Scale Unit Plan

[Math Unit Focus](#)	[Science Integration](#)	[Engineering Practices](#)	
Unite Name: To Scale **List KY math standards** **KY.HS.G.9** Understand properties of dilations. a. Verify the properties that result from that dilations given by a center and a scale factor. b. Verify that a dilation produces an image that is similar to the pre-image. **KY.HS.G.12** Understand properties of right triangles. a. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent).	**List NGSS standards** **HS-ESS-4** Use mathematical or computational representations to predict the motion or the orbiting objects in the solar system.	**List engineering practices from NGSS** **Models may include anything from diagrams to physical replicas, mathematical representations to computer simulations. The importance of building models has to do with bringing certain ideas into focus while obscuring others. All models contain limiting approximations and assumptions, which is important for the student to recognize.**	

T i	Unit Goals with Measurable Outcomes + *STEM Integration*	Student Learning Targets	Essential Questions + [Assessment](#)	5E Connections + [Samle Activities](#)	[Intervention Strategies for Target Groups](#)
L a	**applicable math standards** #5 use appropriate tools strategically. #4 Model with mathematics. **Goal** The goal after day one is that students are able to interpret and understand the appropriate vocabulary.	I can identify proper vocabulary for scale models to a 95% accuracy. I can identify the properties that make a similar polygon to a 90% accuracy.	Why is it helpful to be able to identify if two polygons are similar? There will be an exit slip, whey they will have to write one definition discussed today and one similar postulate discussed There will be a quiz at first day of the unit and given again to after we are complete to determine the amount of growth for this unit.	I will start my lesson by showing them a road map of Kentucky (https://geology.com/cities-map/kentucky.shtml) and explain to them how it is a smaller version of what we drive on. This is my engaging on my 5E because students will be able to start identifying these concepts to real life. I will then ask them how to make a guess on how	After looking at the exit slip I will be able to identify the students that are struggling so that I am able to put them in groups to help going forward.

			small the vehicle will have to fit on the map? We will have a discussion about this.	
applicable math standards #1 Make sense of problems and persevere in solving them #4 Model with mathematics. **Goal** For today students should be able to set up a ratio to solve a proportion.	I can set up and solve proportions using ratios to a 85% accuracy.	Why should you be able to set up and solve proportions? There will be a simple in class assignment with 5 problems to practice setting up and solving proportions.	I will start my lesson this day with guided practice to be able to demonstrate to the students how to set ratios to solve proportions. After we have done a few problems I will ask the students why they should be able to identify proportions? After I get conversations going I will show them our State on a map, I will then show them the United States, the world then the sun and planets and finally the Milky Way. This will also fall into engaging in the 5E because students will be able to discuss and see how this plays into how large things are.	All examples will be recorded on the active board as they are worked and uploaded to google classroom so that students are able to go back and look at as needed.
applicable math standards #1 Make sense of problems and persevere in solving them #4 Model with mathematics. #5 use appropriate tools strategically. **Goals** Students should be able to solve problems asked and to be able to draw the circles correctly.	I can identify proper vocabulary for scale models to a 95% accuracy. I can identify the properties that make a similar polygon to a 90% accuracy. I can set up and solve proportions using ratios to a 85% accuracy. I can draw circles to the correct scale using a compass to a 95% accuracy.	How large is our planet compared to others? Students will be given the page that has 1 in the top right corner of the following document. https://www.nasa.gov/pdf/724927main_Mars_Math.pdf	Students will be asked to identify how large Mars is. They will also be asked to draw circles with the correct scale and proportions according to the information. This will fall into the exploration of the 5E because students will be learning the size of the planets compared to each other.	Students will be strategically placed into groups so that stronger students are placed with others that need more help.

applicable math standards #1 Make sense of problems and persevere in solving them #4 Model with mathematics. #5 use appropriate tools strategically. **Goals** Students should be able to solve problems asked and to be able to draw the circles correctly. Build 3d Model out of playdough. Day 4 they should have all questions answered and most half of the planets drawn on graph paper. Day 5 they should have all planets on graph paper and stared	When presented with written directions, students will be able to follow and accurately calculate the diameter of the circles for their model with 95% accuracy When presented with written directions, students will be able to manipulate fractions to make proportions with 95% accuracy. When given a proportion, students will be able to solve for a missing variable with 95% accuracy. When students are presented with questions from the lesson, they will answer with 80% accuracy using the models they have created..	How large is our planet compared to others? Students will be given the page 1 How big is Mars answer key with the scale at the bottom. They will also be given the Page two Planet fractions and scale. Day 4 they should have all questions answered and most half of the planets drawn on graph paper. This will be for a daily grade and monitored. Day 5 they should have all planets on graph paper and stared This will be for a daily grade and monitored.	Students will be engaged with hands-on activities. They will be given the data in the form of directions they are able to use to draw out and create a visual model. They will have to be able to interpret the information to be able to make a model on paper using a compass and graphing paper. This visual created by the students will help them to engage by giving them a self-created hands-on model to assist with answering questions from the lesson. This remains in the Explore area of the 5E students will still be gathering data and making their drawings.	Students will remain in the same groups as the day before and work together.
applicable math standards #3 Construct viable arguments and critique the reasoning of others. **Goals** Students should be able present their information and paper models explaining their scale. Students will be able to give constructive feedback.	Students should be able to correct their paper models with feedback from others to 100% accuracy.	How large is our planet compared to others? Students will get feedback from others and correct any mistakes. Feedback will be given with all work shown.	Students will present their findings and scale models of 2D papers. This falls into the Explain in the 5E.	Students will remain in the same groups as the day before and work together.
applicable math standards #4 Model with mathematics. **Goals**	Build 3D model to 90% accuracy.	How large is our planet compared to others?	Students will build 3D models. This falls into the Elaborate in the 5E	Students will remain in the same groups as the day before and

	Students will be able to look at corrections and build a 3D model out of Playdough			student will be given time to make 3D models based on their feedback.	work together.

Day 9
At the end of the activity or possibly the next day I would pull random students to interview and ask the following questions.
1. On a scale of 1 to 10 how well did you enjoy the activity?
2. Do you feel you knew enough about the information to be able to answer the questions?
   a. If yes, what was the biggest help in this activity?
   b. If no, in what areas do you feel you need more understanding?
3. Do you have a better understanding of how scale models are designed and constructed?
4. Do you feel you are better prepared to understand a scale model in real life?
   a. If yes, what was the biggest help?
   b. If no, with which concept do you feel you need more instruction?
5. On a scale of 1 to 10 how much did you enjoy having some science in the math classroom?
6. Please describe what you thought went well in this activity.
7. Please describe 2 things you would like to see improved with this activity.

To determine if this enhanced the understanding of the concept, students will be given a quiz before the activity takes place. After the activity, they will again be given the same quiz to see how well the activity increases understanding of the concept. This will fall into the evaluate part of the 5E so I will be able to see the amount of growth and the final results of the 3D models.