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| **Fellow Name: Stephanie Godsey** | **Contact Info: godseysn@mail.uc.edu** | **Date: 1/21/14** |
| **Teacher Name: Bob Leugers** | **School Name: SCPA** | **Grade and Class: 9th grade Honors Geometry**  |

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| **Activity Title:** | **Cost Estimate**  |
| **Estimated Activity Duration:** | **3 class periods (45 min)** |

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| **Setting:** | **Classroom** |

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| **Activity Objectives:** |

The student will be able to:

1. Find the areas of various shapes
2. Convert areas to a realistic cost of construction
3. Relate geometric shapes to the field of civil engineering

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| **Activity Guiding Questions:** |

How do you determine the cost of constructing a performing arts theater? What does a civil engineer do?

| **Next Generation Science Standards (NGSS)**  |
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| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| ☐ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☒ Developing and using models | ☐ Cause and effect |
| ☒ Planning and carrying out investigations | ☒ Scale, proportion, and quantity |
| ☒ Analyzing and interpreting data | ☐ Systems and system models |
| ☒ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☒ Constructing explanations (for science) and designing solutions (for engineering) | ☐ Structure and function.  |
| ☐ Engaging in argument from evidence | ☐ Stability and change.  |
| ☒ Obtaining, evaluating, and communicating information  |  |

| **Ohio’s New Learning Standards for Science (ONLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☒ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☐ Demonstrating Science Knowledge **(D)** |
| ☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

| **Common Core State Standards -- Mathematics (CCSS)** |
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| **Standards for Mathematical Practice (Check all that apply)** |
| ☒ Make sense of problems and persevere in solving them | ☒ Useappropriate tools strategically |
| ☒ Reason abstractly and quantitatively | ☐ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☒ Look for and make use of structure |
| ☒ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, ONLS and/or CCSS):** |

Computing mathematic equations, problem-solving and finding the areas of geometric shapes.

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

Example floor plans, blank graph paper, pricing sheet, estimating sheet, ruler and calculator

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| **Teacher Advance Preparation:** |

Create handouts and prepare an explanation of civil engineering

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| **Activity Procedures:** |

Day 1

1. Hand out pre-test.
2. I will give a brief explanation of civil engineering and how the construction process works.
3. I will hand out examples of performing theater floor plans. They will use the example to create their own theater floor plan.
4. On the board we will create a list of what needs to be included in the floor plan, such as restrooms, changing rooms, stage, etc.
5. I will pass out graph paper and rulers and with a partner, they will create their own floor plan. They will be advised to use shapes in which they can find the area

Day 2

1. The next day Mr. Leugers will continue to allow them to work on the floor plans. The students will re-design or make the necessary adjustments to create a floor plan with realistic room dimensions. This day I am unable to attend.

Day 3

1. I will begin with a review on the board of area formulas.
2. I will then do an example of how to find the area of a room and then calculate the cost of flooring in that room.
3. I will give them a paper that includes pricing for different types of flooring and they will assign different flooring to each room.
4. Next they will find the area of each room they have created and put a cost to the flooring they want to provide in each area. These calculations will be done on a sheet provided to them.

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

At the end of the day I will collect each group’s floor plan and review them to make sure they are doing what I asked of them. Throughout the class period I will also walk around and see how they are coming along and answer questions.

**Summative Assessments:** Prepare a Pre-Test and Post-Test with the input of the RET Teacher. This should be a simple 10-12 question assessment tool. These questions will cover the content related to the Standards. The Pre and Post Test will be identical. There may be several summative assessments at the end of this Activity. Besides the Pre and Post Tests, the students might create a product for which this is a rubric developed. The rubric is also a summative assessment tool. Link the assessment tools.

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.Refer to Activity Template for details. |

I will ask Mr. Leugers to assign partners in a way he sees best fit for the students to learn.

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| **Reflection:** Reflect upon the successes and shortcomings of the Activity. This is done after the Activity is implemented. |

While planning and implementing my lesson I slowly began to realize that there is a lot more involved with teaching than I anticipated. It takes a lot of preparation and then takes real talent to keep 25 students attentive and interested.

 One thing I felt that I could have improved was my very first explanation of what civil engineering is. I wanted to make it a simple and concise explanation, but I think I over simplified it. After my lesson was over and Mr. Leugers and I were talking about it, he has suggested that I should have related civil engineering back to them more by saying examples like they work on the street car right outside of their school. I thoroughly agree that is exactly what I should have done.

 One problem I ran into that I wasn’t anticipating was a scaling issue. The graph paper had boxes that were too large to make the floor plan a scale of 1 block = 1 foot, which is what I anticipated on using. When the issue arose I told the students to use a scale of 1 block = 2 feet. Then students wanted an even bigger area so then I went back and said you can use whatever scale you want. I didn’t like that I said one thing and changed to another rather than being consistent.

 As the class periods went on through the day, my lesson improved. Practice does in deed make perfect. One thing that I was pleased about that I didn’t anticipate them learning was the fact that flooring and construction is extremely expensive. Multiple students kept mentioning how crazy it is that to tile a bathroom costs thousands of dollars. It put a realistic perspective on things for them and hopefully made them appreciate their performing arts theater a little more.

 Over all it went well. I give more respect to teachers because I realize now that it really isn’t an easy task to teach an orderly class. The thought of being a math teacher always crossed my mind when I was younger. However, after teaching this class I am glad that I chose civil engineering as my career path because I would not have liked being a teacher. Even though I didn’t enjoy teaching all that much, I am glad that I had the opportunity to do it because it satisfied my thought of once wanting to be an educator.