Pre-Calculus

Implement start year – 2014-2015

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Unit #3, Conic Sections
Transfer Goal: Students will be able to independently use their learning to model and analyze various situations.

Stage 1 – Desired Results

Established Goals

2009 NJCCC Standard(s), Strand(s)/CPI #
(http://www.nj.gov/education/cccs/2009/final.htm)

Common Core Curriculum Standards for Math and English
(http://www.corestandards.org/)

HSF-IF.C
- Analyze functions using different representations

HSF-GGPE
- Expressing geometric properties with equations
- Translate between geometric description and the equation for a conic section

HSF-A-SSE.3b
- Write expressions in equivalent forms to solve problems (completing the square)

21st Century Themes
(www.21stcenturyskills.org)

☒ Global Awareness
☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy
☒ Health Literacy
☒ Environmental Literacy

21st Century Skills

Learning and Innovation Skills:
☒ Creativity and Innovation
☒ Critical Thinking and Problem Solving
☒ Communication and Collaboration

Information, Media and Technology Skills:
☒ Information Literacy
☒ Media Literacy
☒ICT (Information, Communications and Technology) Literacy

Life and Career Skills:
☒ Flexibility and Adaptability
☒ Initiative and Self-Direction
☒ Social and Cross-Cultural Skills
☒ Productivity and Accountability
☒ Leadership and Responsibility

Enduring Understandings:

Students will understand that . . .

EU 1

- Conics are the result of slicing double right circular cones.

EU 2

- Conics are used in real life.

Essential Questions:

EU 1

How does the way a cone is sliced relate to the type of conic?
How is an equation used to determine the type of conic?

EU 2

How and why are conics used in real life?

Knowledge:

Students will know . . .

EU 1

The type of conic can be determined by the standard form of an equation
Conics have distinct features

EU 2

- Conics are used in architecture, art, and nature

Skills:

Students will be able to . . .

EU 1

Write conic equations in standard form and vertex form
- Translate conic equations from standard form to vertex form and vice versa

Identify the type of conic given the equation in standard form
Graph conics and identify key features

EU 2

Research examples of conic sections used in architecture, agriculture, art, astronomy, and various other real life situations

Stage 2 – Assessment Evidence

Recommended Performance Task : Create a Mural EU 1, EU 3

Other Recommended Evidence: *Tests, Quizzes, Prompts, Self-assessment, Observations, Dialogues, etc.*

Quiz on graphing a parabola given any form
Quiz on graphing parabolas, circles and ellipses.
Test on graphing all conics.
Assessed elements from recommended performance task.

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *Consider the WHERETO elements. Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

- Activity #1: Introduction to Conics – TI-nspire activity identifying how each conic results from slicing a cone. (A) http://education.ti.com/en/timathnspired/us/detail?id=2E8793B33E1048C1BA57F2C79E6F2991&t=629487495F2C47CA93E4DD7B103F29E2
- Activity #2: Create a list of conic equations in standard form. Students must identify what type of conic section is given, convert equation into vertex form, then graph each conic (M)
- Activity #3: TI-nspire: Elliptical Orbits of Planets (T) http://education.ti.com/en/timathnspired/us/detail?id=71A76E27F5684825BAB99107E44D19DB&t=DBC633859A7D466AAF421665A6AE6A91
- Activity #4: Radio Stations (M)
    1. Radio signals emitted from a transmitter form a pattern of concentric circles. Write equations for three concentric circles.
    2. Randy listens to radio station WYAY from Atlanta. Randy's home is located 24 miles east and 32 miles south of the radio station's

transmitter. His house is located on the edge of WYAY's maximum broadcast range.

a. When a radio signal reaches Randy's house, how far has it traveled? Sketch WYAY's listening area on the partial map of Georgia given on the following page. On the map let Atlanta's WYAY have coordinates (0, 0) and use the scale of 100 miles = 60 mm.

b. Find an equation which represents the station's maximum listening area.

c. Determine four additional locations on the edge of WYAY's listening area, give coordinates correct to tenths.

3. Randy likes to listen to country music. Several of his friends have suggested that in addition to WYAY, he try station WXAG in Athens and WDEN in Macon. WYAY, WXAG, and WDEN are FM stations which normally have an average broadcast range of 40 miles. Use your map to help you answer the following questions.

a. Given the location of Randy's house, can he expect to pick up radio signals from WXAG and WDEN? Show how you know.

b. What are the coordinates of the intersections of the broadcast areas of station WYAY and station WDEN? Show your work. (Does it matter whether you find the intersections using miles or mms? Explain.)