

Challenging Your Students to Be Problem Solvers:

To make this activity more challenging to your students, you may want to pose some open-ended questions such as: Determine the number of bricks that were used in the construction of the school building using the simplest method possible. Determine the height of the tallest tree in the schoolyard and describe the method(s) you used to accomplish this task. Do an inventory of all of the trees in the schoolyard and then use a computer spreadsheet program such as Microsoft Excel to create a table and chart (graph) of your data. Determine the percentage of the school property that is covered with concrete, asphalt, and or gravel. Determine the percentage of the school grounds that is used for team sports. Determine the highest and the lowest point on your school property in feet above sea level. Convert this standard measure to a metric measure. If the area of the schoolyard was equally divided among all of the students in your school, how much space would each student occupy? Using only a meter stick, determine the approximate length and width of the schoolyard within a twenty minute period of time.

This is also a great time to add a bit more technology to your students' measurement activities. One instrument that is becoming a common piece of technology is the Global Positioning System or GPS. Your students can use the GPS to measure certain things in the schoolyard and then compare its accuracy to a less technical instrument the students may be using. By collecting and naming the waypoints, your students can later download the information into the computer to be plotted on a map using a Geographical Information System or GIS. This computer software is also becoming an important on-the-job technology component in many career fields.

This should become a team exercise where your student groups might each develop an inventory form of their own design, determine the most efficient way for the group to collect and record the data, design a schedule for collecting the data, gather their materials and equipment, and conduct a self-evaluation of their work. An excellent way to assess this activity is to have the teams repeat each other's steps for solving some of the open-ended problems they have been assigned. This will replicate some of the same challenges faced by engineers, carpenters, landscapers, and others as they gather data to complete a real world project.

Needed Materials:

The materials for this activity will vary according to the methods the students choose to solve their open-ended problems. It is best to challenge the students to determine what materials and equipment they may need. Part of the open-ended problem may indicate what materials or equipment the students are permitted to use.

Safety Rule:

Students should be made aware that this is an instructional activity and appropriate behavior is expected when they are conducting these activities in the schoolyard. All equipment is expected to be used for the appropriate purpose.

Procedure :

Student Information: In this activity, you may be challenged to conduct and determine a variety of measurements and quantities. Part of your assignment may be to describe the method(s) you used to take your counts or determine your measurements. It is important to recognize that mathematical problems can be solved in a number of different ways. Your challenge may be to come up with a method that is both fast and accurate. Sometimes, it can also be beneficial to do a little research ahead of time. You might look in your math textbook for a method, or you may want to search the Internet. These are just a couple possible ways to help you solve your measurement problems. Many times your accuracy can be greatly enhanced by taking an average of several measurements or counts. When you have completed your schoolyard inventory, be sure to submit your findings using the online schoolyard inventory form. After you have submitted your data it will be displayed with other existing data and can be edited. It will also be a downloadable Excel file. You will be able to download the spreadsheet and then bring it up on your computer and do comparison tables of your school inventory to the inventories of others.

List of Schoolyard Inventory Possibilities

- 1. Click on the “View Data” link at the Schoolyard Inventory Activity web page. Click on “View” in the blank sample listed on the chart. What comes up is the data collection sheet that will be used in this activity.
- 2. The following information provides you with a variety of measurement activities that you can conduct on your school grounds as part of a collaborative student group.
- 3. It is up to you, with some help from your teacher, to choose the appropriate measuring devices for each measurement activity you have been assigned.
- a. Total amount of: school property area, schoolyard area, parking area, driveway area, schoolyard used for team sports, schoolyard occupied by playground equipment, blacktop space, schoolyard instructional space, school property space occupied by school buildings, unspecified schoolyard space, catch basin area, other.
- b. What percentage of the whole school property does each of the areas in #1 represent?

- c. Tallest: oak tree, pine tree, cedar tree, maple tree, elm tree, ash tree, sycamore tree, fruit tree, gum tree, other.
- d. Tree with the largest circumference and widest girth at one meter above the ground.
- e. Tree with the largest number of board feet of lumber.
- f. Total number of trees, bushes, wildflowers, flowers, other
- g. Tallest bush
- h. A contour map of the schoolyard showing the lowest and highest elevations above sea level
- i. Total length and square meters of fencing around the schoolyard
- j. Total cubic meters of snow occupying the schoolyard at any one time in 2004-05
- k. Total number of natural rocks exceeding 15 centimeters in diameter found on school property
- l. Deepest point to which the soil froze at any one time in the winter
- m. Total cubic meters of topsoil in the schoolyard
- n. Length of the schoolyard
- o. Number of telephone or power line poles on school property
- p. Amount of aquatic space on school property (including wetlands)
- q. Total number of different species of plants found in one square meter anywhere in the schoolyard
- r. Total number of different species of animals found in one square meter anywhere in the schoolyard
- s. Total number of birds to visit a bird feeder in a ten minute period of time.
- 4. After group and classroom discussions have occurred, login to enter your data.

The reporting form for this experiment is set up so that you can submit your determined measurements and total amounts for several different tasks listed above.

NOTE: In some cases, your measurements and total amounts will be much more accurate if you compare your results and or take averages. In some cases, you will not be able to collect data for a certain task.