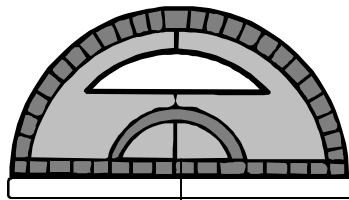


# Using the Altimeter



# Altimeter Lesson

AAAS Benchmarks Addressed: Including, but not limited to the following:

1. The Nature of Science:
  - B. Scientific Inquiry
2. The Nature of Mathematics:
  - B. Mathematics, Science and Technology
  - C. Mathematics and Inquiry
3. The Nature of Technology:
  - B. Design and Systems
4. The Physical Setting:
  - F. Motion
9. The Mathematical World:
  - B. Symbolic Relationships
  - D. Uncertainty
  - E. Reasoning
11. Common Themes
  - D. Scale
12. Habits of Mind
  - B. Computation and Estimation

National Science Education Standards Addressed: Including, but not limited to the following:  
Science as Inquiry, Content Standard A

Objectives: SWBAT build an altimeter.

SWBAT use the altimeter to measure angles.

SWBAT use their pace length to measure distances.

SWBAT use trigonometry to solve for an unknown,

SWBAT measure the height of an unknown object using the above techniques.

Materials:

For Altimeter Type 1: (note: you will have to convert the angle using this type of apparatus. Protractor, string, washer, sinker, or other type of weight.

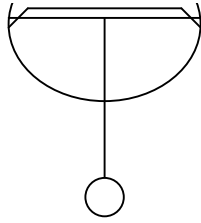
For Altimeter Type 2: Lightweight cardboard (cereal box, manila envelope, etc), attached template, string and washer, sinker, or other type of weight.

For Altimeter Type 3: Pasco's phone number  
Flag Pole or other high object.

Lesson:

1. Building the altimeter:

Type 1: Attach the weight to one end of the string securely. Attach the string to the center of flat side of the protractor. Note, a zero degree will read  $90^\circ$ . You will have to instruct the students to subtract their reading from  $90^\circ$ , or better yet, have them figure it out. Take a straw and cut it so that it is as long as the straight side of the protractor. Trim each end at a  $45^\circ$  angle.



Type 2: Supply each student with a copy of the template. Have them glue it to a piece of light cardboard and cut the two out together. Place the string and weight in the same location. Note that this altimeter will not need recalculating.

2. The amount of direction you will want to give your students will be up to you. I suggest you take the students outside and ask them to measure the height of the flagpole using that which they have learned. You also might want them to fill out a lab sheet, which I have included.
3. Compare the answers the students have calculated.
4. If you know the actual height you may want to have them compare their answers.

Assessment: Grade worksheet as you normally would.

## How High is the Flagpole

1. Walk out 20 paces from the base of the flagpole.
2. Measure the angle to the top of the flagpole. \_\_\_\_\_
3. Calculate the distance from the base of the flagpole. Show all work:

\_\_\_\_\_.

4. Using your trigonometry, how high is the flagpole?

\_\_\_\_\_.

(Did you remember to add anything...How tall are you?)

5. Lets try it a different way. Pace out until your angle measures 45o. Record paces \_\_\_\_\_

6. Using trigonometry, how high is the pole? Remember, how tall are you?

\_\_\_\_\_.

7. Why is this method handy?

Template for altimeter