Ewan Sutherland
Period 4

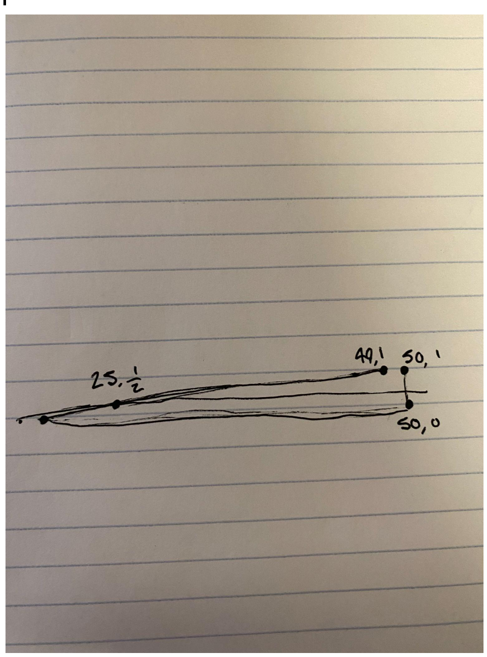
Introduction

In the problem of the orchard hideout, the main goal of these people planting the trees in their lot with the radius of 50 units (units are equal to 10 feet) is to have a center point that is blocked by trees so that all lines of sight into it will be blocked. They are doing this because they are very scared of the public eye and want to become hermits, but still live outside. So, what they want to know is that when they plant their trees at the beginning circumference of 2.5 inches, how long will it take for these planted trees to grow if they are growing by 1.5 inches every year and cover the last lines of sights.

Process and justification

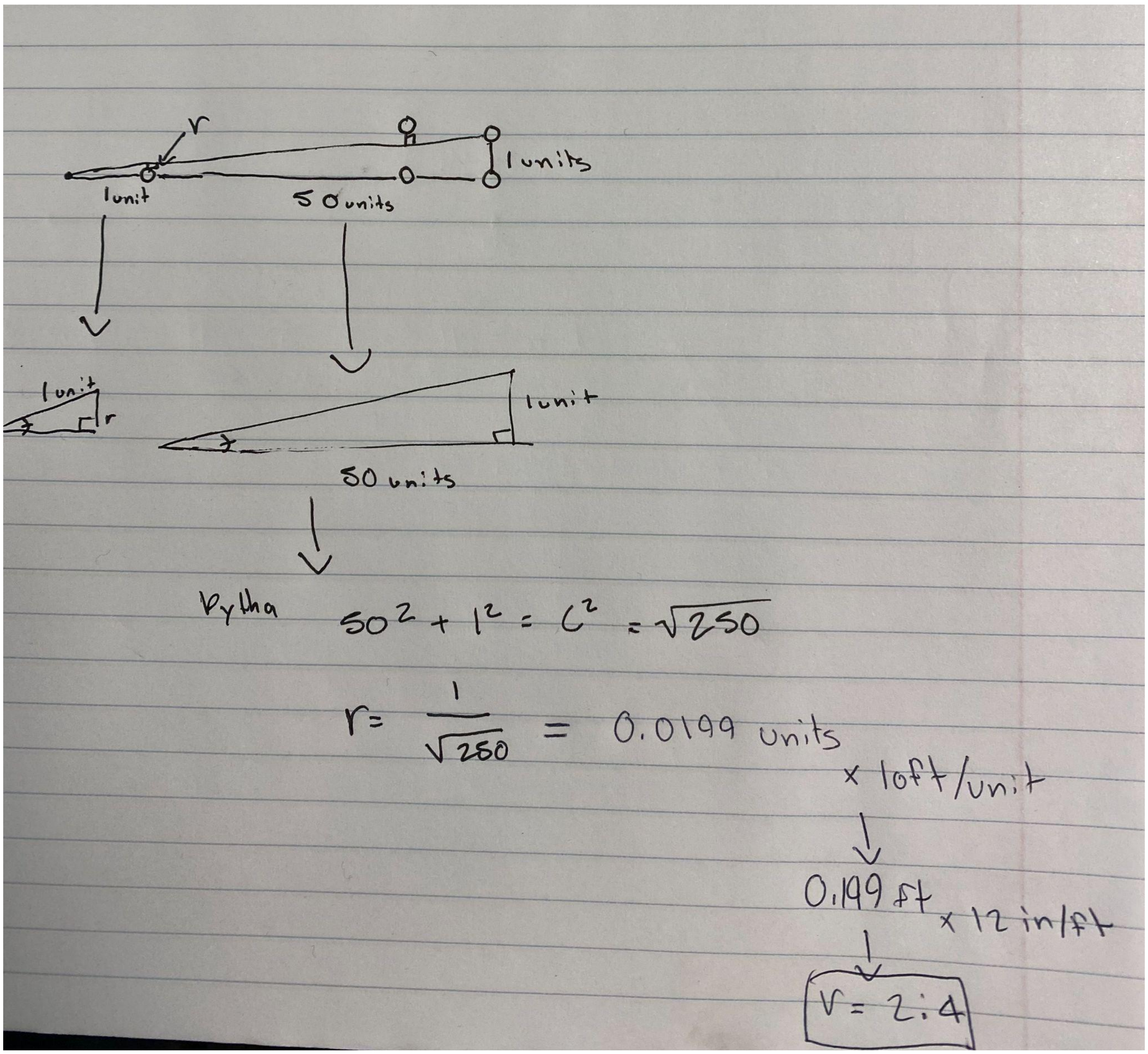
The first positive step toward the solution of this problem is finding the cross sectional area of a tree (keep in mind that we only need to find one tree as every tree in this problem is the exact same). What we know about the trees are in general 2.5 inches in circumference, this increases by 1.5 inches per year but that is non-important for now. It is then important to find the radius of these trees, we start by setting up the circumference formula C=2PIr it would be written in this scenario as 2.5/2=2PiR/2 which can then be transcribed as piR/pi = 1.25/pi which is equal to Radius = 0.3978. We can then plug this into our Area formula which is A=PiRsquared plug everything in A=Pi.3978squared = .4971 inches squared.

The next step to take from here is finding the last line of sight which is easily shown in a picture



The line of sight goes directly through that mid-point which is rested on (25,½). We do not know if this is truly the best line of sight though, because that is something which the math we are learning is not advanced enough to solve and some of the smartest mathematicians are unable to solve. I think this is the best line of sight because of our previous knowledge and work done on Orchards with radiuses of 2, 3, 4, and 6 where we used a similar concept to find the last line of sight. With this evidence of a pattern I think it is a safe assumption that this is a good last line of sight and I will be using it for the project.

Now onto the Similar Triangle part of the process. I have drawn a Diagram on how the similar triangles work together to prove the distance between (1,0) and (50,1) and I will work to explain these.



Starting from the top and going down we can see the full triangle made up of that little one and the big one a full 51 units that is 1 unit high. R is that little line that shows the distance between 1,0 and the line that goes through the midpoint aka the last line of sight, R is what we are trying to find as it will let us know how much distance is to be grown if it is to block that line of sight. So first we know that the hypotenuse on the little triangle is 1, we also know that on the big triangle the sides are 50 and 1. So first it is important to do pythagorean theorem ($A^2+B^2=C^2$)

with the sides on the big triangle, $50^2+1^2=250$ which is then equal to $\sqrt{250}$. Then we start a new equation R= $\frac{1}{\sqrt{250}}$, R is what we are trying to find, this is equal to 0.0199 units. We can do this whole process and know it is equal to R on the little triangle because these triangles are similar and we know this because they share the same angle at the tip of the little triangle; this is also the same tip shared by the large triangle. They also have 90 degree angles so they are similar.

Finally now that we have what R is equal to which is 0.0199 units we need this to be in inches though so we times 0.0199 by 10 feet per unit which is then equal to 0.199 ft, then we times that by 12 inches per foot. We now know that R= 2.4 inches, this is our radius and now we need the area of it so we plug it into the area formula, A=$pi \cdot 2.4^2$ = 18.1. For the final step now we divide 18.1 inches by the amount of growth per year which is 1.5 inches, and finally we end up with 11.7 years it will take for the trees to finish blocking the last line of sight.

Discussion

Coordinate geometry

The importance of coordinate geometry in this unit was not underlooked, it was a main point in the solving of the problem and the problem itself. The main things learned in this unit was finding the distance between these points through different techniques and equations. In example you could use pythagorean theorem to find distance just like we did the last line of sight problem shown above, or you could do it through the distance formula which is D=√(x2−x1)2+(y2−y1)2. We also used the midpoint formula, now we could just divide the give distance in half and place the midpoint there but that would be unfounded and maybe be exact but not entirely it also does not give us a point only number, so by using the midpoint formula $(x_1 + x_2)/2, (y_1 + y_2)/2$ we can get the exact half of both sides and the point in between both of those sides. Coordinates did also play a role in the entirety of the unit problem as we needed to find the distance between coordinates and lines using the skills we learned and that I just described above. In my selection of work you will find a paper demonstrating the Midpoint and distance formula which I just went over.

Circles, pi, and triangles

Before learning about pi and circles in this class I had an alright understanding of the formulas for area and circumference stuff like that. But, this class deepened my understanding of these topics and showed me different ways to find radius and circumference when you do not have all the pieces that you would traditionally use. It also taught me the connection between triangles and circles and the relationship they share. The one connection that I think was the most important was that by making a polygon inside a circle you can divide the sides into triangles and then use these triangles to find radius, area, and circumference. This was not something that I knew was a do-able and without learning this it would have been difficult to complete other assignments.

Proof

Proof was one of the most important things that we learned how to do in class because it provided evidence to our writing, that without it would prove our mathematical concepts and writings to not be trustworthy. So a proof is a necessity and it also demonstrates understanding of the concept. When developing a proof an important first step is to go through the actions that you took to get to your conclusion, this shows the audience your work and the thinking that went on with it. Then you go through what you did and why you did that for example 3+2=5, well I know that when you have 3 of an object then 2 you are able to have that equate to 5 because you essentially have 1+1+1+1+1=5 . I Know that this is a bit rudimentary so here is an example of a more complex proof that I wrote for Pow 2.

“. We know that since the angle bisector goes through the angle we now have two halves of that angle so we have that angle, we also formed right angles with the perpendicular lines that are formed off of the bisecting line, so now we have two angles. Since this is a right triangle we can use pythagoras theorem (A^2 + B^2 = C^2) to find the missing angle, now we have two right triangles that share a longest side and that longest side is the angle bisector. So by having two equal right triangles on both sides of the angle bisector, we can prove that the angle bisector is equidistant from the sides of the angle and so any points placed on the angle bisector line is equidistant to the sides of the angle.”

Reflection

Something that I learned for this unit is that paying attention in class is really not that hard but it is also very important to do so, because without the knowledge of what the teacher is teaching at the moment it can make it very difficult to do work properly. I also expanded my knowledge about geometry during this unit, coming from a traditional public school where we were taught very set in stone techniques for doing math. In this class though and in combination with this unit I was able to learn how to do math in a much more fluid way that made it actually easier. I also now have a better understanding of proofs and all around a better understanding of the concepts that we were learning because we were made to understand why we were doing what we were doing with formulas and such.

This unit was quite challenging though there were periods of times that I went without understanding the topic we were learning and at these times I would feel quite frustrated with everything going on. In the end though I would overcome these challenges and be able to understand what we were doing, most of the time at least. I won’t lie and say that one hundred percent of the time I always came to understand things completely but this struggle and lack of certainty is part of the learning process. Some of my work was a bit messy but I am quite proud of the Pows I did. I think that they look quite nice and are done well. In the end though there was uncertainty and there was completion, what I did is what I did, there is nothing that I can look back on and be disappointed with because what I did was to the best of my ability.