Course: *Algebra II Functions* **Unit #6:** *Functions*	**Year of Implementation:** 2024-2025	
Curriculum Team Members Casey Beck (cbeck@lrhsd.org), Dillon Fields (dfields@lrhsd.org), Robyn Webb (rwebb@lrhsd.org), Beth Underwood (eunderwood@lrhsd.org)		
Stage One - Desired Results		
Link(s) to New Jersey Student Learning Standards for this course: *{provide all applicable links to standards here}* https://www.state.nj.us/education/cccs/2020/		
• **Unit Standards:** ***Content Standards*** Interpreting Functions I.IF A. Understand the concept of a functions and use function notation 1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x) 2. Use the function notation, evaluate functions for inputs in their domains, and interpret statements that use notation in terms of a context. 3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. B. Interpret functions that arise in applications in terms of the context 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the		

quantities, and sketch graphs showing key features given a verbal description of the relationship

5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes

C. Analyze functions of using different representations

7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

c. graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior.

Building Functions F.BF

A. Build a function that models a relationship between two quantities

2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

B. Build new functions from existing functions

3. Identify the effect on the graph of replacing f(x) by f(x)+k, kf(x), f(kx), and f(x+k) for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology

4. Find inverse functions

a. Solve an equation of the form for a simple function *f* that has an inverse and write an expression for the inverse

b. Verify by composition that one function is the inverse of another.

c. Read values of an inverse function from a graph or a table, given that the function has an inverse.

d. Produce an invertible function from a non-invertible function by restricting the domain.

- ***21st Century Life & Career Standards***

- All curriculum writers/revisionists need to include standards that apply to “Career Readiness, Life Literacies, and Key Skills”. This should include a brief description of the standard and the standard number. Document only those standards and practices that apply to each unit. Use the following link to assist you [see pages of 31-36; 41-42; 53-56 for specific standard #’s and strands] https://www.state.nj.us/education/cccs/2020/2020%20NJSLS-CLKS.pdf

    - 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3)

    - 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
    - 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
    - 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

- ***Interdisciplinary Content Standards***
    - SL.11-12.1. Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.
    - SL.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content,

organization, development, and style are appropriate to task, purpose, and audience.
    - L.11-12.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

- ***NJ Statutes:*** NJ State law mandates the inclusion of the following topics in lesson design and instruction as aligned to elementary and secondary curriculum.

  Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

  Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

  LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A

board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35. Diversity and Inclusion (N.J.S.A. 18A:35-4.36a) A board of education shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards. Asian American and Pacific Islanders (AAPI) P.L.2021, c.410 Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416) For additional information, see ***NJ Amistad Curriculum:*** ***https://www.nj.gov/education/amistad/about/*** ***Diversity and Inclusion:*** ***https://www.nj.gov/education/standards/dei/index.shtml*** ● *(Sample Activities/ Lessons):* ***https://www.nj.gov/education/standards/dei/samples/index.shtml*** ***Asian American and Pacific Islanders:*** ● ***Asian American and Pacific Islander Heritage and History in the U.S.*** *A Teacher's Guide from EDSITEment offering a collection of lessons and resources for K-12 social studies,*	

<table>
<tr><td colspan="2">literature and arts classrooms that center around the experiences, achievements and perspectives of Asian Americans and Pacific Islanders across U.S. history.</td><td></td></tr>
<tr><td colspan="2">Transfer Goal: Students will be able to independently use their learning to model, analyze and manipulate various types of situations.

As aligned with LRHSD Long Term Learning Goal(s):https://www.lrhsd.org/Page/6163

Modeling: demonstrate mastery of concepts by evaluating models that others have constructed or by creating appropriate models of their own

Patterns: analyze data and recognize patterns in a variety of situations</td><td></td></tr>
<tr><td><u>Enduring Understandings</u>
Students will understand that. . .

EU 1
● the characteristics and behavior of functions and sequences are essential when interpreting real world problems.</td><td><u>Essential Questions</u>

EU 1
● How can the characteristics, patterns, and end behaviors of a function be determined and transformed?</td><td></td></tr>
<tr><td><u>Knowledge</u>
Students will know . . .

EU 1
● general shape of the graphs of various functions. (I.IF.A.1)</td><td><u>Skills</u>
Students will be able to. . .

EU 1
● define and recognize sequence functions. (F.BF.A.2)</td><td></td></tr>
</table>

• real world situation can be translated into a graph of a function. (I.IF.C.7)	• identify the critical points,asymptotes, domain, and range of polynomial, radical, rational, exponential, and logarithmic functions. (I.IF.C.7.c, F.IF.B.5) • find minimums, maximums, and multiplicity of the zeros in order to graph functions. (F.IF.C.7) • identify transformations of any function. (F.BF.B.3) • identify even and odd functions and the type of symmetry, if any, of each function. (F.BF.B.4) • identify and analyze the end behavior functions. (F.IF.B.4)	
Stage Two - Assessment		
•		
Stage Three - Instruction		

Learning Plan: **Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: 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.** *{place A, M and/or T along with the applicable EU number in parentheses after each statement} All knowledge and skills must be addressed in this section with a corresponding lesson/activity which teaches each concept. The following color codes are used to notate activities that correspond with interdisciplinary connections and 21st Century Life & Career Connections (which involves Technology Literacy): Red = Interdisciplinary Connection; Purple = 21st Century Life & Career Connection*

- Activity # 1 - Intro to Sequences (A, EU 1)
  https://teacher.desmos.com/activitybuilder/custom/60745c1f7c93ff0c934cdf87?collections=611fd97bb1c51318483e1077
- Activity #2 - Students are to research the Fibonacci sequences. They must find real life connections to architecture, art, music, and nature. Students must turn in a written explanation of 3 situations where this sequence is used. (M, EU 1)
- Activity #3 - Library of Functions Card Sort (M, EU 1)
  https://teacher.desmos.com/activitybuilder/custom/57e35c029600440c0fd1559c
- Activity #4 - Graphing Piecewise Functions on Desmos (A, EU 1)
  https://youtu.be/QZXJpUqURTY?si=H9EvM0wZslW3COR1
- Activity #5 - Students take pictures of real world objects depicting the basic graphs (3 from 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, EU 1)
- Activity #6 - Piecewise Functions (A, M, T, EU 1)
  https://teacher.desmos.com/activitybuilder/custom/5f8f048f3e248c2616c0f001

Suggested Sequence of Learning Activities
- Activity #1 outlined above (A, EU 1)
- Activity #2 outlined above (M, EU 1)

• Review polynomial, radical, rational, exponential, and logarithmic functions (shape, asymptotes, end behavior, domain, range) • Activity #3 outlined above (M, EU 1) • Activity #4 outlined above (A, EU 1) • Activity #5 outlined above (T, EU 1) • Activity #6 outlined above (A, M, T, EU 1) • Performance Task	

Pacing Guide

{This chart will be identical in all of the units for this course.}

Unit #	***Title of Unit***	***Approximate # of teaching days***
1	Unit 1 Quadratic Functions	30
2	Unit 2 Polynomial Functions	18
3	Unit 3 Exponential & Logarithmic Functions	18
4	Unit 4 Radical Functions	18
5	Unit 5 Rational Functions	18
6	Unit 6 Functions	14

7	Unit 7 Statistics & Probability	18

Instructional Materials

TI-Nspire Calculator
DESMOS online graphing calculator and activities
Khan Academy
Kuta Infinite Software

Accommodations

Special Education: The curriculum will be modified as per the Individualized Education Plan (IEP). Students will be accommodated based on specific accommodations listed in the IEP.
Students with 504 Plans: Students will be accommodated based on specific accommodations listed in the 504 Plan.
English Language Learners: Students will be accommodated based on individual need and in consultation with the ELL teacher.
Students at Risk of School Failure: Students will be accommodated based on individual need and provided various structural supports through their school.
Gifted and Talented Students: Students will be challenged to enhance their knowledge and skills through acceleration and additional independent research on the subject matter.