

Trigonometry/Clinometer Problems

Welcome to the wild world of trigonometry. Described below are some very perplexing problems encountered recently by members of the Marcus High School faculty. Please solve these problems, showing all your work in the space provided, to help reduce the stress level for these obviously troubled teachers. Please include a sketch of the right triangle you are using and circle your equation and final answer. All calculations should be done to the nearest inch, then converted to feet and inches for your final answer.

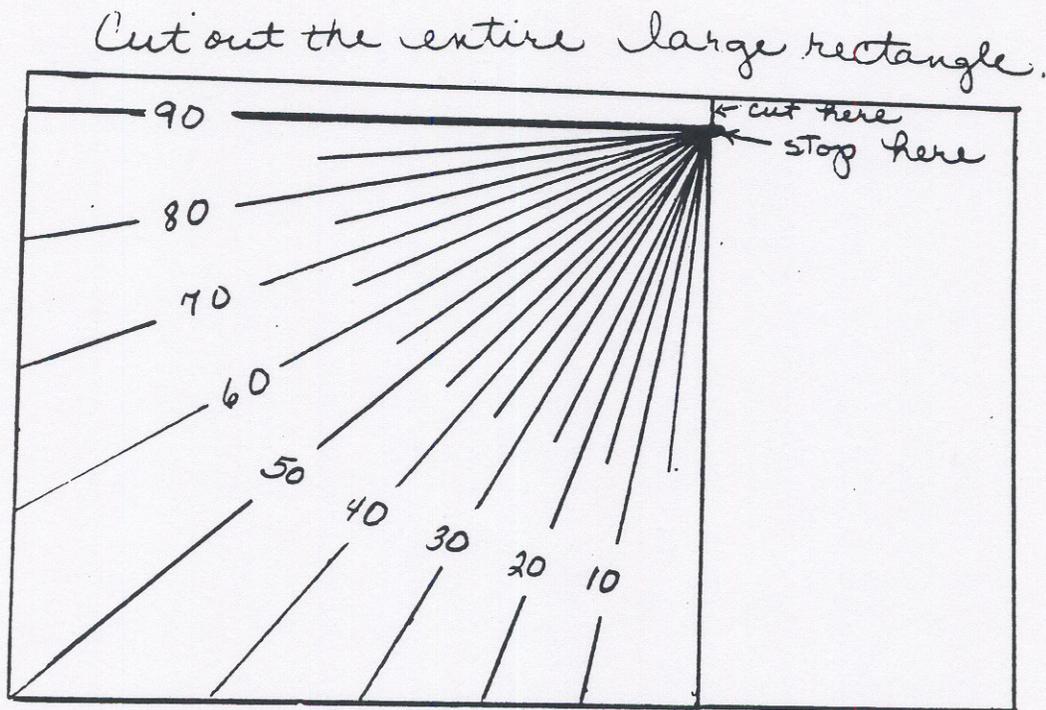
Station 1:

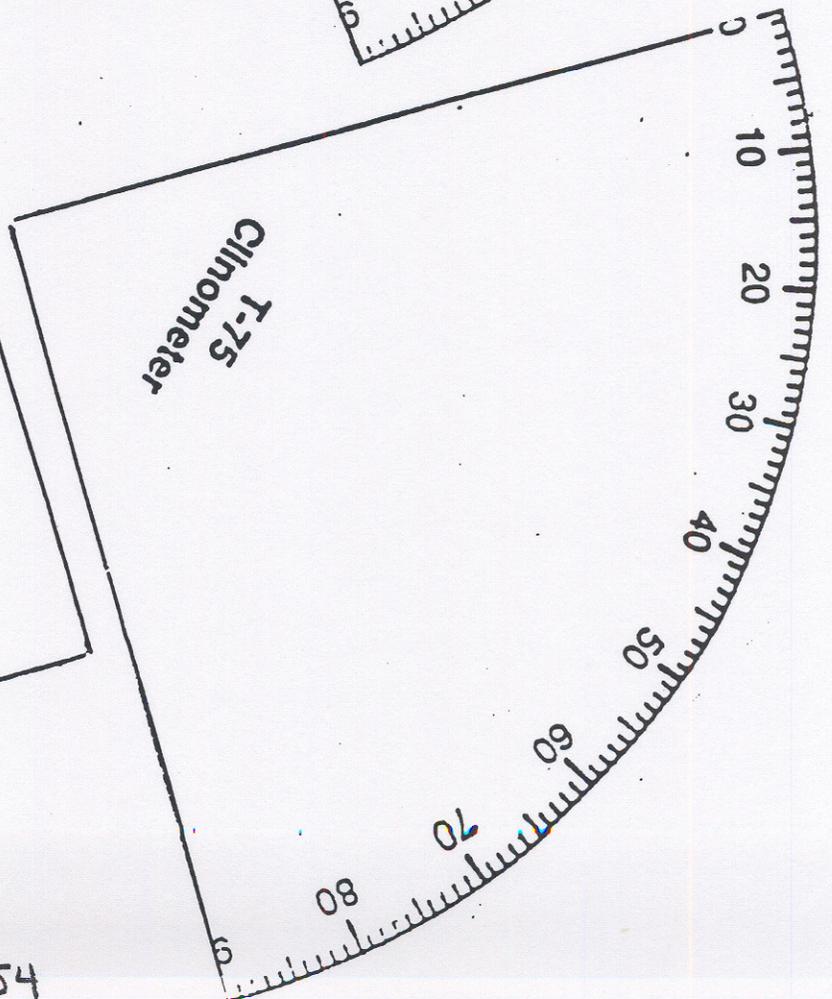
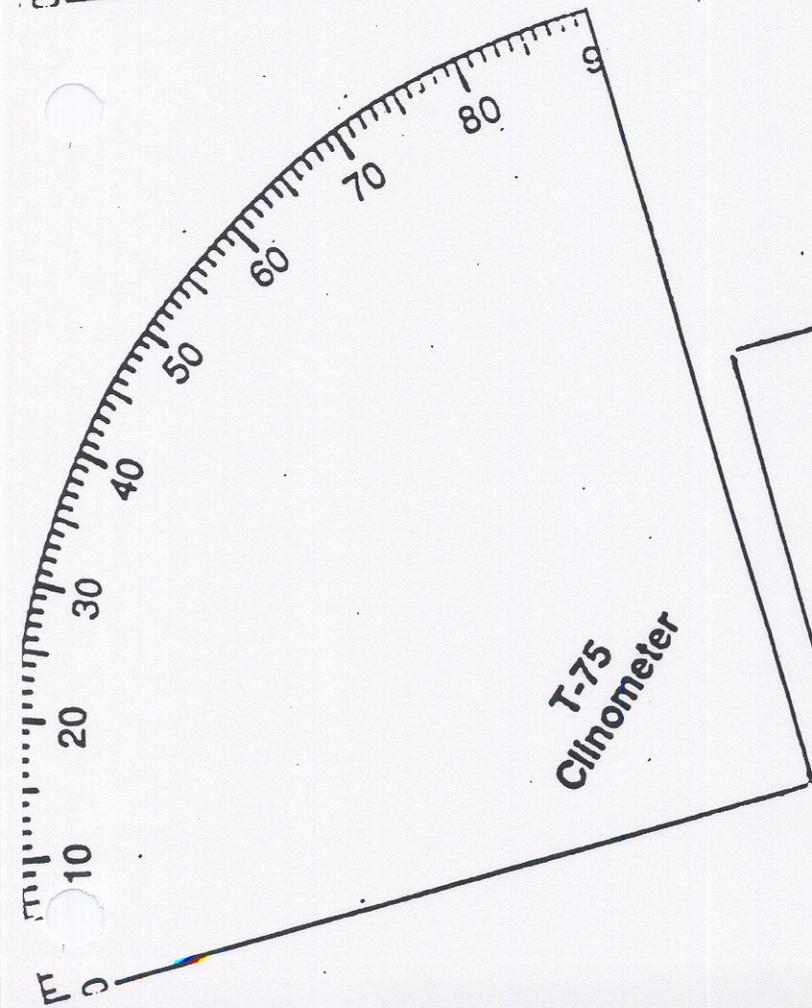
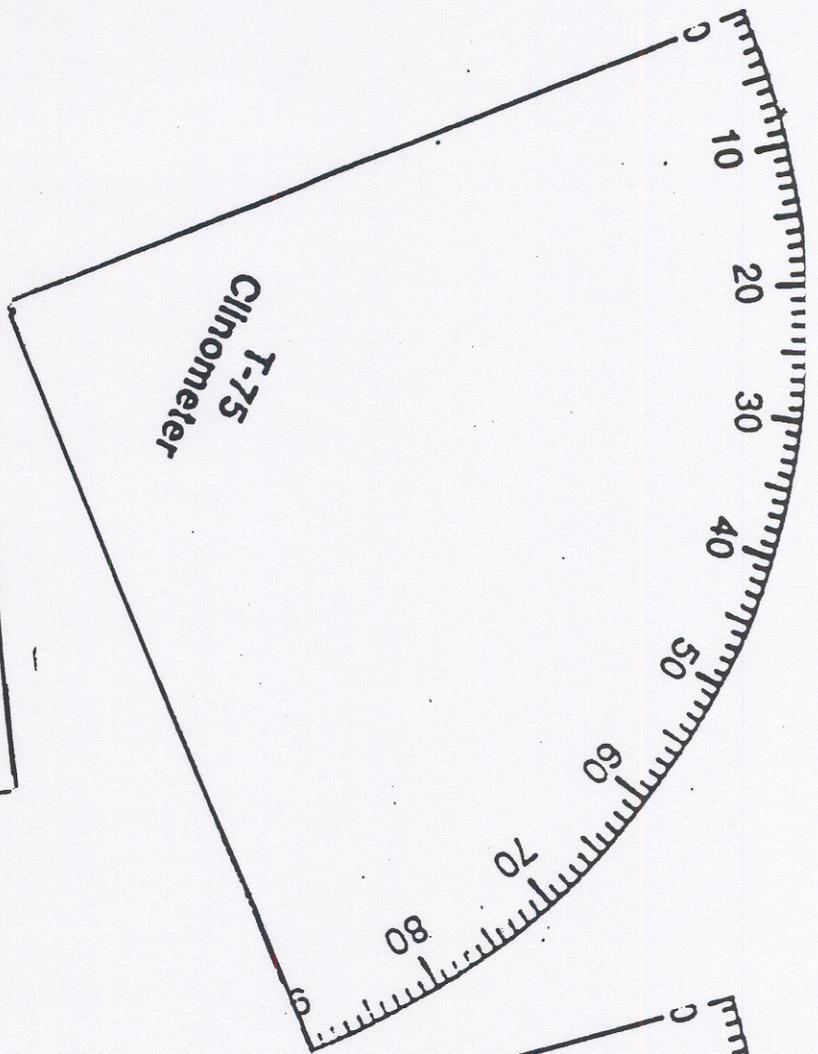
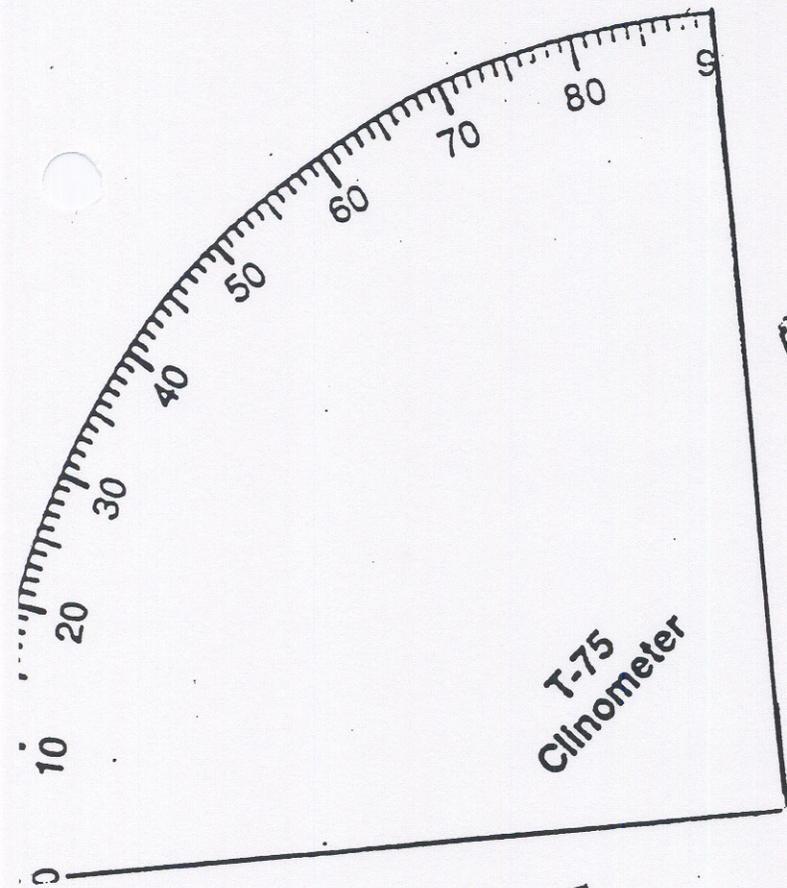
Mrs. Glidewell was sitting on the edge of the canopy over the outside door to the cafeteria, dangling her feet over the edge, greatly enjoying the view of the cow pasture to the west. With the warm sun on her face, she was truly oblivious to the rest of the world...until suddenly, she was dying of thirst. Looking at her watch, she saw that it was time for a DR. PEPPER!! How could she have been so careless to forget to bring one along? And then, as if someone was reading her mind, one of her faithful students appeared directly below her, holding a cold can of Dr. Pepper. He anxiously began trying to figure out how to get it up to his beloved teacher. Of course, throwing it would never work; so, he quickly pulled out his clinometer and calculated the distance up to her from his position directly below her feet. All he needed now was that length of rope or twine to tie onto the can. He knew Mrs. Glidewell would be ever so grateful when she pulled the cold can up. He could already hear her signs of contentment as she imagined the taste of the sweet liquid.

How much rope or twine did he need?

Building Your Clinometer

1. You will need a copy of the clinometer pattern, a piece of string that is from 5 to 7 inches long a ruler, and scotch tape to construct your clinometer.
2. With a pair of scissors, cut down to the indicated dot on the clinometer (the vertex of the angles).
3. Lay one end of the thread into the cut so that approximately 1 inch of the string hangs on the backside of the clinometer pattern.
4. Tape that end of the string securely to the back of the clinometer pattern.
5. Tie a washer to the other end of the string and make sure that the thread swings freely from the vertex.
6. Tape the clinometer pattern to your ruler.



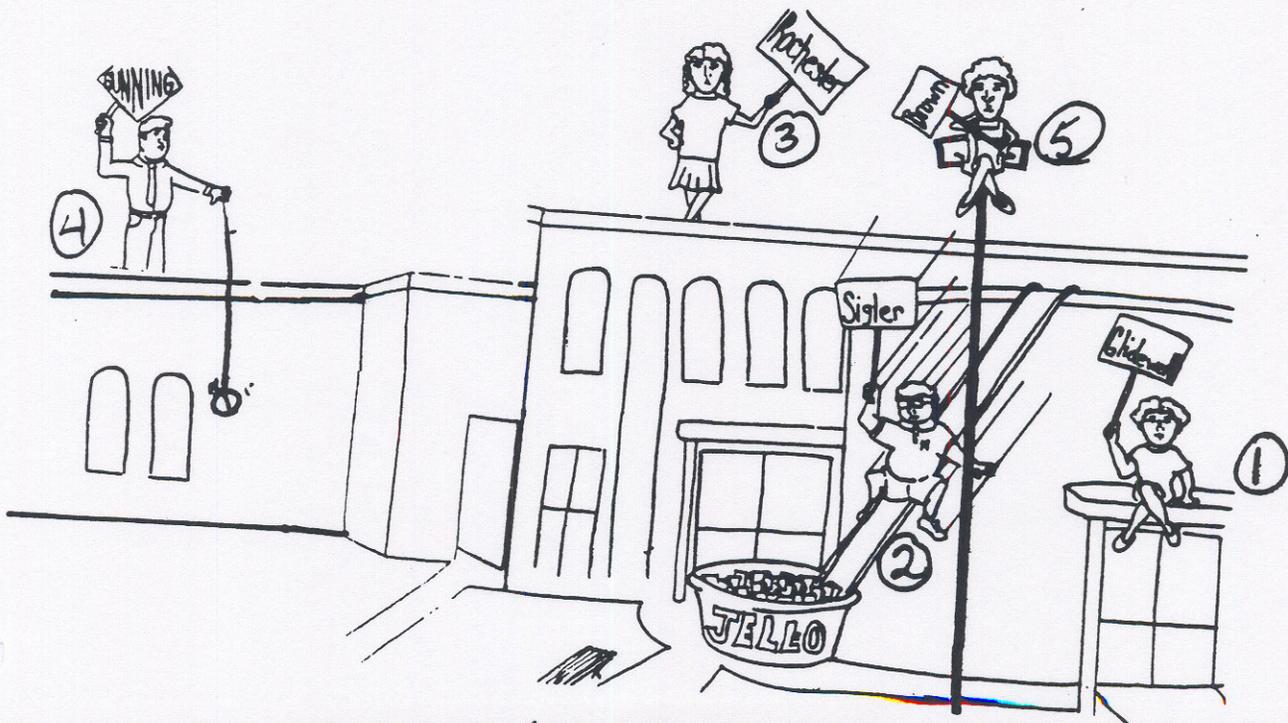


Directions for using your clinometer to solve the given problems:

1. Stand behind the construction paper marker at each station. The distance from the marker to the object being measured in 27 feet.
2. Each person will use his clinometer to measure the angle. Hold the clinometer so that the top of the ruler is in a straight line from your eye to the top of the object being measured. Have a group member read the angle from your clinometer. Compare results within your group. Write down your angle measurement in the data section below. You will go back inside to finish your calculations.
3. To complete the calculations on the problem worksheet, first draw a sketch of the right triangle formed. Label it with the known measurements. Do all work in inches. Do not forget to add the distance from your eyes to the ground. Place your final answer in feet and inches (to the nearest whole inch).

DATA COLLECTED:

- | | |
|-----------------|------------------------------------------------------------|
| 1. Angle: _____ | 2. (All measurements necessary were given in the problem.) |
| 3. Angle: _____ | 4. Angle: _____ |
| | 5. Angle: _____ |

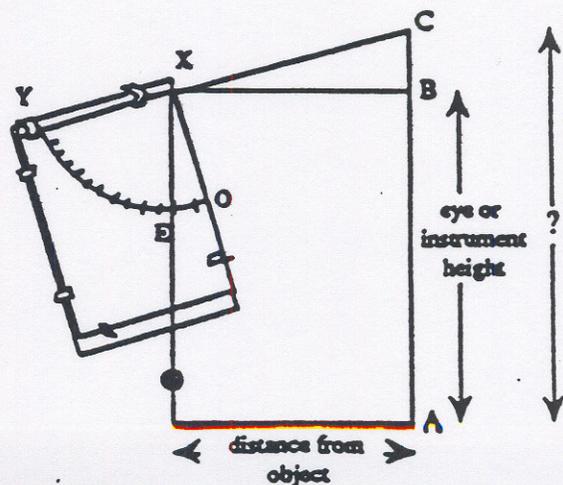
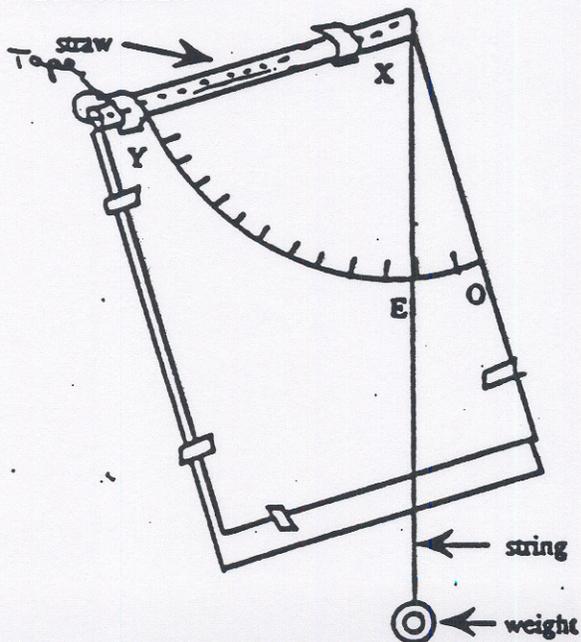


Trigonometry

In order to complete this activity, you will need to have a clinometer — a device used to measure angles of large structures. Make your clinometer using the instructions given below.

1. Cut out and tape the given protractor scale to a piece of cardboard as illustrated below, or xerox the scale on cardstock. The top of the clinometer should have the scale mark of 90.
2. Tape a plastic drinking straw along the top edge of the clinometer scale (90).
3. Run a piece of string through the straw, being certain to secure it at the 90 degree end of the clinometer scale. The string should hang below the clinometer scale.
4. Attach a washer to the end of the string so that it will hang vertically.
5. To use the clinometer, stand at a convenient distance from an object whose height you wish to measure.
6. Sight the top of the object through the straw. Have another person note the degree mark on the clinometer scale where the string is hanging, as you sight the object.
7. In order to achieve greater accuracy when using the clinometer, you must add your eye-level height to the calculated height of the object.

CLINOMETER



Measuring With A Clinometer

My eye height: _____

Object	Estimated Height	Distance	Clinometer Readings	Calculated Height	Group Average