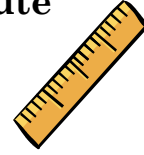


Pennsylvania Governor's Institute
for Mathematics Educators
2004



Names of Group Members:

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Topic/Theme: "Pest Park" *Maintained by: The Department of Ranch Recreation*
Performance Assessment of Geometry and Measurement Concepts

Level: 5th grade

Time Element: 3 math periods

NCTM Standards Addressed:

Geometry:

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
- Specify locations and describe spatial relationships using coordinate geometry and other representational systems.
- Use visualization, spatial reasoning, and geometric modeling to solve problems.

Measurement:

- Apply appropriate techniques, tools, and formulas to determine measurements.

PA Math Standards Addressed:

2.3.5.A Select and use appropriate instruments and units for measuring quantities (e.g., perimeter, volume, area, weight, time, temperature).

2.3.5.B Select and use standard tools to measure the size of figures with specified accuracy, including length, width, perimeter and area.

2.9.5.C Identify and measure circles, their diameters and their radii.

2.9.5.E Construct two- and three-dimensional shapes and figures using manipulatives, geoboards and computer software.

2.9.5.H Describe the relationship between the perimeter and area of triangles, quadrilaterals and circles.

2.9.5.J Define the basic properties of squares, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, triangles, cubes, prisms, spheres and cylinders.

2.10.5.A Identify and compare parts of right triangles, including right angles, acute angles, hypotenuses and legs.

Math Assessment Anchors Addressed:

M5.B.2.1 Use appropriate tools to determine measurements.

M5.B.2.2 Solve problems involving length, time, weight, mass, capacity, temperature, perimeter, area and/or money.

M5.C.1.1 Define and/or use basic properties of quadrilaterals (parallelograms, squares, rectangles, trapezoids, rhombi), triangles, circles, pyramids, cubes, and/or prisms.

M5.C.3.1 Identify, plot, or match points given an ordered pair.

Reading Assessment Anchors Addressed:

R5.A.2.1 Identify the meaning of vocabulary from various subject areas.

Objectives:

During this activity, the students will prove themselves able to:

- Select and use the appropriate measurement tools for given tasks
- Create specific quadrilaterals that match given measurements
- Solve problems using length, perimeter and area
- Locate points on a coordinate plane and list the ordered pairs

Instructional Strategies and Plan (include strategies used to help different types of learners, i.e. auditory, visual, etc.):

1. *(*Note: The following procedures describe a performance assessment that will take place upon completion of several*

geometry and measurement lessons. It is best that this project not be attempted in isolation, as students must first be provided with meaningful conceptual experiences that provide them with a frame of reference from which to successfully proceed..)

Students will be told that they must create a “Pest Park” for the class pet, a Madagascar Hissing Cockroach, which must include several types of recreational activities for our insect friend.

2. Each group of three students will be provided with the necessary materials, including a copy of the project criteria and the scoring checklist. Expectations will be discussed. (**Note: Each group will receive all items detailed in the materials list. The coordinate plane template should be fixed into the bottom of the soda can tray. The bottom of the inside of this tray will serve as the students’ building surface.*)
3. It is expected that the students successfully complete four out of the six structures explained on the attached criteria sheet – one structure to fill each quadrant. Upon completion of project explanation and student question / answer, the young architects may begin their constructions. Directions should be read silently by the students first, and then explained by the instructor. General pictures depicting reasonable facsimiles of the required equipment will be provided, just in case there are children who are unfamiliar with the general terminology. The instructor will facilitate, circulating about the room, providing encouragement and, if needed, redirection.
4. Student presentations will begin on the third day of the activity, provided that no interruptions have impeded student progress.

Materials/Resources:

The following materials should be provided to each group of 3 students:

1 soda can tray (typically holding four six-packs)

1 – 10” x 14” photocopy of a coordinate plane template

1 toilet paper tube

oak tag

scissors

pencils

crayons / colored pencils

coffee stirrers

pipe cleaners

rulers (U.S. Customary and metric)

compasses

The following materials should be provided to each student:
1 copy of the written directions/criteria

Interdisciplinary Connections:

- *Reading*
 - Students will read nonfiction text about cockroaches and respond, in writing, to a reader's response performance task.

- *Technology*
 - Students will utilize the virtual manipulatives on <http://MATTL.usu.edu/NLVM>, to enhance their understanding of geometric concepts.

- *Other*
 - Because the fifth grade teachers at Claysville Elementary School have *Madagascar Hissing Cockroaches* as pets, the students will be oriented toward a goal that is of importance and excitement to the class – the creation of an exercise area for the roach. In science class, as the Environment & Ecology standards dictate, students will be learning about the practices of IPM (Integrated Pest Management), and its relevance to modern day agriculture. The cockroach and its role as a household pest will be discussed, along with the biological adaptations that are responsible for its survival. Complete and incomplete metamorphosis of insects will be examined, and comparisons made between the dreaded American Roach and the Madagascar Hissing Cockroach.

Assessment Strategies:

- *Formative Evaluation* (checking student understanding during the lesson):
The creation of the “Pest Park” structures (i.e. swing sets with isosceles triangles, climbing bars using geometric solids, a carousel with a given radius, etc.) will serve as a formative evaluation. Instructor observation will be used to determine whether or not the students are able to complete the required task.
- *Summative Evaluation* (how will it be determined that the objectives were achieved?):

The instructor will utilize an assessment checklist to score the final projects. Please see the attached criteria and scoring checklist.

Correctives/Remediation:

Because this is a hands-on application project rather than an instructional lesson, most learners' remediation needs will have been addressed prior to this assessment. However, should it become apparent that given students are unable to successfully complete the task at hand, students would be regrouped accordingly, and the instructor would provide more focused support to those students.

Action Plan:

- 1. Frustrated/struggling students will be redirected. The instructor will provide verbal prompts and focused support; directions will be explained using meaningful examples and comparisons.***
- 2. If struggling students are unable to proceed with additional one-to-one attention from the instructor, students will be regrouped so that the instructor can provide focused remediation on the measurement and geometry concepts being assessed. Directions will be broken down into smaller steps, using short and specific sentences.***

Extensions/Enrichment:

- As enrichment, students will be asked to determine the volume of $\frac{1}{2}$ of the toilet paper tube used in the critter crawl.
- Gifted students will construct their own coordinate plane template, rather than using the teacher-made model.

Special Accommodations (special needs students)

- ***Description of the Special Needs Student Selected:***
Due to severe hearing loss, our student's reading and expressive skills are four years below grade level. Math computation is Emily's strength; however, she experiences difficulty with word problems, due to her weak grasp of fifth grade verbal and linguistic skills. A listening device lessens her physical problem, but improved auditory perception does not help Emily to comprehend lengthy verbal explanations.
- ***Accommodations to Use with this Student:***
Emily will be provided with a detailed criteria sheet, as will all other students; however, Emily's sheet will include short,

bulleted statements accompanied by pictures. Prior to project introduction, the instructor will meet with Emily privately (i.e. morning, lunch period, etc.). Conveying the project expectations to Emily beforehand, as well as giving Emily an opportunity to ask questions in a private setting, will ensure an easier transition into successful teamwork, as well as lessen any embarrassment that Emily may feel about her challenges. When student groups are formed, Emily's group will be comprised of patient, reliable students with whom Emily feels comfortable.