

**Pennsylvania Governor's Institute
For Mathematics Educators
2004**

Names of Group Members: Tommy Bedillion, Donald Deitterick, Debbie Frank, Stephen Herd, and Anne Marie McDonald

Topic/Theme: Geometry Staff Development

Level: K through 5 (based on building/district needs)

Time Element: 3 ½ hours

NCTM Standards Addressed:

Expectations: In grades 3–5 all students should:

- identify, compare, and analyze attributes of two-dimensional shapes and develop vocabulary to describe the attributes;
- classify two-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids;
- build and draw geometric objects;

PA Math Standards Addressed:

2.9.3. GRADE 3

- A. Name and label geometric shapes in two and three dimensions (e.g., circle/sphere, square/cube, triangle/pyramid, rectangle/prism).
- B. Build geometric shapes using concrete objects (e.g., manipulatives).
- C. Draw two- and three-dimensional geometric shapes and construct rectangles, squares and triangles on the geoboard and on graph paper satisfying specific criteria.
- D. Find and describe geometric figures in real life.
- I. Predict how shapes can be changed by combining or dividing them.

2.9.5. GRADE 5

- A. Give formal definitions of geometric figures.
- B. Classify and compare triangles and quadrilaterals according to sides or angles.

- E. Describe in words how geometric shapes are constructed.
- F. Construct two- and three-dimensional shapes and figures using manipulatives, geoboards and computer software.
- I. Represent and use the concepts of line, point and plane.
- J. Define the basic properties of squares, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, triangles, cubes, prisms, spheres and cylinders.
- L. Identify properties of geometric figures (e.g., parallel, perpendicular, similar, congruent, and symmetrical).

Math Assessment Anchors Addressed:

Grade 3

MC. Geometry

MC.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

M3.C.1.1 Identify and/or describe two- and three-dimensional objects.
Reference: 2.9.3.A

M3.C.1.1.1 Name/identify/describe geometric shapes in two dimensions (circle, square, rectangle, triangle, pentagon, hexagon, and octagon).

M3.C.1.1.2 Name/identify geometric shapes in three dimensions (sphere, cube, cylinder, cone, pyramid, rectangular prism).

M3.C.1.2 Identify/draw right angles and right triangles.
Reference: 2.10.3.A, 2.10.3.B

M3.C.1.2.1 Identify/draw right angles and right triangles formed by line segments, in geometric figures, on a geoboard, and/or in real-world objects.

Grade 5

ASSESSMENT ANCHOR

M5.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

ELIGIBLE CONTENT

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.1.1.1 Identify/classify/compare cubes, rectangular prisms and pyramids using faces, vertices and edges.

M5.C.1.1.2 Identify/classify/compare triangles and quadrilaterals according to

<p><i>Reference: 2.9.5.B, 2.9.5.C, 2.9.5.F, 2.10.5.A</i></p>	<p>sides (length, parallel or perpendicular) and angles.</p> <p>M5.C.1.1.3 Identify and/or compare parts of right triangles, including right angles, acute angles, hypotenuse and legs.</p>
<p>M5.C.1.2 Represent and/or use properties of lines, line segments, rays, points and planes.</p> <p><i>Reference: 2.9.5.I</i></p>	<p>M5.C.1.2.1 Identify, draw and/or label points, lines, line segments, rays and planes.</p>

Reading Assessment Anchors Addressed:

ASSESSMENT ANCHOR

R3.A.1 Demonstrate the ability to understand and interpret fiction texts appropriate to grade level.

ELIGIBLE CONTENT

<p>R3.A.1.1 Identify the meaning of vocabulary. <i>Reference: 1.1.3.E, 1.1.3.F</i></p>	<p>R3.A.1.1.1 Identify meaning of multiple-meaning words used in text.</p> <p>R3.A.1.1.2 Identify the meaning of an unfamiliar word if word or picture clues are available.</p> <p>R3.A.1.1.3 Identify a synonym or antonym of a word or phrase used in the context of the reading passage.</p>
<p>R3.A.2.1 Identify the meaning of vocabulary from various subject areas. <i>Reference: 1.1.3.E, 1.1.3.F</i></p>	<p>R3.A.2.1.1 Identify the meaning of a multiple-meaning word used in text.</p> <p>R3.A.2.1.2 Identify the meaning of an unfamiliar word if word or picture clues are available.</p> <p>R3.A.2.1.3 Identify a synonym or antonym of a word or phrase used in the reading passage.</p>

Objectives:

- 1) To enhance the teachers' understanding and knowledge of analyzing the characteristics and properties of two-dimensional geometric shapes and demonstrate understanding of geometric relationships.
- 2) To foster and promote the consistent and uniform usage of standard geometric vocabulary and terminology across grade levels.

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

Model differentiated instructional techniques/strategies i.e.:

Visual, Auditory, Kinesthetic, Tactile (VAKT)

Computer assisted instruction

Cooperative grouping

Materials/Resources:

- Geo boards
- two-dimensional geometric manipulatives
- rubber bands
- access to computers with internet hook-up
- LCD projector
- overhead projector
- candy for participants
- AlphaShapes ETA Item # IN034197

Web sites:

www.nctm.com

www.cyberchase.com

www.matti.usu.edu/nlvm

www.funbrain.com/brain/mathbrain/mathbrain.html

www.aplusmath.com

www.coolmath4kids.com

www.aaa.math.com/b/geo.htm

www.iit.edu/~smile/mathinde.html

www.shodor.org/interactive/lessons/#geo

www.illuminations.nctm.org

Book list:

Sir Cumference and the First Round Table by Cindy Neuschwander,
et al

Sir Cumference and the Sword in the Cone by Cindy Neuschwander ,
Wayne Geehan

Sir Cumference and the Great Knight of Angleland by Cindy
Neuschwander , Wayne Geehan

Sir Cumference and the Dragon of Pi by Cindy Neuschwander , Wayne
Geehan

The Greedy Triangle (Brainy Day Books) by Marilyn Burns, Gordon
Silveria

Three Pigs, One Wolf, and Seven Magic Shapes (Hello Math Reader, Level 3) by Grace MacCarone, et al
Grandfather Tang's Story (Dragonfly Books) by Ann Tompert
How Big Is a Foot? By Rolf Myller

Interdisciplinary Connections:

- **Reading**
The teachers will make connections between the selected text, characteristics, and vocabulary of two-dimensional figures.
- **Technology**
We will provide pertinent and current interactive websites to supplement geometry instruction.

Assessment Strategies:

- **Formative Evaluation (checking student understanding during the lesson):** Appropriate teacher participation and feedback pertinent to activities.
- **Summative Evaluation (how will it be determined that the objectives were achieved?):** Formal and informal teacher observation and periodic lesson plan evaluation throughout the school year, ongoing data analysis of student performance on district/standardized assessments, and progress monitoring.

Correctives/Remediation:

- Personal conference
- Peer mentoring/observations
- Ongoing team meetings
- Model lessons

Extensions/Enrichment:

- Further professional development
- Specific content study groups
- Development of master teachers
- Establish a connection between community and school

Program Agenda:

Concept – Understanding the characteristics and properties of two-dimensional figures

Connection - Activity (5 – 10 minutes)

- PSSA type question to assess the teachers' knowledge base of geometry (see Appendix 1)

Reflection of activity/discussion (10 – 15 minutes)

Content Instruction – activities (2 hours)

- sort and classify geometric shapes using a Venn diagram* (see Appendix 3)
- construct specific polygons using two-dimensional geometric shapes* (see Appendix 4)
- exploration of www.illuminations.nctm.org website

*each of these activities will include:

- introduction to the activity
- exploration time
- check for understanding during activity
- discussion of content
- adaptations/modifications for special needs

Guided Practice: (20 to 30 minutes)

- Read-Aloud of The Greedy Triangle (Brainy Day Books) by Marilyn Burns, Gordon Silveria (see Appendix 2)

Culminating Activity: - (30 Minutes)

- Design an age appropriate activity utilizing the geometric concepts, including proper vocabulary to be implemented during their geometry unit.
- Each grade level will share these lessons with the other grade levels.