InTASC Standard 7 Unit Lesson Plan

Day 1

Grade/ Grade Band: 7th Grade Math, 80 minute period	**Topic/Title:** Surface Area & Proportions/ "Tiling the Classroom with Coins?!?"

Brief Class Description (contextual information including number of students, subject, level, IEP/ELL/GT or other special considerations): This is a 7th grade math class. There are 25 students in the class. The teacher informed us that they are all performing on level. She said that they were all at a 7th grade or upper 7th grade level. There is one student with a 504 plan. The accommodations for this plan include small group setting for instruction and testing, extra time to complete assignments, periodic breaks, and frequent checks for understanding. There are no students with IEPs in this class. This is an 80 minute period.

Brief Lesson Description (Overview/Abstract): Students will be figuring out the cost of tiling the floor and walls of their classroom with different foreign coins, this will require students to find the surface area of the classroom space that they need to tile, as well as find the cost of each foreign coin in relation to a baseline (American currency), by using proportions, so that the class can compare different coins to find the "cheapest" way to tile the classroom.

Objective(s):

Students will be able to research the diameters of specific coins from a specific country in order to calculate how many coins it would take to cover the area of various rectangular surfaces (floor and 4 walls).

Students will be able to solve proportions by solving ratios related to currency.

Students will build their knowledge of the concept of surface area by investigating their classroom.

Prior Student Knowledge: Formula for the surface area of a rectangular prism and area of a rectangle. How to solve proportions and ratio relationships	**Possible Preconceptions/Misconceptions:** Students don't fully understand the concept of surface area past the formula.
Common Core Standards: CCSS.Math.Content.7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. CCSS.Math.Content.7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.Math.Content.7.RP.A.3 Use proportional relationships to solve multistep	**Standards for Mathematical Practices:** Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Model with mathematics. Use appropriate tools strategically. Attend to precision.

ratio and percent problems.	

Required materials:	**Safety considerations:**	**Technology Integration/Needs:**
Measuring Tape Yard Sticks Laptops	Students trying to measure the walls may prove difficult, as they are middle schoolers and therefore may not be tall enough to reach all the way up. A solution to this is to use a yardstick at the top of the wall, then from there down use a measuring tape. This provides structure where they cannot reach.	Laptops for research Projector

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions. Include timing/pacing, adaptations (IEP, ELL, culture, other) and transitions.

10 minutes (70 minutes left in period)

Setup: Put the warm up questions on a piece of paper or a word document to be projected. Have the launch letters already printed; if routine the students can pick them up as they walk in, or I can prepare to pass them out. I should have at least 2 different ways of answering the warm up questions near me so I can reference them if need be. I also need to have a timer ready with 6 minutes on there so students can get started on the warm up without delay when class starts. Have dry erase markers ready to write the "key points" of the launch letter, and have the driving question ready to present.

The class will begin with two warm up questions, which will be modeled like the PARCC exam. The Warm up questions are attached; they are about finding the surface area of a rectangular prism and finding proportional relationships. Students will have 6 minutes to complete these questions, which will be projected on a timer. Then we will go over the answers with the class. We will call on a student to read the first question out loud to the class. Then we will call on a student to ask how they solved the problem (what method of solving they used, what they did first, what formulas they used). We will then call on another student to define "surface area". If a student just tells us what the formula for surface area is, this will not be accepted. A student must define, in words, what the term "surface area" means. Our eventual definition should be approximately "the area of all the sides of a figure, without the middle part (which would be the volume)". A similar process will be used for the second warm up problem.

After the warmup (on the first day), we will pass out "Launch Letter" (attached) to the students. We will have the students read the letter out loud using "popcorn" reading style. After students are done reading the letter, we will ask the class what the "key points" of the letter are. This may include

- what the letter is asking,
- what they need to do,
- how the letter relates to the warm up,
- the main idea of the letter,
- any numerical information given, etc.

Students are welcome to annotate however is most comfortable to them. The teacher will write the key ideas on the board that the students provide. The driving question will then be presented to students on the board. **(How much money do we need to tile the classroom floor and walls with coins?)**

WARM UP:
If you are given the rectangular prism below, with the following information, what is the surface area?
Height: 4mm
Width: 2mm
Length 8mm

In 1954, Great Britain's Diane Leather was the first to break the 5-minute mile in women's track and field. Assuming she ran at a constant speed, if her time at the ¾ mile mark was 3:44.7, what would her time have been at the 2.25 mile mark?

- 6:19.2
- 8:25.6
- 11:14.1
- 13:51.8

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- *"It's alright if you didn't finish solving the problems, we are going to go over them as a class."*
- *"Who would like to volunteer to read the first warm up question out loud?"*
- *"What is the question asking?"*
  - The question is asking for the surface area of the rectangular prism
- *"How do we find surface area?"*
  - We have a formula for it, 2(height)+2(width)+2(length)
- *"If we plug in our information to the formula we have, what do we get?"*
  - 2(height)+2(width)+2(length)=2(4mm)+2(2mm)+2(8mm)

    =8mm+4mm+16mm

    =28mm
  - $28mm^3$-why is this wrong? Because we are not multiplying the mm together, we are adding them.
- *"What is surface area? Not the formula, but the concept."*
  - Surface area is the area of all the surfaces of the prism, not the full area of the whole thing.
  - The area of a surface
  - The area of the outside of an object
- *"Who wants to read the second question aloud?"*
- *What is the question asking for?"*

- The question is asking for the time at a certain point.

- *How do we solve this?"*
  - We could translate the time into seconds
  - We use a proportion with 3/4s is to 3:44.7 as 2.25 is to *x*

- *"Walk me through what you did to get your answer."*
  - Make .75/3:44.7 a fraction, and to make it easier we can convert into seconds. How we do that is, 3 minutes is 120 seconds, so 120+44.7 is 164.7 seconds. The we set that fraction, .75/164.7 equal to 2.25 divided by *x*, and cross multiply those to get .75*x*=(164.7)(2.25). Then we solve it and we get *x*=494.1 seconds, which we can convert back to minutes or we can just look at the answers and see that only one ends in .1 so the answer is C.
  - We could also make the fraction 164.7/.75, and solve that, and then multiply it by 2.25 to get 494.1 seconds.
  - We could notice that .75 multiplied by 3 is equal to 2.25, so the answer to *x* will be 164.7 multiplied by 3 as well.

- *"Did anyone else do something different?"*
- *"Based on these two questions, what do you think our lesson is about?"*

- *"Who would like to start off reading the letter that was just handed out to you?"*
- *"Now that everyone has looked at and read the letter, what do you think the key points of it are?"*
  - Students may need more prodding than "key points" so
  - *"What is the letter asking of you?"*
  - *"Based on that, what do you think you need to do to solve this?"*
  - *"Does this have anything to do with the warm up questions?"*
  - *"Ready for some Language Arts? What is the main idea of the letter?"*

Differentiation: Using "popcorn" reading to make sure students are listening when we talk, and we are focusing on the students for much of the introduction to the lesson; using a timer during the warm up to chunk the content; writing the "key points" on the white board as well as projecting the driving question uses multiple representations for students.
Transition: "What information are you given in the letter? If that information is given, what do you have to find out to solve this? Think to yourself about it."

EXPLORE/EXPLAIN Cycle(s)

EXPLORE: Include description of student centered tasks with information on timing/pacing, differentiation, material management, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions.

Explore 1(15 minutes) (55 minutes left):

Setup: Have assigned groups pre-made and ready so students do not get off task with their friends; the students either by routine already have their math journals or I should set aside a minute or two for students to get them from the cubbies.

Teachers will assign students to groups of 3. Students will work together to brainstorm what information they need to do in order to solve the driving question. To do this, students will need to make a list in their math journals of information that they will need to know to solve the problem. Information that should come up is

- "knowing the dimensions of the classroom"
- "knowing the size of each coin"
- "finding a base to compare each of the coins from each country"
- "finding the surface area of the classroom, but without the ceiling"
- perhaps "using proportions to find how much each coin is worth in American currency"
- "finding how many coins fit in the classroom".

They will list the steps that they are planning on taking. They also need to write how they are planning on presenting this information to the class at the end of the 3 days (powerpoint, prezi, poster, or other). They should include something relating to finding the area of the classroom floors and walls, and well as ideas on how to research about coins from foreign countries. They must include what information about the coins that they will need to know in order to complete this project. All these instructions will be projected onto the screen so students can refer back to it, and the groups can get the instructions on a handout if they wish to get one. 15 minutes will be put on the timer so students have an idea of when they should be done figuring out what information they need.

- *"We have assigned you groups of 3. When I tell you to, you can get into your groups anywhere in the classroom that you like. With your groups, talk about what information you came up with while you were thinking about what you need to know to solve this problem. Once you think you've figured out all the information you need, talk with your group about how you would like to present your findings to the class. You can do a poster, a powerpoint, a prezi, or another presentation medium* ***but if you choose another one, check with me first. I need to approve it.****"*
    - Students may need help trying to figure out what information they need or could be missing. I want them to have all information before they move on to the investigation and discover they need something they didn't come up with.
    - *"What do you need to know about the room?"*
    - *"What do you need to know about the coin?"*
    - *"How are you going to use this information to solve the problem? Think about the warm up."*
    - *"How would you compare the different coins?"*

Differentiation: Letting students pick what presentation medium they would like to use lets them be creative; grouping the students into 3s makes sure all the students have an opportunity to participate in brainstorming; projecting instructions and having them on paper caters to students with varying learning styles; using a timer so that the instructions are chunked and students do not feel overwhelmed.

Transition: "If you have all the information you think you need, one person in your group should raise

their hand so I can come over and make sure you have everything. You have 5 minutes left on the timer, so your group should have most of the information needed figured out."

EXPLAIN (STUDENT CENTERED): Include description of cognitive outcome (concepts and vocabulary), student centered explanation (tasks) with information on timing/pacing, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions. Also include "look fors" and how this part helps students "bring the pieces together".

Explain 1(10 minutes) (45 minutes left):

Setup: Have a list of the names of students in each group, so when I go around letting groups choose their countries I can just write one name beside a country and know later which group that is. Also have a mental list of presentation mediums (or a written list) that students *may not* use.

After 15 minutes are up, even if some groups are not finished brainstorming, the countries groups can pick from will be projected.

- Great Britain
- Japan
- Germany
- Ethiopia
- Canada

When students are done brainstorming, the teacher will go over and have the students explain what they came up with during their brainstorm. The teacher then needs to approve the students to move onto the next part of the project. In order to be approved, all information that is needed to complete the project needs to be addressed. Information that they need to be considering includes

- finding the area of the room (subtracting the area from doors, windows, and cabinets),
- needing to know the diameter of the coins
- knowing the value of the coins in the country that they're from
- what the money's worth when compared to American money
- how they're presenting the information in the end.

Once approved, the group will pick which country they would like to research from a list provided on the board. We will then give the students the corresponding paper for that country. The teacher will then tell students that they may begin their investigations.

- *"Now that you have all the information you need figured out, you can pick what country your group wants to do! They are projected, and you cannot do a country that is not up there."*

Differentiation: Student groups get to choose what country they would like to do. This gets them more interested and engaged in the lesson.

Transition: "Now that you have your country picked out, you can use the steps in your journal to start your investigation."

ELABORATE (25 minutes)(20 minutes left): **Include description of applications and extensions tasks with information on timing/pacing, differentiation, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions.**

The timer will be set for 25 minutes, and during this time students can use the information they came up with and the steps in their math journals to start their investigation. During this time, the driving question will be projected along with instructions (*use the steps in your math journal to start your investigation.)*

(How much money do we need to tile the classroom floor and walls with coins?)

Differentiation: Students can start their investigation however they like, so some groups may be measuring the classroom, or finding diameters on their devices, or another step to find out the information

they need. A timer is used to chunk the investigation.
Transition: "Your 25 minutes for today are up, but it is completely alright if you didn't finish anything! Start to clean up whatever materials you got out, and make your way back to your assigned seats."

COGNITIVE CLOSURE (aligned with objective(s):
Reminder: A learning ticket is not considered a cognitive closure by itself.
(20 minutes)
Setup: Have Checkpoint 1 printed and ready to pass out. This sheet students will not be picking up at the beginning of class. Also set aside one or two minutes for clean up during this time.
Students will clean up their materials, putting them back where they found them neat and ordered. Then I will hand out a Checkpoint 1 (last 7-10 minutes of day one): Each student will INDIVIDUALLY fill out a slip of paper with their name, and their group members names on it. They will answer the following questions:

- What country are you looking at?
- What did you research today?
- What have you already measured?
- What do you still need to investigate more on next class?
- How is your group presenting the information that you find to the class at the end?

will have 15 minutes to complete this, if they do not finish it then that is fine. Then I will project the objectives for the lesson (Students will be able to research the diameters of specific coins from a specific country in order to calculate how many coins it would take to cover the area of various rectangular surfaces (floor and 4 walls), students will be able to solve proportions by solving ratios related to currency, students will build their knowledge of the concept of surface area by investigating their classroom.) and I will have 1-2 students explain if, and if so how, we completed any of those three objectives today, and then another 1-2 students explain how they predict we might complete those objectives over the course of the lesson.

- *"The objectives for this lesson are up on the board. Who can sum them up in their own words?"*
- *"Did we complete any of these today? If so, how did we?"*
- *"How do you think these objectives will be completed next lesson?"*
- *"We will continue this project during the next lesson."*

Differentiation: There are 1-2 students who state the objective in their own words, so students can hear it from two different perspectives, as well as the predictions. Each students gets their own checkpoint although they are in groups of three. This allows all students the opportunity to show what they learned. A timer is also used for the completion of the checkpoint so that students don't get overwhelmed by the time.

EVALUATE:

Diagnostic Assessment(s): To assess what the students know beforehand, we will be giving them a warm up question, to evaluate their understanding of surface area. We already know from the observations that the students know only the formula for surface area. They will develop a conceptual understanding before

we move on to the project. .

Formative Assessment(s): Checkpoint 1 (last 7-10 minutes of day one): Each student will INDIVIDUALLY fill out a slip of paper with their name, and their group members names on it.

Summative Assessment(s): N/A

Timing/Pacing Adjustments (Slinky Time): Include a plan for how to adjust instruction if tasks take longer/shorter than anticipated:
Students are able to work on their investigations for a longer or shorter time period if need be.

3/14/17

Dear Students,

We, the board of directors, work hard in order to provide students attending Green Street Academy with an original and unique scholastic experience. This includes a variety of classes offered, top of the line educators, as well as original and unique design aspects in the school itself.

We have been wanting to do some minor renovations in order to give our school a little extra something to make it more unique! Multiple design options have been discussed. It was decided that order to promote a more diverse atmosphere we would like to experiment with the idea of tiling the classroom floor, and the 4 classroom walls with coins from a foreign country. We are very excited to announce that we will be using your classroom as a model.

However, before moving forward with this proposition, we need your help. Your job will be to research and record the information needed to fulfill this proposal. You will research coins from different countries, including, but not limited to, Great Britain, Japan, Canada. You will have three days to gather this information and submit to us which country has the the cheapest coin to use, and what the cost would be to title your classroom floor and walls with that coin.

We thank you for your participation and support, and look forward to hearing from you soon!

Warm regards,

The Board of Directors of Green Street Academy

Day One Checkpoint!

Name: Date:

Group members:

1. What country did your group select?

2. What did you research today? What have you measured today?

3. What do you still need to investigate during our next class?

4. How is your group presenting your project to the class on day #3?

Day 2

Objective(s): Students will be able to research the diameters of specific coins from a specific country in order to calculate how many coins it would take to cover the area of various rectangular surfaces (floor and 4 walls). Students will be able to solve proportions by solving ratios related to currency. Students will build their knowledge of the concept of surface area by investigating their classroom.	
Common Core Standards: CCSS.Math.Content.7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. CCSS.Math.Content.7.G.B.4 Know the formulas for the area and circumference of	**Standards for Mathematical Practices:** Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Model with mathematics. Use appropriate tools strategically. Attend to precision.

a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.Math.Content.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.	

Required materials:	**Safety considerations:**	**Technology Integration/Needs:**
Measuring Tape Yard Sticks Laptops Markers Plain Poster Paper	Students trying to measure the walls may prove difficult, as they are middle schoolers and therefore may not be tall enough to reach all the way up. A solution to this is to use a yardstick at the top of the wall, then from there down use a measuring tape. This provides structure where they cannot reach.	Laptops for research Projector

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions. Include timing/pacing, adaptations (IEP, ELL, culture, other) and transitions.
(15 minutes)(65 minutes left)

On the second day, we will give the students a more advanced question that incorporates both surface area and proportions. The question is attached, and students will have 7 minutes on a timer to complete the problem. Then we will go over the warm up as a class, having students describe how they did the problem and why their answer is correct, then have the class agree or disagree with the instructional strategy that the teacher uses (a thumbs up or thumbs down), and then if there are any disagreements we will review why and how the answer was achieved.

After the warm up, we will have students share their thoughts about their investigations from Day 1; what they did, what they may have discovered. Then the driving question will be presented and students will continue with their investigation (Explore 2). **(How much money do we need to tile the classroom floor and walls with coins?)**

WARM UP: Matthew has two boxes to keep his baseball hats in. The first one, which is smaller, has a height of .5 feet, a width of .5 feet, and a length of 2 feet. The second larger one has a height of 24 inches, a width of 24 inches, and a length of 96 inches. What is the ratio of the two surface areas?

- *"How do we solve this problem?"*
  - Plug the information into the formula, so 2(96in)+2(24in)+2(24in)=288 inches and 2(2ft)+2(.5ft)+2(.5ft)=6 feet. But we can't compare inches to feet, so we convert the feet to inches and 6 feet is 72 inches so the ratio is 72:288.
  - The ratio is 1:4 because 72:288 can be simplified.
  - We convert the inches to feet. 288 inches is 24 feet so we have 6:24 as our ratio which simplifies to 1:4.
  - Or we could represent it as a fraction, so the smaller box is ¼ the size of the bigger box or the bigger box is 4 times as big as the smaller one.
- *"How can you check to see if your answer is correct?"*
  - Use another method to check, like if you converted wrong if you convert the other one then

the answer won't be the same

- *"Thumbs up or thumbs down if you agree with the answer."*
- *"If you have your thumb down, why?"*
- *"Who would like to share what they thought about their group investigation last time? What did you investigate, what did you discover, what you still need to find."*

Differentiation: Thumbs up thumbs down allows shy students to participate without having to talk in front of the whole class; sharing thoughts from last time could give groups the opportunity to bounce off each other so more students get the opportunity to talk; use of a timer allows chunking.

EXPLORE/EXPLAIN Cycle(s)

EXPLORE: Include description of student centered tasks with information on timing/pacing, differentiation, material management, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions.

Explore 2 (25 minutes)(40 minutes left): Students will continue (they should begin this on day one) investigating the driving question. **(How much money do we need to tile the classroom floor and walls with coins?)** They can do this in whatever order they would like. They may start on the laptops researching the coins from their chosen country, or they may start by taking the dimensions of the room (floor and all 4 walls). Each student will be required to have all information written down in their own notes. (This will begin on day one, and continue on day two). By the end of the investigation, students should know which coin from their specific country is the cheapest one to use, and exactly how much it would cost in American dollars to tile the classroom floor and wall with that coin.

- ***"****Use your group! If you need to, have your group members all working on different things at the same time!"*
- Use a timer to make checkpoints for students: *"By this time, you should have the [blank]part of your investigation done. If you were measuring, or finding ratios, or looking up diameters of coins, you should be done what you were just working on. Now you should be moving on to the next step of your investigation.*

Differentiation: Groups are allowed to start off from their previous investigation, again in whatever order they want. Then the use of the timer every minutes chunks the content so students don't get overwhelmed with the amount of work they need to do. Separating the work also lightens the load on individual students.

Transition: "By this time, you should be mostly finished getting the information you need to make your presentation for the class."

EXPLAIN (STUDENT CENTERED): Include description of cognitive outcome (concepts and vocabulary), student centered explanation (tasks) with information on timing/pacing, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions. Also include "look fors" and how this part helps students "bring the pieces together".

Explain 2 (20 minutes)(20 minutes left): Once the groups have gathered all the information they need, from various sources, they need to take time and do the math for solving the problem. This includes

- the total surface area of the classroom
- how many coins it would take to tile the classroom
- how much money in total it would cost (amount of money being tiled)

ELABORATE: Include description of applications and extensions tasks with information on timing/pacing, differentiation, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions.

Elaborate (10 minutes)(10 minutes left): After the group finishes gathering all of their data, and finds which coin is the cheapest one from that country to use, they will begin constructing their presentation. This may be done on PowerPoint, Prezi (using their laptops), on a poster (materials will be provided), or another medium which was approved on the first day. Their presentations must include the following

information:

- how much each coin from their country was worth,
- which coin was the cheapest,
- how much it would cost using that coin to tile the classroom.

(This will begin at the end of day two, and will continue at the start of day three). The timer will be set for 10 minutes.

Differentiation: The students chose their presentation mediums on the first day, if they choose to change to an electronic medium they can; the timer gives students chunking of the amount of work.

Transition: *"Start cleaning up whatever materials you used today, it's okay if you didn't finish the presentation!"*

COGNITIVE CLOSURE (aligned with objective(s):

Reminder: A learning ticket is not considered a cognitive closure by itself.

Check point two (last 7-10 minutes of day two): Students will individually fill out the slip of paper given to them by the teacher. They will write their name and the names of their group members on their paper. They will then answer the following questions:

- Which country are you investigating?
- Which coin from your country did you find to be the cheapest to use to tile the room?
- Circle the following that best describes how far you got making your presentations
    - (not started/just starting, started and about half way done, almost done/already finished).

The timer will be set for 7 minutes, and the checkpoints will be collected. Then I will project the common core standards related to this lesson and similarly to day 1, ask the students how they apply to the lesson today.

- *"Read these Common Core Standards. That's a lot of math language, isn't it? Who can paraphrase?"*
- *"How did we use these standards in the lesson today?"*

EVALUATE:

Diagnostic Assessment(s): I will be giving them a warm up question, to evaluate their understanding of proportions. The second day they will be given warm up about proportions, so that we can evaluate where the student's understanding is on that. If it happens that the students need more work before moving on, we will have time to review that as well.

Formative Assessment(s): Check point two (last 7-10 minutes of day two): Students will individually fill out the slip of paper given to them by the teacher. They will write their name and the names of their group members on their paper.

Summative Assessment(s): N/A

Timing/Pacing Adjustments (Slinky Time): Include a plan for how to adjust instruction if tasks take longer/shorter than anticipated: If student investigations take longer than planned, and the presentations are not started, then visual presentations will be scrapped and students will present their findings orally. If the investigations take shorter than planned, then we will have the students write short letters to the school board telling them what they have investigated and concluded, but this letter will be professional. This

will include which coin they were assigned, the ratio to American currency, the dimensions of their classroom, a summary of all their mathematical work, and then a conclusion of why the coin they chose would be the cheapest to use. (responding to the initial letter from day one).

Day One Checkpoint!

Name: Date:

Group members:

1. What country are you investigating?

2. Which coin from your country did you find to be the cheapest to use to tile the room?

3. Circle the following that best describes how far you got making your presentations
   a. Not started
   b. Just starting
   c. About halfway done
   d. Almost done
   e. Already finished

Lesson Plan SEMS 498 (Math)

Objective(s):
Students will be able to research the diameters of specific coins from a specific country in order to calculate how many coins it would take to cover the area of various rectangular surfaces (floor and 4 walls). Students will be able to solve proportions by solving ratios related to currency. Students will build their knowledge of the concept of surface area by investigating their classroom.

Common Core Standards:	**Standards for Mathematical Practices:**
CCSS.Math.Content.7.G.B.6 Solve real-world and mathematical problems	Make sense of problems and persevere in solving them. Reason abstractly and quantitatively.

involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. CCSS.Math.Content.7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.Math.Content.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.	Model with mathematics. Use appropriate tools strategically. Attend to precision.

Required materials:	**Safety considerations:**	**Technology Integration/Needs:**
Laptops Markers Plain Poster Paper	None for Day 3	Laptops for research Projector

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions. Include timing/pacing, adaptations (IEP, ELL, culture, other) and transitions.
(5 minutes)(75 minutes left)

We will review the launch letter (attached on first day), students will be given a presentation rubric and then students will go to their project groups to finish up the last of their math and work on their presentations.

- *"Get out the letter from the Board of Directors that you all got the first day of this lesson. Who can sum up what they stated in the letter?"*
- *"I am handing out right now a rubric for your presentations. You should absolutely base your presentation off of the elements of this rubric. Also, for privacy, your presentations if they are digital should be emailed to me or saved to a flash drive, that way when we present it will take less time to load."*
- *"Take a few minutes when you get with your teams to brainstorm how you are going to use this rubric in your presentation."*
- *"When I say go, get into your groups, have one person from your groups get whatever materials you need for today, and start working."*

EXPLORE/EXPLAIN Cycle(s)
EXPLORE: Include description of student centered tasks with information on timing/pacing, differentiation, material management, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions.

Explore 3 (30 minutes)(45 minutes left): Students will finish the last of their investigations into the driving question, and then, by this point, they should be working on their presentation, whatever it may be. Students will be given 35 minutes of the period to finish the presentations, set with a timer. For privacy's sake, the students will be instructed to NOT save the final presentation by their own individual email, instead save it to a flash drive or email it to the teacher. I will first set the timer for 10 minutes, and after those 10 minutes every group should be done with all investigating and all students should be working on the presentation. Then there will be 20 more minutes for making presentations. The students have already gotten a rubric today for them to use for their presentations.

- *"I am setting this timer for 10 minutes! After the 10 minutes are up you should be absolutely done*

with your investigations and start to work of your presentations if you haven't done already."

- *"10 minutes have passed, by this time all groups are working on presentations to share later today. Make sure you are saving them! You have 25 minutes to finish up."*

Differentiation: Students are able to work in small groups to provide every student with the opportunity to participate; the timer chunks the project so students don't get overwhelmed with work.
Transition: "There are 2 mintues left for finishing presentations. Please send them to my email or save them to a flash drive *now*."

EXPLAIN (STUDENT CENTERED): Include description of cognitive outcome (concepts and vocabulary), student centered explanation (tasks) with information on timing/pacing, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions. Also include "look fors" and how this part helps students "bring the pieces together".
Explain 3 (35 minutes)(10 minutes left): The presentation mediums were determined earlier in the lesson, and students will stick by that decision. Information that must be included is the types of coins that were available along with their worth, which coin ended up being the cheapest for the Board of Directors to use, and how much it would cost to use that coin to tile their classroom. The rubric for the presentation is attached. Of the 35 minutes allotted to present, each groups will have a cap of 3 minutes to present their findings, kept by a timer. For students who have their presentations online, there is extra time allotted for those groups to sign onto any online resource they chose, or they could put their presentation on a flash drive, or email it to the teacher. This has been instructed to them previously, multiple times. While the groups are presenting, the rest of the students will fill out a table given to them so they have a record of the different countries and coins, so the class can discuss the overall best coin to use (Attached).
Differentiation: Each group has 3 minutes to present to keep student's attention; all students have a worksheet to fill out; there are multiple representations of coins; use of a timer

ELABORATE : **Include description of applications and extensions tasks with information on timing/pacing, differentiation, grouping, adaptations (IEP, ELL, culture, other), probing or clarifying questions with answers, and transitions.**
Elaborate 3 (7 minutes)(3 minutes left): When all the groups are done presenting, as a class there will be a discussion about which coin would be the cheapest for the school board to use.

- *"So now we have seen all the presentations of coins to use for tiling the floor and walls, which coin is the cheapest to use and how do you know?"*
- *"Does anyone have a different thought?"*
- *"How can we use the method (surface area and proportions) in other situations like this? Does it have to be money that we're tiling?"*
- *"What other than tiling can you come up with for using surface area and proportions? Turn and talk to the person next to you, and be prepared to share your answers."*
- *"How can this relate to your community specifically?"*

COGNITIVE CLOSURE (aligned with objective(s):
Reminder: A learning ticket is not considered a cognitive closure by itself.
(3 minutes): Students will look back to the objectives and recall how they predicted we would complete them. Then they will discuss if they were correct/incorrect predictions.

- *"Who remembers what the predictions were the other day for completing the objectives of this lesson? Were they correct?"*

- *"How?"*
- *"How did we end up completing these objectives?"*

EVALUATE:

Diagnostic Assessment(s): The two previous lessons serve as diagnostic assessments because the lesson is ongoing with the same content.

Formative Assessment(s): Students will complete a table of presentation notes and one of the columns is "which coin is the best from this country and why".

Summative Assessment(s): To close the unit, students will be presenting their findings how they would like (powerpoint, poster, etc) and be evaluated on that presentation by a rubric that they are given (attached).

Timing/Pacing Adjustments (Slinky Time): Include a plan for how to adjust instruction if tasks take longer/shorter than anticipated:
If timer permits, during the cognitive closure we can talk about what they would change about the project. If student investigations take longer than planned, and the presentations are not started, then visual presentations will be scrapped and students will present their findings orally. If the investigations take shorter than planned, then we will have the students write short letters to the school board telling them what they have investigated. (Responding to the initial letter from day one).

Math - Problem Solving : PBl

Teacher Name: **Emily and Lexi Trumble and Kramer**

Student Name: _____

CATEGORY	4	3	2	1
Mathematical Reasoning	Uses complex and refined mathematical reasoning.	Uses effective mathematical reasoning	Some evidence of mathematical reasoning.	Little evidence of mathematical reasoning.
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem (s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem (s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem (s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem (s) OR is not written.
Explanation	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand, but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
Strategy/Procedures	Typically, uses an efficient and effective strategy to solve the problem (s).	Typically, uses an effective strategy to solve the problem (s).	Sometimes uses an effective strategy to solve problems, but does not do it consistently.	Rarely uses an effective strategy to solve problems.
Neatness and Organization	The work is presented in a neat, clear, organized fashion that is easy to read.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in an organized fashion but may be hard to read at times.	The work appears sloppy and unorganized. It is hard to know what information goes together.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.

Date Created: **Mar 07, 2017 06:18 am (CST)**

<u>Presenting: Coins of the World!</u>

Name: Date: Period:

Country	Best Coin Group 1	Best Coin Group 2	Best Coin Group 3	Best Coin to use and why
Great Britian				
Ethiopia				
Canada				
Germany				
Japan				