

# Unit 1: Functions

Content Area: **Math**  
Course(s):  
Time Period: **September**  
Length: **8 classes**  
Status: **Published**

## State Mandated Topics Addressed in this Unit

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N/A	N/A

## Functions

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## Learning Objectives

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- Objective 1 - Create and solve equations.
- Objective 10 - Estimate the average rate of change from a graph.
- Objective 11 - Write a function that describes a relationship between two quantities
- Objective 12 - \*Determine an explicit expression, recursive process, or steps for calculations from a given context\*
- Objective 13 - Write a function that describes a relationship between two quantities.
- Objective 14 - Combine functions using arithmetic operations.
- Objective 15 - Build a function by combining two functions and relate the resulting functions to a model.
- Objective 16 - Compose functions.
- Objective 17 - Identify the effect on a graph of  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$ .
- Objective 18 - Find the values of  $k$  given a graph.
- Objective 19 - Experiment with cases using technology.
- Objective 2 - Create and solve inequalities.
- Objective 20 - Recognize even and odd functions from their graphs.
- Objective 21 - Recognize even and odd functions given an algebraic expression.
- Objective 22 - Find inverse functions.
- Objective 23 - Find the end behavior.
- Objective 3 - Understand that a function has one member of the domain assigned to exactly one element of the range.
- Objective 4 -  $F(x)$  denotes the output of  $f$  corresponding to the input of  $x$ .
- Objective 5 - The graph of  $f$  is the graph of  $y=f(x)$

- Objective 6 - Use function notation to evaluate functions for inputs in their domain.
- Objective 7 - Interpret statements that use function notations in terms of context.
- Objective 8 - Calculate the average rate of change of a function from a graph or a function on an interval.
- Objective 9 - Interpret the average rate of change.

## Essential Skills

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- Essential Skill 1 - The artist will be able to understand that a function has one member of the domain assigned to exactly one element of the range.  $f(x)$  denotes the output of  $f$  corresponding to the input of  $x$ . The graph of  $f$  is the graph of  $y=f(x)$
- Essential Skill 10 - The artist will be able to build a function by combining two functions and relate the resulting functions to a model.
- Essential Skill 11 - The artist will be able to compose functions.
- Essential Skill 12 - The artist will be able to identify the effect on a graph of  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$
- Essential Skill 13 - The artist will be able to find the values of  $k$  given a graph.
- Essential Skill 14 - The artist will be able to experiment with cases using technology.
- Essential Skill 15 - The artist will be able to recognize even and odd functions from their graphs.
- Essential Skill 16 - The artist will be able to recognize even and odd functions given an algebraic expression.
- Essential Skill 17 - The artist will be able to create and solve equations.
- Essential Skill 17 - The artist will be able to verify inverse functions using composition.
- Essential Skill 18 - The artist will be able to create and solve inequalities.
- Essential Skill 19 - The artist will be able to find inverse functions.
- Essential Skill 2 - The artist will be able to use function notation to evaluate functions for inputs in their domain.
- Essential Skill 20 - The artist will be able to find the end behavior.
- Essential Skill 3 - The artist will be able to interpret statements that use function notations in terms of context.
- Essential Skill 4 - The artist will be able to calculate the average rate of change of a function from a graph or a function on an interval.
- Essential Skill 5 - The artist will be able to interpret the average rate of change.
- Essential Skill 6 - The artist will be able to estimate the average rate of change from a graph.
- Essential Skill 7 - The artist will be able to write a function that describes a relationship between two quantities.
- Essential Skill 8 - The artist will be able to determine an explicit expression, recursive process, or steps for calculations from a given context.
- Essential Skill 9 - The artist will be able to combine functions using arithmetic operations.

## Standards

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MATH.9-12.F.BF.A.1.a

Determine an explicit expression, a recursive process, or steps for calculation from a

	context.
MATH.9-12.F.BF.A.1.b	Combine standard function types using arithmetic operations.
MATH.9-12.F.BF.A.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
MATH.9-12.F.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$ , $k f(x)$ , $f(kx)$ , 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.
MATH.9-12.A.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
MATH.9-12.F.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
MATH.9-12.F.IF.B.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.
MATH.9-12.F.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

## Instructional Tasks/Activities

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- Academic games & Competitions
- Arts inspired projects
- Formative Assessments
- Ladder Activity
- Notes
- Worksheets

## Assessment Procedure

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- Classroom Total Participation Technique
- Classwork
- DBQ
- End Behavior test
- End Behavior test review
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance

- Problem Correction
- Project
- Quiz
- Quiz Review
- Rubric
- Teacher Collected Data
- Test
- Test review
- Worksheet

## **Recommended Technology Activities**

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- Appropriate Content Specific Online Resource
- Chromebook
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Power Point
- Quizizz
- Screencastify

## **Accommodations & Modifications & Differentiation**

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Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

## **Gifted and Talented**

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- Compare & Contrast
- Conferencing
- Debates
- Jigsaw

- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

## **Instruction/Materials**

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- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

## **Environment**

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- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

## **Honors Modifications**

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The honors track will move at a faster pace for this unit. They will also analyze graphs that contain asymptotes and holes to prepare them for pre-calculus. They will have more in depth critical thinking and analysis type questions.

## **Resources**

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- Resource 1 - <https://njctl.org/courses/math/algebra-ii/>