**LEWISBURG AREA SCHOOL DISTRICT**

**LESSON PLAN (LOW TECH)**

**Teacher Name: \_Nathaniel Nauman\_\_\_\_\_\_ Class: \_Trigonometry \_\_\_\_\_\_\_\_\_\_**

**Topic: Translate and Reflect Trigonometric Graphs Date of Lesson: \_12/07/2012\_\_\_\_\_\_\_\_\_\_\_\_**

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| **LESSON ESSENTIAL QUESTION**: | How are trigonometric graphs translated and reflected? How can these translations and reflections of trigonometric graphs be applied to real world problems? |
| **STANDARD / LEARNING TARGET:** | Identify, analyze, solve and draw translated and reflected trigonometric graphs. |
| **ACTIVATING STRATEGIES**:  (Anticipatory Set) | As students walk into the classroom I will be greeting them while having some light instrumental music playing (loud enough to notice but quiet enough to not disturb anyone) on my I-pod, laptop or a computer. Once the class officially begins I will stop the music, officially introduce myself to the class, and ask if anyone has any idea why I was playing music earlier. I do not expect to receive an answer from the students, but if I received a correct response I would happily weave it in at this point. Then I would start to talk about how the pitch of all music is actually determined by the size of sine waves, where the wider a sine wave is, the lower the pitch is of a sound. I will continue by mentioning that trigonometry is also frequently used in astronomy, geography, architecture, engineering and physics. I will then mention that trigonometric graphs are very valuable because they have all of these applications. |
| **KEY VOCABULARY**: | Translation, Reflection, Amplitude, and Period. |
| **RESOURCES:** | An I-pod/Laptop to play music on (can bring myself), light instrumental songs (can bring myself), White Board/Black Board, White Board Markers/Chalk, White Board Eraser/Black Board Eraser, and Exit Slips (can print myself if necessary). |
| **TEACHING STRATEGIES**: | After this I will write up the general form for Translations of Sine and Cosine Graphs and the four steps to solve and graph such translations (pg. 915 in textbook). While doing this I will quickly review what the amplitude and period are since they should have learned about this in the last class. I will then ask students if they have any questions, answer any questions I receive, and then write a translation problem on the board. This first problem I will solve on the board while asking for student input/suggestions when reasonable. After answering any questions students may have, I will write another problem on the board and ask them to solve it, making sure to tell them that they are welcome to ask there neighbors for help if they wish (for this and all of the other problems). While they are working on this problem I will walk around the room and answer student's questions and give students advice to correct any mistakes students make. I will then work through the problem by asking students to tell me what to write. If some students seemed to struggle with this problem then I will write up a second problem for students to work on, otherwise I will continue. Then I will write up a word problem involving translations of a sine or cosine function and ask students how comfortable they feel with trying to translate this question into mathematical terms. If I receive a positive response then I will let them do it, otherwise I will translate it while asking students for input. At this point I will have students work on the problem while I walk around and help students like before. I will then work this problem out on the board with students telling me what to write. Then I will introduce reflections of sine and cosine graphs and the general form that they are written in, making sure to note that this is just the same form as was used for translations but having a < 0, while drawing graphs to visually show what is happening. I will then write a problem on the board that involves both translations and reflections. I will walk around and help students as before while they are working on this problem. I will then have students direct me as I work this problem out on the board. Now I will introduce translations and reflections for tangent graphs, explaining that we do the same things as before, just this time to a tangent graph. Then I will write a tangent translation and reflection problem on the board and ask students to solve it. Then I will walk around and help students as usual, and then have students direct me as I solve it on the board. |
| **EXTENDED THINKING ACTIVITY / ASSIGNMENT:** | If there is some extra time then I will provide students with another word/application problem that uses tangents. Once again, if they are not comfortable translating the problem into mathematical terminology, then I will do this on the board with student input. If there is still more time then I will encourage students to start working on their homework. |
| **SUMMARIZATION/ CLOSURE:** | Once a few minutes are left before the end of class, I will hand out exit slips that ask students:  (1) What is something that you learned in this class?  (2) What is something that you liked or found to be interesting about this class?  (3) What is something that you did not like or found to be boring about this class?  (4) What might you like to do in this class in the future? |