Area of a Complex Figure Using Google Earth (Activity Handout)

How to get started...

- Open an internet browser and type in the URL, www.realworldmath.org
- Look on the top of the page and click on *Lessons*
- Under the Lesson Menu click on *Measurement*
- Under Measurement Lessons click on *Complex Area*
- Next to Complex Area Problems, click on the {Kmz file}

There are two parts to this activity:

Part One:

Today we will just be focusing on Part One. You will use the Google Earth ruler tool to measure each complex shape- a corn crop, a soybean crop, and a wheat crop (choose miles as our unit of measurement). After you have measured a crop find the area of the complex figure. Directions for this first step are found by clicking on the "?" icon in the field.

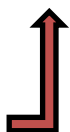
Let's get started....

Begin with the Corn Crop

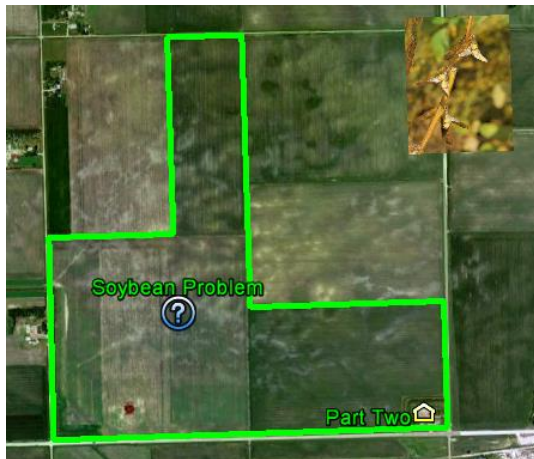


Label the image above with the measurements found using the Google Earth ruler tool (in miles).

Find the area of the complex figure showing all of your work in the space provided.

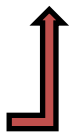


Next, look at the Soybean Crop



Label the image above with the measurements found using the Google Earth ruler tool (in miles).

Find the area of the complex figure showing all of your work in the space provided.

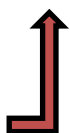


Last but not least, look at the Wheat Crop



Label the image above with the measurements found using the Google Earth ruler tool (in miles).

Find the area of the complex figure showing all of your work in the space provided.



Part Two:

When you click on the house icon, you will see a problem or several problems that a farmer may want to solve. When we get to our next unit on Proportions we will re-visit this site to solve these problems.

**If you have finished before the hour is over, double check your work, see if any of your peers need support, or explore Google Earth.

Handout 4

Tic-Tac-Toe Menu

Directions: Chose activities in a tic-tac-toe design that go through the center (**everyone must do the center space**). For this space you will go to the following [website](#) and choose a job to include in your Glog that uses area.

<http://www.xpmath.com/careers/topicsresult.php?subjectID=3&topicID=13>

You may go horizontally through the center, vertically through the center, or diagonally through the center. The activities you choose will be featured on your Glog. Star the activities you plan to complete. Color in the box when you finish the activity.

<p style="text-align: center;">Collect</p> <p>2-3 Facts, ideas, or formulas which are important to you for understanding area. (Knowledge)</p>	<p style="text-align: center;">Teach</p> <p>Include an example to show how you would explain finding area of a complex figure. (Synthesis)</p>	<p style="text-align: center;">Draw</p> <p>Add a diagram or picture that shows what area of a complex figure is and cite where it came from. (Application)</p>
<p style="text-align: center;">Link</p> <p>A Video clip of what area is or how to find area of a complex figure and cite where it came from. (Synthesis)</p>	<p style="text-align: center;">Relevancy</p> <p>Include a link to the website mentioned above and include at least one job that uses area. Include a job description.</p>	<p style="text-align: center;">Compare</p> <p>Two things from this unit. Look for ways they are alike and different-- how finding area of a basic shape is alike and different than area of a complex figure. (Analysis)</p>
<p style="text-align: center;">Create</p> <p>An original poem or short story that includes what area is and how to find it when looking at a complex figure. (Synthesis)</p>	<p style="text-align: center;">Survey</p> <p>Others in this class to learn their opinions about finding area of complex figures include <i>appropriate</i> quotes. (Analysis)</p>	<p style="text-align: center;">Memorize</p> <p>And recite a quote or a short list of facts about the area of complex figures (add to your Glog, recite during presentation). (Knowledge)</p>

**Tic-Tac-Toe Sample Menu board based on Bloom's found at:
<http://daretodifferentiate.wikispaces.com/Choice+Boards>

How to Co-Plan and Teach this Unit:

Even though I am the only teacher in my resource math class I plan, collaborate, and bounce ideas off of the general education math teacher that I actually do co-teach with (since I teach about 70% of what is taught in the general education 8th grade math class). The general education teacher typically does the “what” and the “why” and I help to facilitate the “how” by finding/creating a lot of the hands on activities and projects. This unit is a combination of our resources but to the audience of my more high needs students. Ideally, if I had another teacher in my resource class which really has two diverse groups in itself, I would love to explore the parallel co-teaching model. I have tried the parallel teaching model a few times in the general education math class and it is always interesting to hear when we debrief, the similarities or differences and the outcomes that we both experienced. With this unit it would be great to have a more basic activity going while at the same time, a more in-depth activity was happening for a few of my students who could be pushed further, but need the adult facilitator to do so. I would also want to try to implement the station teaching model of co-teaching. I have not been able to try this before but I think it would be beneficial to work closely with small groups and have more inquiry based application with the use of manipulatives and computer programs as well as other stations where students are pushed to a deeper level of application with a teacher present facilitating higher level thinking questions. In the meantime, with my current situation I do the best I can to differentiate my lessons and meet the diverse set of needs while catering to individual IEP goals and state standards.

Use of Content Enhancement Series:

In this lesson I tried to incorporate a routine from each category. From the teaching routines for planning and leading learning I included the Unit Organizer Routine in which I maintained the integrity of the unit and kept the big ideas focused and showed how they are connected. When looking at the teaching routines for exploring text, topics, and details I included the framing routine to make this concept as concrete as possible and not so abstract. When looking at the teaching routines for teaching concepts I included the idea of the concept anchoring routine. Since we had just discussed what area was and the different formulas they were able to anchor the new concept to the old, it was just taking things one step further. Lastly the teaching routines for increasing student performance I chose to incorporate were the quality of assignment routine and the ORDER routine. Whenever I give assignments I spend a lot of time planning because I always try to make them relevant and engaging. Spending time on what the assignment will be and considering alternate forms of assessment. I like when students can show me what they have learned in a comprehensive way that makes them think outside of the box. Checking for understanding should be more than multiple choice and regurgitating formulas and basic facts.

How I incorporated content from CEP 842 into this Unit:

When choosing what components from CEP 842 to include into my unit I first considered my students' needs. I have a great group of students in my resource math class so I wanted to take lessons that I have used in the past and revamp them to be even better. The students I have this year are much more into math than groups I have had in the past and they have a desire to want to know and do. However, they also have the most difficulties as far as disabilities go, it takes a lot of repetition and hands-on for this group to get it but once they've got it, they got it. It is a very unique group indeed and paired with taking this class simultaneously I feel it has led me to becoming a better teacher. Because I am a special education teacher I felt as if this course has affirmed things that I currently do such as UDL and differentiation. I try to engage students with as many visuals, hands-on activities, video clips, technology, relevancy, and the option of choice. I also always maintain an emphasis on creating a positive classroom environment, which is also supported by Capturing Kids' Hearts. I have a strong belief that the classroom should be an environment where students feel safe and willing to question. I always tell my students that we grow and learn from our mistakes so they are welcome in my classroom. I am also very aware that often times when my students leave the resource room they are not as comfortable and more self-conscious about what they may or may not be able to do. I am working on shifting this thinking but at least while they are in my classroom, I want them to thrive.

Areas I know that I can improve on would be my use of questioning--pushing for the higher order thinking questions and even teaching Bloom's Taxonomy to my students so that they understand the importance of it also. Another area for improvement would be the use of student peers. Because I have a wide variety of ability and strengths, I think peer tutors and tutees would not only empower my students but allow them to share their talents with one another and help with group accountability. As these are areas that I would like to improve on you will see I added them to this unit throughout the lessons.

Classroom-based evaluation:

From this unit students will have learned how to correctly choose a formula based on the appropriate shape and apply it to find the shape's area, define what a complex figure is and show how to sub-divide the figure into familiar shapes, tie everything together to find the area of a complex figure and then choose what to present in order to show their understanding with the use of a web 2.0. I have taught elements of this unit such as area, and area of complex figures using the Google Earth portion. However I created this unit with additions and more clarity. I somewhat assumed that my students would understand how to break a complex figure into familiar shapes but a lot of them could not see it initially so I added a lesson into this unit to ensure that for future

reference there is not the assumption which led to student confusion. Students really enjoyed the Google Earth assignment however it is good to allow them to use this program ahead of time perhaps at the end of a day's lesson if there is extra time because if students are on it for the first time they can be easily distracted at the cool features in Google Earth. Also, I have used a Glog for another math concept and students loved it so much I thought I would incorporate it into this unit. It is neat to see them enjoying the technology presentations such as Glog, Bitstrips, and Prezi as they are living in such an increasingly technology driven age. However, it is important to use these presentation tools early in the year perhaps as get to know you activities or simple projects so that once again, students understand how to use the programs come time for assessing their understanding *and* so that they are not over stimulated with the possibilities and features of the programs. To provide relevant data about the learning of students with disabilities you can use the typical method of pre and post-tests. You can also use IEP progress monitoring as well as rubrics and menus for presentations. With the rubrics or menus you can show what students are learning as well as how they choose to respond—ways in which they learn best. Sometimes, the best data you can get comes from the students' methods of presentations and styles of learning revealed.