

## ***Math + Students + YouTube = Fun!!!***

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John C.D. Diamantopoulos, Ph.D.

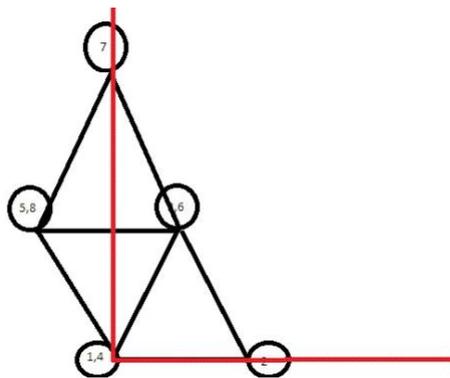
Northeastern State University

*diamantj@nsuok.edu*

It seems like as we get more technologically advanced, have more and more things going on in our lives and the lives of our students, we can't just count on the beauty of mathematics alone to attract in new students. It seems that students are increasingly wanting (or needing) new and creative ways to draw them into the discipline! Perhaps this might not have always been the case back in the day when there was no YouTube, Netflix, Facebook Twitter...or even SnapChat! Years ago, the beauty of a well-written proof of Cantor's Diagonalization Theorem for the countability of the rational numbers, or the excitement of seeing the construction of a solution in the Existence and Uniqueness Theorem for an Initial Value Problem in Differential Equations, might have been most "prime time excitement" anyone could take...there's so much competition for our time these days, we're always looking for more to draw/keep the student's attention.

It was while working on a totally different project with a colleague that the idea just came to me, or a way to educate a mathematical concept and have an education/interactive activity for the students that would be fun for all. I'm sure this could be done with virtually any mathematical topic, especially those that are highly visual, and have similar results in the end. What I will attempt to do here is outline the original motivation for the project, the planning and then the ultimate execution of the idea.

I was working on a project involving Maya geometry with a college friend, and we came upon the idea of how they used a ceremonial rope to verify a right angle; e.g., for purposes of construction. This rope has eight equally spaced knots (two knots on each end) separating the rope into seven equal segments. The knots were arranged in such an order that it stacked these equilateral triangles creating the visual-verification of a right angle. Our original plan was to create an animation to show this process, and once I learned a procedure to do this I created an animated GIF for this purpose. Here's a glimpse of that animation:



The full article in which this appears can be found at:

<http://www.maa.org/publications/periodicals/convergence/maya-geometry-in-the-classroom>

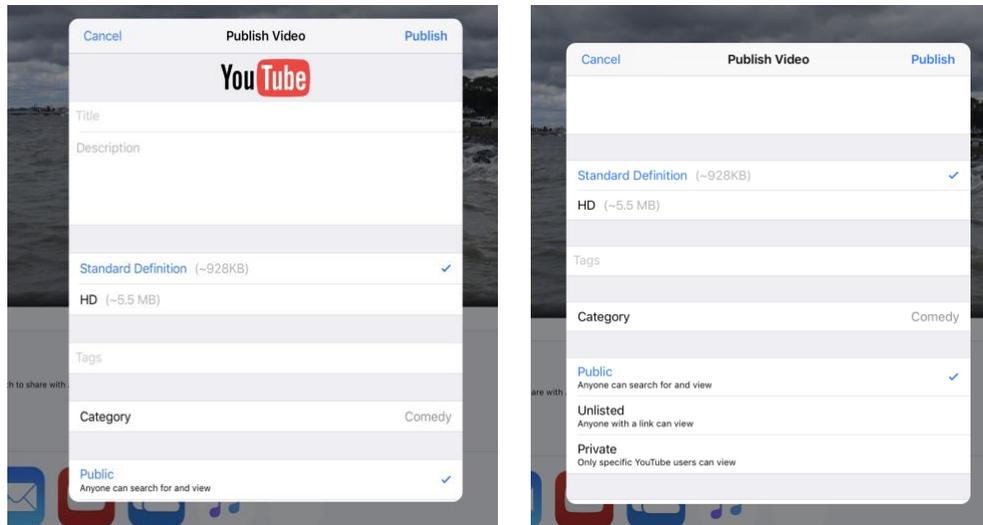
It was in the process of creating this animation that the idea just came to me, as if like a vision... I started seeing the dots relating to students, marching around for the formation/pattern that the ancient Maya described for verifying a right angle. Once this popped into my mind, I got very excited for the potential but knew I needed 3 critical things to pull this off... person, place and thing!

First, I needed to find a group of willing students to pull this off. Wow, finally a benefit of being a college professor... we're always around groups of students! I explained the process to one of my classes that semester and they seemed intrigued by the technique of the ancient Maya. I then explained I wanted them to be in the project and we'd be acting it out together...and they got very excited! So, the first of the main parts of the project was well in place. Also, I needed to find a time when we could all get together and not be rushed, but have time to make a quality project out of the learning experience. I decided to schedule this project for a day when a take-home exam was going to be given to the students, so our only mandatory class activity would be handing it out and discussing any immediate questions. Once that was done, we had the rest of the period to get to our site(s) and record the project. Secondly, I needed to find a location which would be large enough where they could "act it out" but also afford me a nice vantage point for recording their adaption to video. This was perhaps the hardest part of the project, since most anything I could find was too much of an extreme angle or too far removed from where the students would be located, to make a very compelling video. I actually didn't get final approval for my "ideal location" until the morning of the activity! It featured a walking area above on all four sides, with a full floor area in full view down below...PERFECT! And finally, I needed the right "thing" for the students to use to form the legs of the equilateral triangles and to "draw in" the right angle lines. I wanted something that would be bright and large enough to be seen in the video and easy to control/handle for the students. I ended up finding a bright yellow nylon rope, and taped off the eight equally spaced "knots", and some red ribbon to form the right angle lines!

Once I had all this planned out, the actual execution on that day was better than I could've imagined! The students really took ownership, actually made t-shirts with their "knot number", corresponding to the numbering of the circles/nodes in the image above, and one student even brought extra tape in case someone had forgotten their shirt at home; which was a good thing, since one student really did forget their shirt/number! We had a quick "run through", but then recorded their formation on video with my iPhone in each of the three site locations I'd found ahead of time. As I'd thought, the one I anticipated as my "prime location" was the best vantage point for the video (the others were either too far removed, or too cramped). And to think this "prime location" only got approval for our use as of that very morning! So...don't give up, just ask and hopefully your best location will be one that you're able to use for your project.

In the end, the video project was quite the hit with my students and every single person who saw the video recorded on my iPhone! In fact, I have some new project ideas that I'd like to do sometime soon...just have to work through the logistics of "how?". The final part of this that I'd like to talk about is the actual posting of the video; the students were very anxious to get access, so they could show friends or family! What I used was

YouTube, and the interface with the iPhone made this a snap. I just selected the video I wanted to use, chose to upload/share it to YouTube and saw the following options:



You're first given the options to include a title and description of the video...then select quality of the video that will be uploaded (caution, if you select the highest quality then be sure you have a high speed connection to YouTube!) and the category. Finally, and maybe most importantly, select whether it is *public* (anyone who searches YouTube can watch it!), *unlisted* (only those you send/share the direct YouTube link can view it) or *private* (only select YouTube users can view). For projects of this sort, I always have used *unlisted* because to use *private* you really need to know ahead of time exactly who is going to view the video; which was never my intent, I just wanted it "somewhat sheltered" from view and *unlisted* always seemed like the best option.

But I highly suggest you try such a project, I'm not even so sure what the students are doing is the most important part... They'll each take ownership in their part, and I think enjoy the entire experience. I think this is a perfect activity for a math club, or a history of math type of course, and gives a memory that you/they can keep or share for a lifetime! So, plan...execute and... ENJOY!