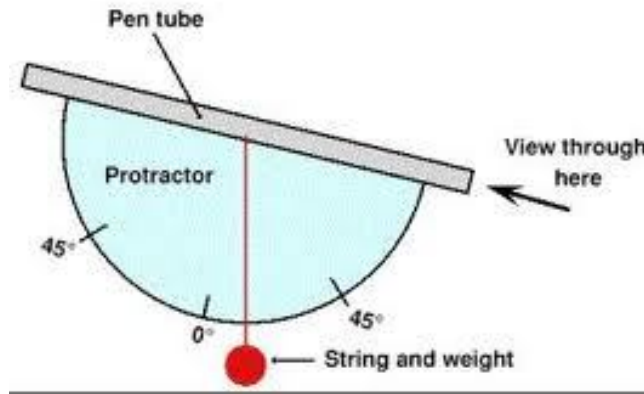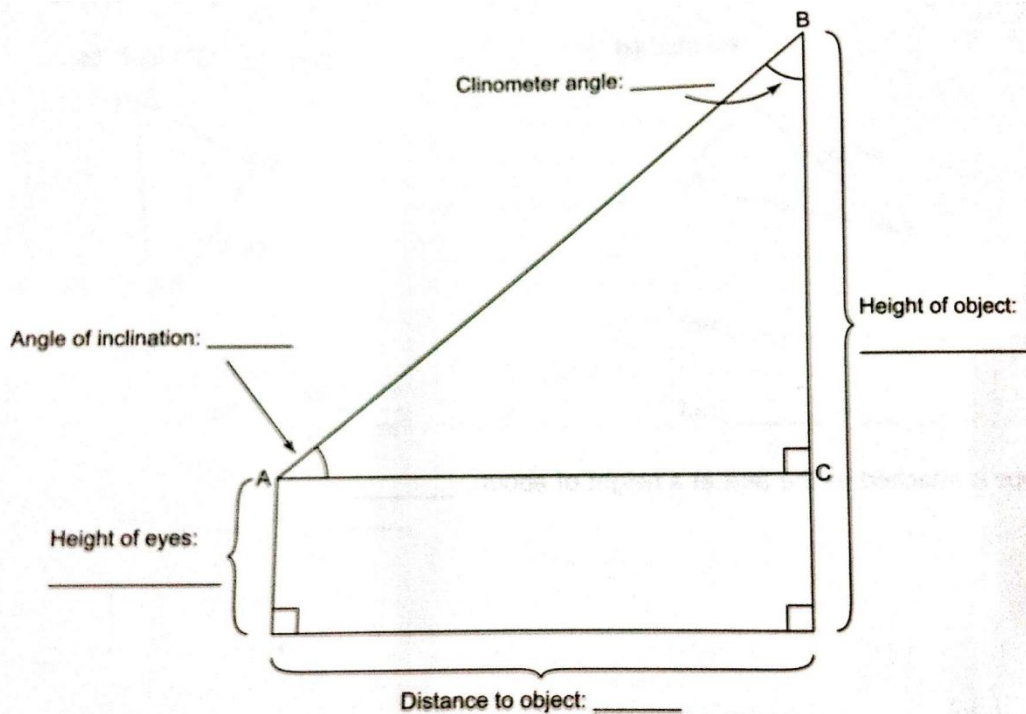# Math Lab: Measuring the Height of an Inaccessible Object

A **clinometer** is an instrument that measures the angle between the ground or the observer and a tall, inaccessible object such as a skyscraper or a building. They look like this:

Pen tube

View through here

Protractor

45°

0°

45°

String and weight

For each object you measure, you will need to draw a diagram such as the one below and fill in the blanks.

B

Clinometer angle: _____

Height of object:

_____

Angle of inclination: _____

A

C

Height of eyes:

_____

Distance to object: _____

In order to find the angle of inclination, we must subtract the clinometer angle from 90. In order to find the total height of the object, we must remember to add the height of the measurer's eye level as shown in the diagrams above and below.
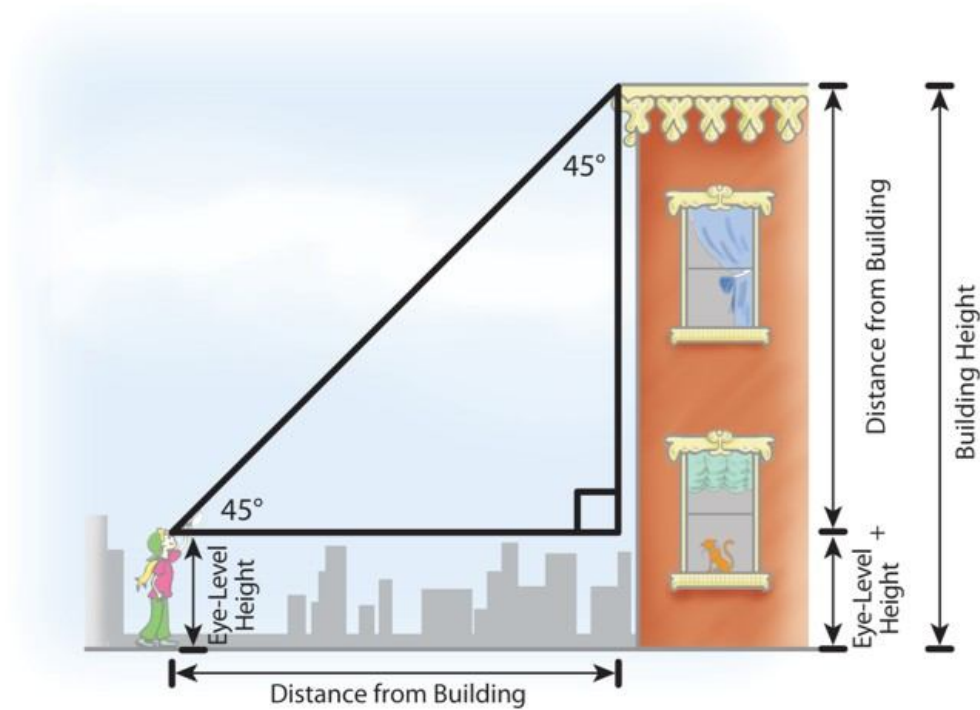
Procedure

1. Choose a tall object; for example, a tree, building, or flagpole.
2. Mark a point on the ground. Measure the distance to the base of the object.
3. Person #1 stands at the point. They hold the clinometers, then looks at the top of the object. Person #2 records the angle shown by the thread on the protractor. Person #2 also measures the height of Person #1's eyes above ground level.
4. Subtract the clinometer angle from 90 to find the angle of inclination.
5. Use the tangent ratio to calculate the side opposite in the triangle.
6. Add your answer in part 5 to Person #1's eye-level to find the height of the object.
7. Change places with your partner and repeat steps 1-6.
8. Find an additional 2 objects and repeat steps 1-7.

Data

Object	Distance to Object	Clinometer Angle	Angle of Inclination	Height of Eyes	Height of Object

Show all of your calculations and diagrams for your answers in the table below.

Observations

Make at least 3 general observations about the accuracy of the experiment.

Conclusion

1. Does the height of your eyes affect the measurements? Explain.

2. Does the height of your eyes affect the final result? Explain.