

# Unit 5: Functions

Content Area: **Template**  
Course(s):  
Time Period: **Full Year**  
Length: **Full Year**  
Status: **Published**

## UNIT RATIONALE

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We will extend our skills of constructing functions to model linear relationships to other types of functions. We will show how different functions relate to their parent function and how to transform the graphs. Students will look through how these functions are represented in the real world. They will use function notation, evaluate functions using function notation, and interpret statements that use function notation in context.

## ESSENTIAL QUESTIONS

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In what ways can we use and manipulate algebraic equations to find the value of an unknown quantity?

How do variables help you model real world situation and solve equations?

How can different mathematical models be graphed using different types of functions?

How can we determine the best type of function to use?

How can we use different tools and representations to solve problems?

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## STANDARDS

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### NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

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New Jersey (NJSL) - High School - Mathematics (2020)

MA.F-IF

Interpreting Functions

MA.G-CO.A.2

Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

MA.F-IF.A.2

Use function notation, evaluate functions for inputs in their domains, and interpret

	statements that use function notation in terms of a context.
MA.F-IF.B	Interpret functions that arise in applications in terms of the context
MA.S-ID.B.6a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data.
MA.A-SSE.B.3c	Use the properties of exponents to transform expressions for exponential functions.
MA.F-IF.C	Analyze functions using different representations
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MA.F-IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.F-BF	Building Functions
MA.F-BF.A.1b	Combine standard function types using arithmetic operations.
MA.F-BF.A.1c	Compose functions.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.F-BF.B	Build new functions from existing functions
MA.F-BF.B.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.
MA.F-LE.B	Interpret expressions for functions in terms of the situation they model
MA.A-REI.D.11	Explain why the $x$ -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

## **NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS**

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PFL.9.1.12.CFR.2	Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions.
PFL.9.1.12.CFR.4	Demonstrate an understanding of the interrelationships among attitudes, assumptions, and patterns of behavior regarding money, saving, investing, and work across cultures.
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

TECH.9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
TECH.9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

## NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

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CS.9-12.8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
CS.9-12.8.1.12.AP.7	Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.
CS.9-12.8.1.12.AP.8	Evaluate and refine computational artifacts to make them more usable and accessible.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
CS.9-12.8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
CS.9-12.8.2.12.NT.2	Redesign an existing product to improve form or function.

## PRE-ASSESSMENTS

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Non-curricular tasks to identify students' readiness levels with problem solving.

Rubric Based Reassessments and Algebra 1 assignments.

## INSTRUCTIONAL PLAN

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### MODULE 1

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<b>Student Learning Intentions (SLI) WALT: (We are learning to...)</b>	Students will fill out interactive notebook pages to help them in their algebra 1 class.
<b>Student Learning Strategies</b>	Interactive notebook pages Common mistakes Resource and flip books
<b>Success Criteria</b>	Students can fill out the pages of their interactive notebook so they have a resource for their

	classroom
<b>Formative Assessment (drives instructional decisions)</b>	There is no formative assessment for this introduction to each topic
<b>Activities and Resources</b>	Interactive Notebook Pages listed
<b>Suggested Modifications</b>	Fill out pages for absent students

- [DOMAIN\\_AND\\_RANGEINT.docx](#)
- [DOMAIN\\_AND\\_RANGEINT1.docx](#)
- [DOMAIN\\_AND\\_RANGEINT.pdf](#)
- [DOMAIN\\_AND\\_RANGEINT1.pdf](#)
- [Evaluating-Functions-from-an-Equation.pdf](#)
- [Relations\\_INT.pdf](#)
- [Evaluating\\_Functions-GraphINT.docx](#)
- [Evaluating\\_Functions-GraphINT.pdf](#)
- [function\\_notationINT.pdf](#)
- [Relation\\_or\\_FunctionINT.pdf](#)
- [Evaluating-Functions-from-Graphs.pdf](#)
- [PARENT\\_FUNCTIONS.docx](#)
- [Function-Machines-and-Notation.pdf](#)
- [Relation\\_or\\_FunctionINT.docx](#)
- [FunctiontransformationsINT.pdf](#)
- [FunctiontransformationsINT.docx](#)
- [PARENT\\_FUNCTIONS.pdf](#)
- [DRINT.docx](#)
- [function\\_notation.docx](#)
- [DRINT.pdf](#)

## MODULE 2

<b>Student Learning Intentions (SLI) WALT: (We are learning to...)</b>	Students will complete a function transformation project from a Choose 4 list so they can show the understanding of functions.
<b>Student Learning Strategies</b>	Showing students how functions are incorporated into the real world. Students search these functions and come up with real world examples.
<b>Success Criteria</b>	<p>I can create a project listed below.</p> <p>I can show the features of transformations of functions.</p> <p>I can identify a real world example of each function.</p> <p>I can describe the function and its features.</p>

<b>Formative Assessment (drives instructional decisions)</b>	Rubric attached to powerpoint
<b>Activities and Resources</b>	Activity attached
<b>Suggested Modifications</b>	Have students work in pairs or by themselves. It's a choose 4 so students can do an activity they feel most comfortable with.

[TransformationProjectSTEM.docx](#)

[Function Transformation Project](#)

## REFLECTIONS

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This unit was towards the end of the marking period, so a lot of time was spent catching students up.

The project was really cool to see students do something they enjoy like dance or sing. I would only do 3 days for the project not four, or maybe make it a more intense project for the posterboard and/or flip book.

## INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS

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LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.K-12.NJSLSA.W4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.K-12.NJSLSA.W5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
LA.K-12.NJSLSA.W6	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
LA.K-12.NJSLSA.W7	Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.
LA.K-12.NJSLSA.W8	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
LA.K-12.NJSLSA.W9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared

writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

LA.L.9-10.2.C

Spell correctly.