Gold Seal Lesson

Author(s):			*Lesson Title:*			
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Grade Span			*ICLE Application Model*			
K-4	*5-8*	*9-12*	*A*	*B*	*C*	*D*
X						*X*

Instructional Focus:

Number Operation and Concepts
Students use number, number sense, and number relationships in a problem-solving situation. Students communicate the reasoning used in solving these problems.

Measurement
Students use a variety of tools and techniques of measurement in a problem-solving situation. Students communicate the reasoning used in solving these problems.

Statistics and Probability
Students use statistics and probability to analyze given situations and the results of experiments. Students communicate the reasoning used in arriving at a conclusion.

Performance Task

In this task, students learn how to set up the dimensions of different sports playing fields by measuring distances with their steps.

1. To show the importance of having some tool for measuring, have each student (or a sample of students) mark off a distance in the classroom, hallway, or outside that they believe to be 20 feet. Then have them measure each of the distances with an appropriate measuring tool and have students compare the actual measures to their estimates.
2. Make a list of the estimates on the chalkboard and, as a whole class, find the range of the estimates. Then, have the students individually calculate the classes mean, median, and mode of the estimates.
3. Now have students measure their step. Let them use any method they wish to do this. Each student should also describe the method they use for measuring their step.
4. Have each student (or group of students) measure off 20 feet using the step method. They should mark their beginning and ending point. Now have them measure the distance with an appropriate measuring tool to see how well the step method of measuring worked.
5. Have the students compare results of estimating a measure and measuring using the step measure. Ask the students if one method appears to be more accurate than the other.
6. Ask the class to consider whether expressing distances in steps would be useful by having them examine the differences in step length between students (looking at distribution and mode).
7. Give the students the dimensions of 1-3 sports fields or courts (depending on grade level) and have them convert the measures from the actual measures into the equivalent number of steps.

The following is an extension of this activity to do with students at the 5-8 level after they have had exposure to the Pythagorean theorem.

8. Ask the students how they could show that the fields are square (baseball) or rectangular (soccer, volleyball, etc.).
9. Have students work in small groups to mark off a field using the step measure. Each group should define a field, other than the one they worked on above, by stating what kind of field it is, what shape (square or rectangular) it is in, and what the dimensions are in steps. Then, have the group mark off the field and prove, using the Pythagorean theorem, that it is a square or a rectangle.

Teachers' note:
It may be useful to prepare and distribute activity logs for students to record their thoughts, methods, calculations, and results for each section.

ICLE Essential Skills

Understand the characteristics of measures of central tendency (i.e., mean, median, and mode). (m 15)
Use the Pythagorean theorem to compute side lengths of right triangles. (m 21)
Use the technique of dimensional analysis to convert units of measure (e.g., convert km/hr to m/min) including drawing to scale and applying ratios. Understand and use various techniques for estimating, making and converting measure; and using these to perform dimensional analysis. (m33)

Scoring Guide:

Calculations 70 Points	Student uses appropriate processes and formulas for calculating mean, median, mode, step length, and diagonals (hypotenuse) on fields, and for converting dimensions of playing fields. Calculations are correct.
Measurement 30 Points	Student uses appropriate method for measuring step, either by taking average of several measures or dividing walked distance by number of steps.

Keywords

English Language Arts	Mathematics	Science
Reading	**Algebra** **Computation**	**Earth Science**
Writing	**Geometry** **Angles** **Geometric shapes** **Geometry in daily life** **Pythagorean theory** **Rectangles** **Relationships**	**Life Science**
Communications	**Statistics** **Central tendency** **Data analysis** **Measurement** **Range**	**Chemistry**
Literature	**Calculus**	**Physics**
Other	**Trigonometry**	**Other**
	Other **Dimensions** **Distance**	