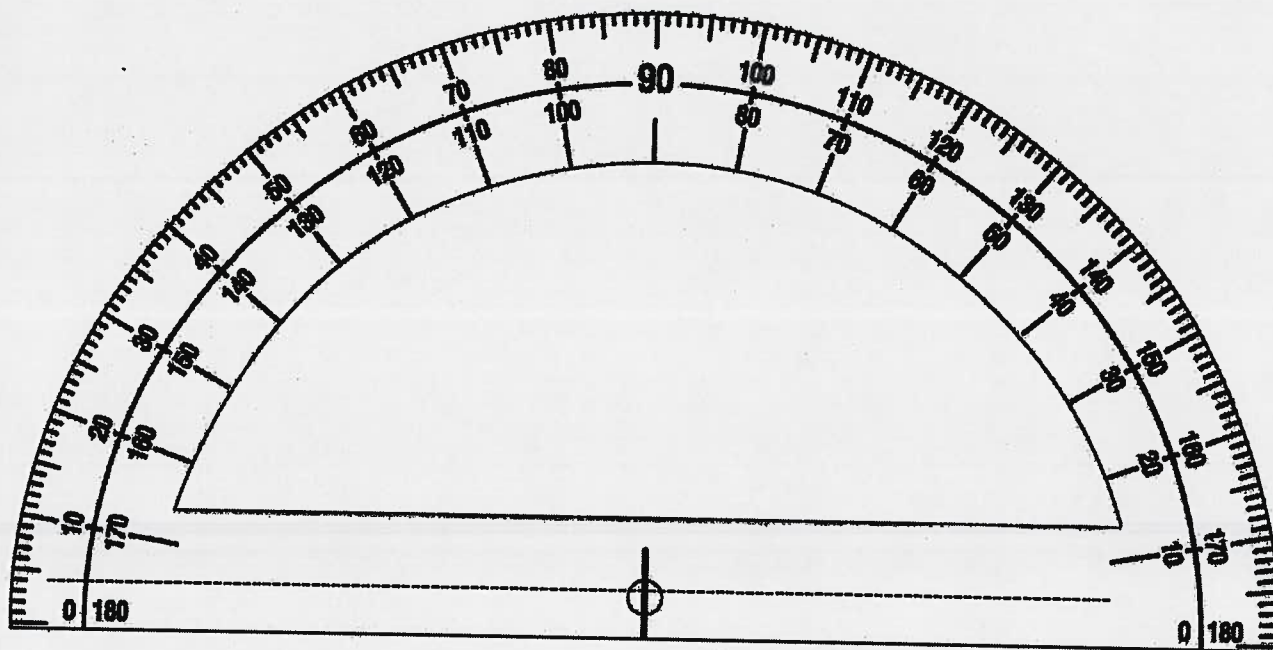


2.6.1: Constructing a Clinometer

A clinometer is used to find the angle of elevation of an object.



Read all directions carefully before you begin

1. Cut along the dotted line above, and glue the protractor onto a piece of cardboard. Carefully cut around the edge of the protractor.
2. Take a 20 cm piece of string, and tie a washer or paperclip to one end. The other end should be taped to the flat edge of the protractor so that the end touches the vertical line in the center, and the string can swing freely. This can best be done by taping the string to the back of the protractor and wrapping it around the bottom.
3. Glue a straw to the flat edge of the clinometer. The finished product should look like figure 1 below

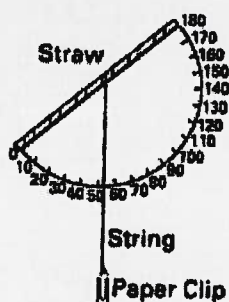


Figure 1

You can now use your clinometer. To find an angle of elevation, look through the straw to line up the top of an object. The string hanging down will then be touching the angle of elevation. Note: The angle you measure will always be less than 90° when you are reading the clinometer.

2.6.2: Applications of Trigonometry Assignment

Introduction

How would you find the height of a tree? You could climb to the top to measure it, but that would not be either safe or practical. How can we measure the height of clouds, airplanes or other highly inaccessible objects? Airports measure the clouds for pilots to let them know at what altitude they should fly. In this activity you will measure the heights of various objects using a single clinometer and trigonometric ratios.

You will measure the following heights:

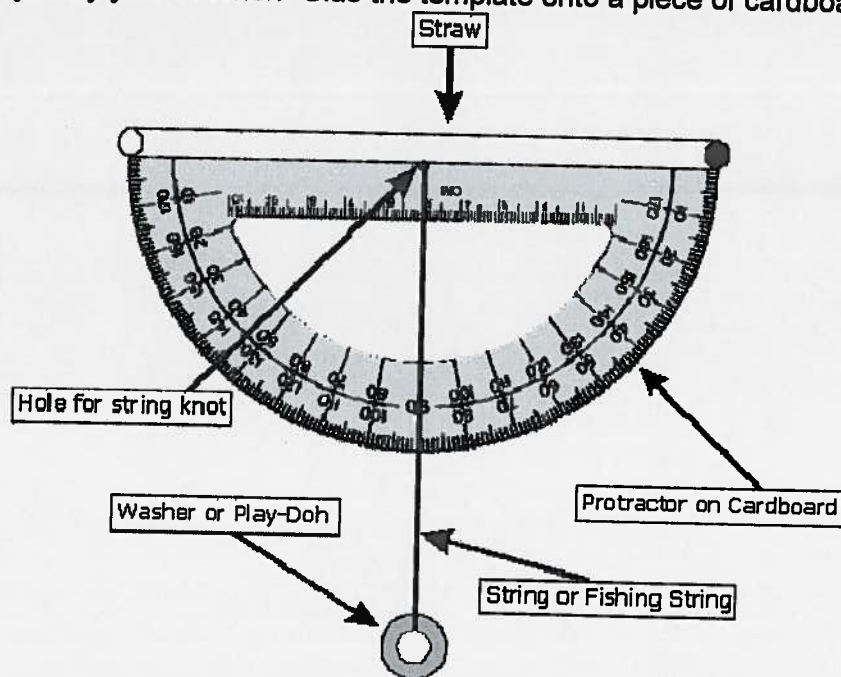
1. _____
2. _____
3. _____

You must hand in the following details:

- Show a table of data
- Show ALL calculations
- Table of results
- Sources of error

Building Clinometer

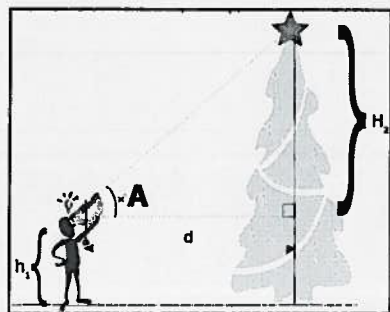
First you will need to make clinometer. You will be using the protractor template using the instructions on handout 2.6.1 given to you by your teacher. Glue the template onto a piece of cardboard.



2.6.2: Applications of Trigonometry Assignment (Continued)

Measuring Distances

Use a tape measure to find an appropriate distance back from the object you are finding the height of. Hold the clinometer level along the horizon line and adjust the angle of the straw to sight the top of the object through the straw.



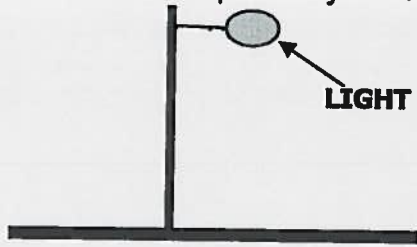
METHOD for finding inaccessible heights

Object Name	Height of person's eyes from ground (m)	Angle of Elevation (A)	Distance from Base (m)	Height of Object (Show work in box)

2.0.5: Applications of Trigonometry Assignment

Analysis

1. If you were to measure the height of a light sticking out from a post could you use today's method? Explain why or why not.



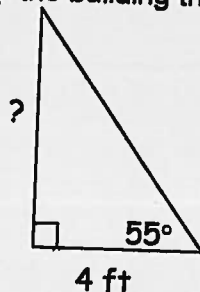
2. Darla is standing 15 m from the base of a building and using a clinometer she measures the angle of elevation to be 37° . If her eyes are 1.65 m above ground level, find the height of the building.

2.7.1 Applying Trigonometry

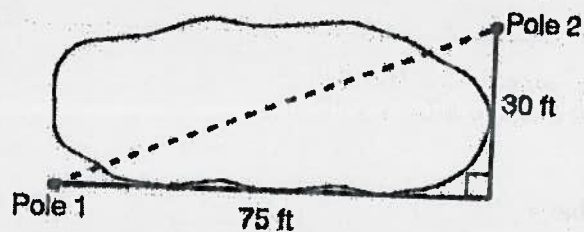
Use BLM 2.7.2 to organize your solution steps.

Then, solve the application questions. Find angles to the nearest degree and distances to the nearest tenth of a unit.

1. A ladder is leaning against a building and makes an angle of 62° with level ground. If the distance from the foot of the ladder to the building is 4 feet, find, to the nearest foot, how far up the building the ladder will reach.



2. The Dodgers Communication Company must run a telephone line between two poles at opposite ends of a lake as shown below. The length and width of the lake is 75 feet and 30 feet respectively.



What is the distance between the two poles, to the nearest foot?

3. A ship on the ocean surface detects a sunken ship on the ocean floor at an angle of depression of 50° . The distance between the ship on the surface and the sunken ship on the ocean floor is 200 metres. If the ocean floor is level in this area, how far above the ocean floor, to the nearest metre, is the ship on the surface?

4. Draw and label a diagram of the path of an airplane climbing at an angle of 11° with the ground. Find, to the nearest foot, the ground distance the airplane has traveled when it has attained an altitude of 400 feet.