

# 10-Graphing Non-Linear Functions

Content Area: **Math**  
Course(s):  
Time Period: **Full Year**  
Length: **2 weeks (8-10 blocks)**  
Status: **Published**

## **General Overview, Course Description or Course Philosophy**

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This final unit looks back on and expands topics covered throughout the course, especially function tables, graphs, and equations. Students will compare the characteristics of various functions and identify real-world situations in which each can be used.

## **OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS**

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Students will understand that:

- Non-linear functions can be used to solve a problem or predict an outcome
- Functions are a mathematical way to describe relationships between two quantities that vary

Essential Questions:

- How can you recognize various functions (linear, exponential, quadratic) from a table? A graph? An equation?
- How can you describe a non-linear change from a graph?
- Give an example of a real-world situation that can be represented using a non-linear function. Explain.

## **CONTENT AREA STANDARDS**

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### **A.CED**

**A. Create equations that describe numbers or relationships**

### **A.REI**

**A. Understand solving equations as a process of reasoning and explain the reasoning**

**B. Solve equations and inequalities in one variable**

**C. Solve systems of equations**

**D. Represent and solve equations and inequalities graphically**

### **A.SSE**

## A. Interpret the structure of expressions

## B. Write expressions in equivalent forms to solve problems

MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.F-IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
MA.F-IF.C.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
MA.F-IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
MA.F-LE.A.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
MA.F-LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MA.F-LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
MA.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

## **RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)**

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9.1.8.PB.3: Explain how to create budget that aligns with financial goals.

LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
CS.K-12.3.c	Evaluate whether it is appropriate and feasible to solve a problem computationally.
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

## **STUDENT LEARNING TARGETS**

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### **Declarative Knowledge**

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Students will understand that:

- Key characteristics of non-linear functions are vertex, zeros, intercepts, domain, range, maximum/minimum, and opening direction
- Linear functions have a constant first difference
- Quadratic functions have a constant second difference
- Exponential functions have a multiplicative relationship

## **Procedural Knowledge**

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Students will be able to:

- Categorize and graph exponential growth and decay
- Identify and graph inverse variations
- Identify and graph quadratic equations in two-variables
- Use first and second difference to determine type of function
- Compare functions using equations, tables, and graphs

## **EVIDENCE OF LEARNING**

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### **Benchmark Assessments**

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Benchmark Assessments conducted three times per year, using Pear Assessment (Standards Based Assessments)

### **Alternate Assessments**

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- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

## **Formative Assessments**

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- Class Discussion/Exit Cards
- Homework/practice problems (assigned from textbook or various web resources, such as Khan Academy, Albert, Quizizz, or Desmos)

## **Summative Assessments**

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- Lesson quizzes
- Teacher-generated unit test
- Performance tasks

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

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### **Core Instructional Resources**

- *Algebra 1: Common Core*, Sections 4-1, 4-3, 11-6, & 11-7

### **Supplemental Resources**

- [Illustrative Math Tasks](#)
- [Arlington Algebra Project \(A Final Look at Functions\)](#)

## **INTERDISCIPLINARY CONNECTIONS**

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Students can write equations or functions to model real-world systems, for example, acceleration due to gravity and projectile motion.

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

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See link to Accommodations & Modifications document in course folder.

