**Lesson Title: Laser-Tag-Mania!**

**Unit Title: Creating and Graphing Equations**

**Teacher Candidate: Nick Spencer, Bill Munson**

**Subject, Grade Level, and Date: Algebra, 8th Grade, February 4th 2017.**

**Placement of Lesson in Sequence**

Lesson 3 of 3

**Central Focus and Essential Questions**

The central focus for this lesson is to have students create and graph equations using our story problem and geogebra to practice using technology with mathematics. Then evaluate them based on their real world application to the story problem.

**Content Standards**

CCSS.MATH.CONTENT.HSA.CED.A.1

Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.

[CCSS.MATH.CONTENT.HSA.CED.A.2](http://www.corestandards.org/Math/Content/HSA/CED/A/2/)

Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

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| **Learning Outcomes** | **Formative Assessment Process** |
| Students can create their equation from the story problem and then accurately graph it using geogebra | Their will be a poster with all the vocab words  And their meaning in the room and while i move around the room listening to student conversations i will remind them to use the vocab words and where they can find them. |
| **Success Criteria** (method and criteria for interpreting student success in relation to learning target) | **Plan for Providing Feedback to Students** |
| Each group will write their equation and graph on the board and their success will be evaluated based on whether the graph matches the equation. | Feedback will be provided to students based on the recording sheet that they turn in at the end of the lesson. |

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| **Learning Targets** | **Student Voice** |
| -I can create an equation based on a story problem  -I can make a graph to match an equation using geogebra | -Each group gets to choose their own numbers for the story problem  -class discussion about which equation would make the best game of laser tag. |

**Prior Content Knowledge and Pre-Assessment**

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| **Academic Language Demands** | | |
| **Language Function** | **Vocabulary & Symbols** | **Secondary Language Demand** |
| - Students will accurately use vocab words to describe their thoughts during group and class discussions.  - Students will be able to write down their reasoning for which numbers they picked and what their graph shows. | · Equation  Graph  Variable  Slope  Y-intercept  X-intercept  Rate of Change  Linear  Positive  Negative  Initial value | **Mathematical Precision:**  Students will need to correctly label and use vocab words during discussion.  **Syntax:**  -Students can use y=mx+b equation form.  -Students can make a graph or a y=mx+b equation  **Discourse:**  -Students will have the opportunity to work as a group to make their graphs and equations  -As a class we will discuss what each graph and equation would mean for a real laser tag game. |

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| **Language Target** | **Language Support** | **Assessment of Language Target** |
| -I can use the vocabulary words correctly to explain my thoughts.  -I can explain my thoughts through writing | Student vocab will be on a poster in the room so that they can see it to remember words and their meanings. | Student vocabulary during discussions will be assessed informally by the teacher who will be walking around the room listening to student conversations.  -Student writing will be assessed using the recording sheet that they turn in at the end of the lesson. |

**Lesson Rationale (Connection to previous instruction and Objective Standards)**

This lesson gives students a chance to practice creating equations and use technology to make graphs of them. Then once they have the graph and equations they will be able to see each others graphs and as a group the students will discuss the meaning of the equations based on the story problem provided. They get a chance to evaluate the graphs data as applied to the problem to pick which situation they like best.

**Differentiation, Cultural Responsiveness and/or Accommodation for Individual Differences**

Differentiation will be used by putting the students in groups of various skill levels, so that the students can hear different levels of thoughts, ideas, and feedback to maximize conceptual understanding.

For students who speak another language, the instructions and materials will be provided in appropriate languages to ensure student success. Laser-tag was chosen to target the 8th grade age-level because many kids find this game fun and entertaining.

**Materials – Instructional and Technological Needs (attach worksheets used)**

iPad for each group, markers for the white board, white board, recording sheets for each group.

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| **Teaching & Instructional Activities** | | | |
| **Time** | **Teacher Activity** | **Student Activity** | **Purpose** |
| 5-10 Minutes | Warm-Up Activity: As students enter the room, the teacher has two different story problems on the overhead projector of which the students individually must find the slope and initial value of each problem, and record their answers on a sheet of paper.  During this time the teacher will take attendance, and then when most or all of the students seem to be done, the teacher will ask students to raise their hand and give the answer for each of the story problems and explain why they know their answers are true. | Students will enter the room and head to their seats and await instruction. Once instructed to complete the warm-up using their own sheet of paper, they will find the slope and initial value for each problem and then give the teacher their answer and explanation when asked for it. | The purpose of this warm-up activity is for the students to be mentally refreshed with identifying slopes and initial values, as in the main activity they will be deciding their own slope and initial value to complete the assignment. |
| 25-30 Minutes | Laser-Tag-Mania! Activity: The teacher will break the students into groups of 3 or 4. Then the students will be given the recording/instruction sheet, and the teacher will explain that the students are “going to play laser-tag”, and must decide their own values for initial life points (initial value/y-intercept) and their damage per laser-shot (slope).  Each group can choose any values they want. Then the teacher will give each group an iPad equipped with the Geogebra app, and tell the students that they must graph their equation using the app.  Their equations must be in the form of y=mx+b, and must logically make sense.  After the students decide their values and plug them into their equation, they must graph them using Geogebra to answer the question on their sheet “How many shots can somebody take before they lose?”.  Once the students find their answer using Geogebra, they record their answer and explanations on their recording sheets that were provided. | Students will get into the groups assigned by the teacher, and each group will receive the recording sheet with the activity information. After listening to instruction, the students will read the laser-tag story problem, and come up with some values of their choice to complete the story.  After choosing the initial life points and damage per shot value, students will plug this information into a y=mx+b equation. After the equation is complete, the students will plug it into Geogebra, and figure out by looking at the graph how many shots one can take before reaching 0 life points.  After figuring out how many shots will equal 0 life points, the students will record their answer on their sheets, and then write their explanations at the end of the worksheet. | The purpose of this activity is for students to use their conceptual understanding and procedural fluency of solving story problems using equations to help them create an equation using their own values to develop and use mathematical reasoning through mathematical modeling. |
| 10-15 Minutes | Closing Section:  The teacher will instruct groups to finish up their explanations, and then have each group draw their graphs on the board with their equation written. After the graphs are drawn, the teacher will go through each graph asking the class “Who would play a game of laser-tag using these values?” and then call on a couple students to explain why. The teacher then will call on a student or two that did not raise their hand for each graph, and ask them “Why wouldn’t you play this game using those values?”.  After each graph has been discussed, the teacher will collect each group's’ recording sheets before the end of class. | The students will go up to the board and draw their graphs that Geogebra provided them and write the equation that was used.  Students will then raise their hand for each graph that the teacher points at if they like it, and give a reason for why they would play that game using those values, or why they would not play that game.  Students will then give the teacher their group’s recording sheets. | The closing section of the class is being used as a type of formative assessment in which the students use their own voice to explain why they did or did not like the values of each graph using mathematical reasoning and explanation. |

Group-Members: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:

Laser-Tag-Mania!

Explanation:

You and each of your group-members are about to play an epic game of laser-tag. Assume you have \_\_\_ life points upon starting the game and each time you get shot you lose \_\_\_ life points. Choose your own values for the blanks above, create an equation using those values for the y=mx+b equation, and graph your equation using Geogebra. Based on your graph, how many times can one person be struck with a laser before they lose?

Shots taken to hit 0 life points left:

\_\_\_\_\_\_\_\_\_\_\_ Shots

Why did you choose these values? Would you want to play a game of laser-tag using these values? What is a positive thing about these values? A negative thing?