

Lesson Title: Finding Parabolas

Academic Subject Level: Pre-Algebra, Algebra I or II

Grade Level: 8 – 11

Art Form: Visual Art

Brief Description: Students find a piece of artwork that contains a parabola shape. They trace the shape three times onto a coordinate plane and then find the equation of each graph. They also identify the artist and write a brief biography of the artist.

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Standards – State of Ohio

Algebra 1:

-Generalize patterns using functions or relationships (quadratic) and freely translate among tabular, graphical and symbolic representations.

-Describe problem situations (quadratic) by using tables, graphs and symbols.

-Solve quadratic equations with real roots by factoring, graphing, using the quadratic formula with and without technology.

Visual Arts:

-Demonstrate the role of visual art is solving an interdisciplinary problem.

-Apply and combine visual art, research and technology skills to communicate ideas in visual form.

-Use key concepts, issues and themes to connect visual art to various content areas.

Materials:

- Tissue paper or some other type of tracing paper.
- Markers
- Graph paper
- Large construction paper, poster board or other for mounting.

Pre-lesson assignment:

The week before this lesson, students were assigned to bring in a copy of a work of art that contained a parabola shape. I had several examples for them. They were to know the artist and write a brief biography of the artist.

Procedures:

1. A lesson is presented on finding the equation of a parabola given its graph. Several examples are given for students to practice. (If class periods are short, this part of the lesson can be presented the day before and practice given for homework.)
2. Students trace the parabola from artwork and cut it out.
3. Students make a coordinate plane on graph paper. They then trace their parabola in 3 places on the graph paper:
 - a.) The vertex not at the origin and the y-axis as the axis of symmetry.
 - b.) The vertex not at the origin and the y-axis as the axis of symmetry.
 - c.) The vertex not at the origin and the axis of symmetry not the y-axis.
4. Students now find the equation for each of the 3 graphs they traced.
5. Mount work of art, biography, coordinate plane with parabolas, and computations on large paper.

Modifications:

-This lesson can be altered by using lines, parallel lines and perpendicular lines for pre-algebra or algebra.

Comments:

When finished, the students mounted the piece of artwork, short biography, coordinate plane with traced parabolas and their computations on a large sheet of construction paper or poster board. I thought it was very interesting to see the math work and artwork side-by-side. I saw the students really looking into the artwork to find the parabolas! Even though we had spent a long time studying parabolas and quadratic equations, it opened their eyes to the fact that even though they had the same parabola, the equation changed as the parabola moved around the coordinate plane. The equation is just directions telling you where the parabola is located on the coordinate plane and what it will look like when you find it!!

Grading Rubric:

Parabola Art Project

Name: _____

1. Is picture a true parabola? (5 points)
2. Is parabola traced accurately to 3 places on the coordinate plane? (10 points)
3. Equation 1: vertex at $(0,0)$ – (20 points).
4. Equation 2: Axis of symmetry is the y-axis, vertex not at the origin. (20 points)
5. Equation 3: Axis of symmetry is not the y-axis. (20 points)
6. Artist is identified. (5 points)
7. Short biography of artist is included. (20 points)

(Hint: I used a graphing calculator to grade equation 3. Type in their equation and see if it matches their graph.)