

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

Names of Group Members: Mary Cunnally, Diana Graeber, Greg Kaylor, Bradley Wagner

Topic/Theme: Searching for a Parabola on an Inclined Plane

Level: Algebra II; PreCalculus

Time Element: 2 periods or 1 block

NCTM Standards Addressed: Algebra and Data Analysis

PA Math Standards Addressed:

2.6 – Statistics and Data Analysis

2.8 – Algebra and Functions

Math Assessment Anchors Addressed:

M11.D.1 – Demonstrate an understanding of patterns, relations and functions.

M11.D.4 – Describe or use models to represent quantitative relationships.

M11.E.4 – Develop and evaluate inferences and predictions or draw conclusions based on data or data displays.

Reading Assessment Anchors Addressed:

R11.A.2 - Demonstrate the ability to understand nonfiction text, including informational, e.g., textbooks, print media, editorials, public documents; autobiography; biography; and essay appropriate to grade level.

Objectives:

Students will demonstrate an understanding of real-world applications of parabolas by completing an experiment.

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

1. Review the properties of quadratic equations, solving a system of equations, simple physics concepts, and pertinent vocabulary.
2. Model the procedure for the experiment.
3. Conduct experiment and record results.
4. Analyze the results analytically and graphically.

Materials/Resources:

1. Medium size ball
2. Ramp
3. TI 83+ graphing calculator and calculator-based ranger
4. Lab activity worksheets
5. Enrichment worksheet
6. CD player and copy of “Spinning Wheel”

Interdisciplinary Connections:

- **Reading**
Identification of vocabulary and relevant details in the Galileo story
- **Technology**
Create a scatterplot on the TI 83+ calculator and calculate the quadratic regression
- **Other**
History: Facts about Galileo

Assessment Strategies:

- **Formative Evaluation (checking student understanding during the lesson):**
Teacher will observe and question students as they conduct the experiment and the analysis.
- **Summative Evaluation (how will it be determined that the objectives were achieved?):**
Teacher will conduct a post experiment discussion.
Students will select three points from the data, generate a quadratic equation algebraically, and then verify their solutions using the TI 83+ calculator.

Correctives/Remediation:

Students will utilize a program on the calculator to determine equations of randomly drawn parabolas written in vertex form.

Extensions/Enrichment:

Students will analyze a worksheet of graphs and write an explanation of what may have occurred to give each graph its' unique appearance.

Special Accommodations (special needs students)

- **Description of the Special Needs Student Selected:**
 1. Two years below grade level in mathematics.
 2. Motivated to be in the regular classroom.
 3. Willing to receive teacher's assistance in a private environment.
 4. Frequently engages in non-compliant behaviors in class to escape completing his assigned work.
 5. Reading skills including fluency and comprehension must be developed.
 6. Opportunities should be presented to enhance conversational and social skills.

- **Accommodations to Use with this Student:**
 1. Allow students in pairs to read the Galileo story aloud.
 2. Students work in small groups during the activity and worksheet sessions.
 3. Provide remediation using the calculator activity.