

Trigonometry Project

GOALS/PROJECT OVERVIEW:

Measure the height of various objects without getting up on a ladder. Use a clinometer and trigonometry ratios to measure really tall things!



WHAT YOU WILL NEED TO CONSTRUCT THE CLINOMETER:

1. Protractor
2. Straw
3. Scissors
4. Weight
5. String
6. Tape

WHAT YOU WILL NEED TO COMPLETE THE ACTIVITY:

7. Clinometer
8. Tape Measure
9. Paper
10. Pen or Pencil

PARTNER AND OBJECT GUIDELINES:

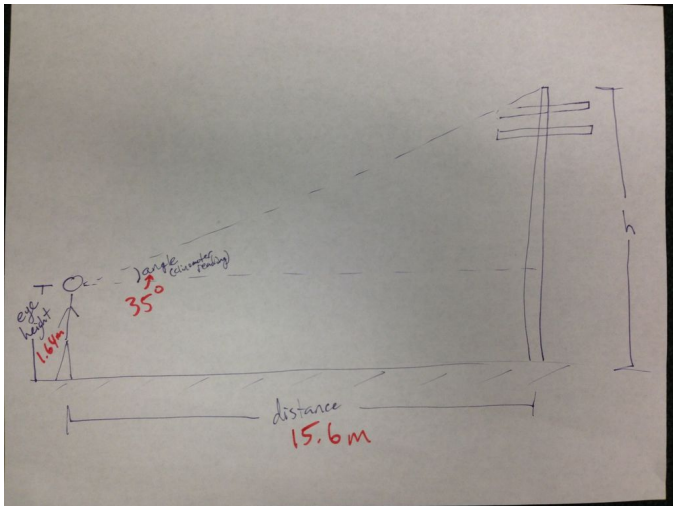
1. *PARTNERS:* You may work by yourself or with a maximum of ONE other student from any class. It is a lot easier if you have someone else to help you with measuring, but I understand that in this time of social distancing, that may not be possible. You can definitely use a sibling if you want!
2. *OBJECTS:* Pick out three different objects that would be difficult to find the heights of by simply measuring.

Good examples:

- The flagpole outside of Lindquist commons
- Your house, or a part of your house (if you have multiple levels with a roof)
- The football field uprights (the top of the fork-like object on the field)
- Anything else for what you have often wondered, "How tall is that?"

WHAT EACH PERSON/GROUP MUST DO:

1. Construct a clinometer. This must be turned in at the end as part of your project grade. View <https://www.youtube.com/watch?v=FVqNEBWH4B0> for some instructions.
2. Pick a spot to measure each object. You should be far enough away from your object that you can see the top of it, and you need to be on level ground with the base of the object. I recommend you mark the spot you pick to stand so you can easily come back to it.
3. Look through the straw of your clinometer at the top of object you are measuring. The weighted string should hang down freely, crossing the protractor portion of the clinometer. Read the angle shown, and subtract 90 degrees to find your angle of vision from your eye to the top of the object. It is easier to do this if you have another person reading the measurement, which is why I recommend you work in pairs or get a sibling to help. Record the results you obtain for each object.
4. Once you have your angle of vision, use your tape measure to find the distance from the spot you're standing to the base of the object you're measuring.
5. You also need to be sure to calculate your eye height. This information is vital because you are measuring from your eye, not the ground, and therefore it needs to be considered for your final answer.
6. Once you have completed the measurements for all the objects outside, draw a diagram for each, labeling the information you just collected. Here is an example of what that might look like:



- Now set up appropriate trig ratios for each diagram (remember, you should have THREE of these) and SOLVE for the height of your object, showing all work. Don't forget that I had you find your eye height for a reason, so be sure to consider that in your final answer.

CHALLENGE!

- Can you find the height of a tall object without measuring the entire distance from where you are standing to the base of the object?
- We did this problem when we were covering trig (remember K2?). You'll need to use two measurements from the clinometer and you will have to walk a measured distance closer to the object you're measuring.

WHAT EACH GROUP MUST TURN IN:

- One blank copy of the grading rubric on top with names filled in.
- Documented evidence that you actually went out and measured and did not just make up numbers.

Examples of appropriate evidence:

- A Multitude of photos of the process with captions so I understand what I am seeing.
 - A video documenting your experience.
 - Several paragraphs detailing your experience including struggles and successes throughout the process.
- Each member must completely answer the self-evaluation questions on his/her own. This is the only piece of the group project that partners will not consult each other.

DUE DATE:

I'll give you two weeks to do this one...it's optional, remember!

Please see Mr. Barody with any questions, but be sure to plan ahead and start the project early. Don't come asking questions about gathering data the day before the project is due... Mr. Barody will not be as friendly as he would be a couple weeks ahead of the due date.

DATA PROJECT SELF EVALUATION: EACH MEMBER SHOULD DO THIS PART ON HIS/HER OWN. TYPE YOUR ANSWERS TO EACH OF THE FOLLOWING QUESTIONS. PLEASE BE THOUGHTFUL AND USE COMPLETE SENTENCES!

1. List the responsibilities of each group member.
2. Do you feel that everyone did his/her fair share?
3. How much time do you estimate you spent on this project?
4. Please describe any difficulties that you had with project.
5. Why did you think this project was assigned?
6. Did you enjoy this project? Why or why not?
7. Did you feel the directions were clear? Any areas that need more clarification?
8. What advice would give a student who is just starting this project?
9. Looking at the rubric on the reverse side, how many points do you feel your project deserves? Please justify your answer and do not fill in the rubric...that is for me to do!

Name(s): _____

Trigonometry Project RUBRIC

ITEM	POSSIBLE POINTS	EARNED POINTS
Clinometer Construction	5	
Three diagrams with detailed drawings & labels, as well as the solutions to the height of the object	15	
Evidence of Data Collection	10	
Other: Including but not limited to: <ul style="list-style-type: none">• Neatness• Creativity; Unique• Submitting in order specified by deadline• Thoughtful and complete project and self evaluation responses.	10	
TOTAL	40	

COMMENTS: