Pre-Calculus

Implement start year – 2014-2015

Revision Committee Members, email, extension

Chris Melograna cmelograna@lrhsd.org ext. 8679
Christina Mull cmull@lrhsd.org ext. 8051
Joanne Wagner jwagner@lrhsd.org ext. 8887
Maryann Wilson mwilson@lrhsd.org ext. 8665

Unit #2, Graphing Functions

Transfer Goal: Students will be able to independently use their learning to model and analyze various types of functional 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.B.4, 5, 7, 8

- Interpret functions that arise in applications in terms of the context
- Analyze functions using different representations

HSF-F-BF.A.1, B.3

- Build new functions from existing functions

HSF-F-LE

- Construct and compare linear, quadratic, and exponential models and solve problems

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

- Real world phenomena can be represented with graphs of functions

EU 2

- Characteristics of a graph can be found by investigating a function

EU 3

- Behaviors of graphs can reveal various patterns.

Essential Questions:

EU 1

What real world phenomena can be represented with graphs of functions?

EU 2

Based on a given function, how can the characteristics of the graph of the function be determined?

EU 3

How are patterns and end behaviors related when graphing functions?

Knowledge:

Students will know . . .

EU 1

General shape of the graphs of various functions
How to translate a real world situation into a graph of a function
How to analyze a graph in order to solve a real world problem or interpret real world phenomena

EU 2

The position of coefficients and constants in a given function transforms the graph of the function in specific ways

EU 3

- The difference between an even and odd function
- The end behavior of functions

Skills:

Students will be able to . . .

EU 1

Graph linear, exponential, logarithmic, polynomial, rational, radical, and step functions

EU 2

Find the critical points and asymptotes of polynomial, radical, rational, exponential, and logarithmic functions
Find minimums, maximums, and multiplicity of the zeros in order to graph functions
Identify and graph transformations of any function
Use a graph to identify limits.

EU 3

Identify even and odd functions and the type of symmetry, if any, of each function
Identify and analyze the end behavior of these functions

Stage 2 – Assessment Evidence

Recommend Performance Task: Water Fountain Project *EU1, EU2*

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: Use the TI-nspire to graph the 10 basic functions (A)
Activity #2: TI-nspire: Vertical and Horizontal Translations, Stretches and Shrinks of Functions (M) (from TI-nspire website)
(education.ti.com/en/us/activity/detail?id=185595832E674F7A88F05B985197E8B4&ref=/en/us/activity/search/subject?d=F988B132B1A74080AC6C1D0A68C5E3BB &s=B843CE852FC5447C8DD88F6D1020EC61&sa=2728754A144142118F13165941B9056E&t=E2FC1E7AF383446AA33E3A68F30BD326
Activity #3: Students take pictures of real world objects that depict the 10 basic graphs (3 from the book or the internet, the rest must be pictures taken by the student), then insert the pictures into a TI-nspire calculator or the online software. Students will determine the equations of their pictures. (T)

The following is a suggested sequence of learning activities and number of days for Accelerated Pre-Calculus class. Approximate days for completion: 20. Adjustments should be made accordingly for other levels.

- YWBAT graph 12 basic functions, label any asymptotes, and state the domain and range in interval notation (A)
  - Activity #1

- YWBAT transform 12 basic functions and state the domain and range in interval notation (A, M)
  - Activity #2
  - Activity #3

- YWBAT graph piece-wise functions (A)

- YWBAT determine the end behavior, multiplicity of zeros, minimums / maximums, and state if the function is even, odd, or neither, and graph each polynomial function (A, M)

- YWBAT graph rational functions with asymptotes, and discuss the limits of each function (A, M)

- YWBAT graph exponential functions with asymptotes, and discuss the limits of each functions (A,M)

- YWBAT graph logarithmic functions with asymptotes, and discuss the limits of each functions (A, M)

- Performance Task (M, T)