Cover Letter:

This unit began with a review (at least for me) of the Pythagorean theorem and coordinate geometry. The main ideas that were covered in this section were perpendicular and angle bisectors, the distance formula, midpoint formula, and how the distance formula is derived from the Pythagorean theorem. We were looking for these concepts as they are the foundation of how we solve the unit problem. We explored these concepts the most with the assignments, "The Sprinkler Dilemma" where we were given 2 points, 3 points and, x points, and we had to find a place that was equidistant from all those points, and the POW "Fire Fire" where we had to find a point equidistant from a number of lines.

We moved on after this to dive into circles and the square-cube law. The square-cube law tells us that the surface of the 3d object scales at the square of its length (or radius in the case of a cylinder), and the volume of that object scales at the cube of its length (or radius in the case of a cylinder). We explored this through the "Length, Perimeter, Area, and Volume" assignment where we basically proved what I stated above. Finally, we moved on to solve the unit problem.

Throughout all of this Julian continually asked us to present proof. As part of this, we analyzed the ways other people prove their point in our data primer assignment, where we chose an article with a graph or statistics, and we analyzed those statistics, and how they were used to prove that person's point. We also learned to create geometric proofs to justify our work. You start by solving the problem, then you work backward with a general case, and use that to show how you are right and why. A good assignment from this is one I will pull from honors where we had to prove that the medians of a triangle meet at a single point.

Throughout this unit, we covered the Pythagorean theorem and the basics of coordinate geometry, Circles, and the square-cube law, and the burden of proof on our journey to solve the unit problem.

The Unit Problem:

Introduction:

The Unit Problem for this unit involves 2 individuals who purchase a circular orchard with a radius of 50 units (a unit is 10 feet). They want to make this orchard into an orchard hideout, (where no one can see into the center, and if you are in the center you can't see out). Since this happens to be a perfectly geometrical orchard, the center of the orchard is on (0, 0), and all the trees are planted on whole number coordinate points. We are asked to find out how long it will take for the orchard that they plant to become a true orchard hideout.

Process and solution:

We begin by being given the following information: The cross-sectional area of a tree trunk increases by 1.5 square inches per year. Right now, the tree trunks each have a circumference of 2.5 inches. The unit distance [for instance, the distance from (0, 0) to (1, 0)] is 10 feet. The last line of sight is the line that goes from the origin through the point (25, 12).
We then must find out "how long after the orchard is planted will it become a true orchard hideout.
Our first step is to find the two trees that are nearest to the last line of sight. Those trees are at (1,0) and (49,1). We can prove this is true, by making sure that the line of sight goes through the midpoint of a line segment connecting the two trees. It does, as that midpoint is at (25, 1/2). We must then find the distance between one of the trees and the last line of sight. That distance is 0.019996 units. To see how why and how we do it this way, see fig 1. Now, to find out how much the tree has to grow to reach that line of sight, we must convert that to inches, giving us 0.19996 feet or approx 2.4 inches. Now that we have that, find the area of the trees and how much that radius grows per year, to find out how long it will take for that radius to get to 2.4 inches. That means that the tree has to get to an area of 18.088 inches^2. We have our starting tree circumference, so from that, we can deduce that the trees have a starting area of 0.497 in^2. Now like we said above for the trees to make an orchard hideout, they would have to reach an area of 18.088, we can construct the following equation with the information we've been given 18.088=0.497+1.5x where x is years. If we solve that, we get 11.73 years. So, the solution to our unit problem is "It will take 11.73 years for the orchard to become a true orchard hideout.

Selection of Work:

Perpendicular bisectors:
The sprinkler dilemma:
https://docs.google.com/document/d/1Rownjj-bzQP4XZGEwW4Oq6TJpzYWaixj_JJLsZsQ7TQ/edit

Distance and midpoint formulas:
Down the garden path:
https://docs.google.com/document/d/18U61M0R-Iun8DGmv8rrFQUZJozZFiKT_juAYh-iONzQ/edit

Angle bisectors:
Fire Fire:
https://docs.google.com/document/d/1bfYZN2E3MG8rzPcRfIwPTnU2803Je24SxOQCIFvADXo/edit
https://drive.google.com/file/d/1bcKLPmRPWJqFLM8UdW4UKXGTIlqJKuTJ/view
https://drive.google.com/file/d/1Tmasgpn_ELZtRp531F-XeIY6WNvxUD_5/view
https://drive.google.com/file/d/1oCEg76UR2R_b3RiN2-J5ViwiR6d5eXVx/view

Distance from a point to a line:
Orchard time for Raduis 3:
https://docs.google.com/document/d/1c2iENlHAfhy169k5FbH-3yEwGiYKSwgO7iwOVyeIDDo/edit

The Square-Cube Law:
The Square Cube Law, and Unpacking the Article:
https://docs.google.com/document/d/184-DFLjBrY2ps4Iol0Yf_-29KCemzkTQCjG6T2ICC3Q/edit
https://docs.google.com/document/d/1ibT9aEqH4zOSUmXDd9bmqgLBJ-rZ3Un5sCOtTxi3hoE/edit

Proof:
Data Primer: You Find the Data!:
https://docs.google.com/document/d/1fZzzGyVu5vm_mQGyy5sZzsy7C19OP5cmCRKUEbhBtWY/edit
Medians and Altitudes:
https://docs.google.com/document/d/11HIr06ImpC5woPlr4NtJvwXtzwpmij2ioTwFrQvifrM/edit
https://docs.google.com/document/d/1XR3bAg8y-tt7UVOCv6RbW1EzgN3rTnGedMeE_qSY6aU/edit

Reflection:

This unit did not really help to improve my understanding of the relationship between geometry and algebra. This in part is because of the knowledge I already had going into this unit, and how algebra and geometry at the basic level are closely related, and often you see elements of one in the other. It is, however, most likely because I found it really hard to be engaged in this unit. It moved very slowly, far more slowly than I would have liked, and that often resulted in boredom, when I had grasped the concept that we were studying and was ready to move on, but we still had another week to go on it. I had hoped that choosing honors track would mean some acceleration or even some work that was more challenging to do INSTEAD of the regular classwork, but all I found there was time-consuming work, that is slightly related to what we are doing in class, but just piled more work onto my workload. This also helped keep me from really engaging. Overall, my understanding of the relationship between geometry and algebra was not really improved or deepened, both because I struggled to engage in class, and because I already had a strong understanding of this relationship.

Despite what you may think, after the first 1 or 2 weeks, learning fully online was no longer a factor in my lack of engagement, and I actually found that I enjoyed learning from home more than actually going to school, as it gives me so much more freedom to do what I want when I want, and it does not constrain me to a specific time that I spend on each class. A great strategy that I found for learning at home was to look at the daily agendas, and then complete the assignments given there while the teacher is lecturing, or explaining the instructions on the assignment. This helped me to minimize my screen time, and keep me sane despite learning from home.

In this unit, I discovered that it is really important to find ways to keep yourself from becoming bored, as I learned a trait of mine is, I become bored quickly if I am not interested in the topic we are working on. A good way to do that, is as I mentioned above, getting the assignments done during class, as something to do to keep me from completely disconnecting. Overall this unit was a good learning experience for me to really find out more about the way I learn best, and how I can make sure that that is accommodated.

Fig 1: