

How Tall Is That Building?

A lesson in Precision & Accuracy

Materials: the entire class will need 1 meter stick and some clay. Each student needs paper, pencil, and a folder (to write on).

Beforehand: 1. Decide what tall object you'll be measuring- building, tree, flagpole, etc..., and 2. find out how tall it actually is.

Procedure: Begin class outside...

Outside

1. Explain to students what we're doing- measuring the height of our school (or this tree, flagpole, etc...) using an old but still reliable method.
2. At the top of their paper have students write down the word 'Precise'. Ask what that word means, and then have everyone write the definition (something like "how close the measurements are to each other"). Below that do the same for 'Accuracy' ("how close the measurements are to the real value/standard").
3. Stand a meter stick up against the building/object you're measuring, and put a blob of clay at the top end of it to make it stick to the building.
4. Have students make, as in write down, a prediction of the building's height in meters. Share a few out loud. (You're going to be surprised at how low and high some are!)
5. Now explain the technique- step back far enough so that when you hold your thumb out sideways at arm's length and sight with one eye, the middle joint of your thumb just barely covers the meter stick. Now your thumb is calibrated: 1 thumb = 1 meter. Carefully count how many thumbs tall the building is. Repeat at least 2 more times and average results. (*Keeping your elbow straight when holding your thumb out is a good way of making sure you keep your thumb at a set distance from your eye.*)

Inside

6. Back inside the classroom, have each student write their average on the board.
7. Have students copy the following questions and answer thoughtfully and with sentences. Go through them together as discussion if you like.
 - Question 1- How precise are the classes' results? (*Students could indeed argue both ways, that the averages are both precise and im-precise, as long as they explain why.*)
 - Question 2- How accurate are the classes' results? (*You'll have to reveal the true height of the building.*)
 - Question 3- Graph results. Suggestions-

- Bar graph showing all student averages. Round all averages to the nearest whole number.
- Bar graph showing number of students within 1 meter of the actual height, those between 1-2 meters off, and those more than 2 meters off (3 total bars on this graph).
- Anything else you can think of that's not terribly difficult.