

MEASURING THE FLAGPOLE

Performance Standard (6D/7A/7B).G

Determine the height of a flagpole accordingly:

- *Mathematical knowledge*: know how to determine and describe acceptable levels of accuracy in estimating measurements and how to make simple measurements using indirect techniques,
- *Strategic knowledge*: use appropriate measurement techniques and proportional reasoning, and
- *Explanation*: explain completely and clearly what was done and why it was done.

Procedures

1. Provide students with sufficient learning opportunities to develop the following skills in order to (6D) solve problems using comparison of quantities, ratios, proportions and percents, (7A) measure and compare quantities using appropriate units, instruments and methods, and (7B) estimate measurements and determine acceptable levels of accuracy:
 - Develop, use, analyze, and explain methods for solving numeric or word problems involving proportions,
 - Select and justify the choice of either U. S. customary or metric systems of measurement according to the situation,
 - Make simple measurements using indirect techniques, and
 - Determine and describe acceptable levels of accuracy in estimation situations.
2. Provide each student a copy of the "Measuring the Flagpole" task sheet and the rubric. Have students review and discuss the task to be completed and how the rubric will be used to evaluate it. (This task may be expanded to include the design and building of measurement tools, which ties nicely to some science concepts and standards. If teachers want to do this, they need to build in another day of class time to design their tools and a day to actually build them. Teachers would then need to evaluate the design and building phase using the science performance standards and appropriate rubrics.)
3. Have the students work in pairs to determine the height of the flagpole in front of the school building and develop a feasible plan for accomplishing this task. solve the problem. Tell the students they may not climb the pole, and that any methods they choose to use must be safe to them, the flagpole, and others. Otherwise do not help the students or guide their thinking as they solve the problem.
4. On the following day, have the students follow through with your plan and measure the flagpole.
5. Once they have completed the task, have each student write a complete description and justification of his/her procedures and findings, including:
 - A written description of the tools and measurement units used and why.
 - Information on the level of accuracy used in the measurements, and any possible error present.
 - Any drawings that will help explain the procedures or reasoning.
 - All calculations with a justification.
6. Evaluate each student's work using the rubric and its guide to determine the performance level. Give each student a score in each of the three categories. You may want to judge evidence for each standard separately and average the scores, or you could judge the task holistically. Minor errors in computation include making errors in the actual addition, subtraction, multiplication, or division that result in wrong answers. Major errors include not recognizing differences in units of measurement before or after computation.

Examples of Student Work not available

Time Requirements

- One class period to complete, but advanced planning may be necessary.

Resources

- Copies of the "Measuring the Flagpole" task sheet
- A variety of measuring tools should be made available for student selection and use.
- Any type of measurement device that students may have used in the past is appropriate.
- Mathematics Rubric

NAME _____ DATE _____

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Student Task Sheet

You and a partner need to determine the height of the flagpole in front of your school building. Develop a feasible plan for accomplishing this task. Tomorrow you will be asked to follow through with your plan.

Once you have completed the task, you must turn in a complete written description and justification of your procedures and findings. Make sure to include:

- A written description of what tools and measurement units you decided to use and why.
- Information on the level of accuracy used in your measurements, and any possible error present.
- Any drawings that will help explain your procedures or reasoning.
- Any and all calculations and a justification of these procedures.