Unit 5: Introduction to Functions
Algebra Prep
10 Class Meetings

Created July 2020

Essential Questions

- How can functions describe and represent real-world situations, model predictions and solve problems?

Enduring Understandings with Unit Goals

EU 1: Functions are a mathematical way to describe relationships between two quantities that vary.
- Describe how the dependent and independent variables relate to each other.

EU 2: Real-world situations can be represented in a variety of ways.
- Represent functions using an equation, a table, and a graph.

EU 3: Function notation is a mathematical method of representing an equation as a function.
- Decipher the meaning of questions posed in function notation.

Standards

Common Core State Standards:
- **8.F.A.1**: Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Function notation is not required in Grade 8.
- **HS.F.IF.A.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).
- **HS.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.
- **HS.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.
- **HS.F.IF.B.5**: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- **8.F.A.3**: Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.
- **8.F.B.5**: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
- **HS.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).

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ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.
Competency 2: Speak to diverse audiences in an accountable manner.
Competency 3: Develop the behaviors needed to interact and contribute with others on a team.
Competency 4: Analyze and solve problems independently and collaboratively.
Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. **Relations and Functions**
   - Identify the Domain and Range of a function
   - Identify Functions – Vertical Line Test

2. **Using Graphs to Relate Two Quantities**
   - Analyze a Graph (Independent and Dependent Variables)
   - Compare and contrast a Table and a Graph
   - Sketch a Graph
   - Identify Domain and Range

3. **Patterns and Linear Functions**
   - Compare and contrast Linear Functions
   - Classify Functions as Linear or Nonlinear

4. **Graphing a Function Rule**
   - Graph a Function Rule Using a Table
   - Graph a Real-World Function Rule
   - Identify and compare Continuous and Discrete Graphs

5. **Writing a Function Rule**
   - Write a Function Rule
   - Use Function Notation

Interdisciplinary Connection:
- Language Arts- Accountable Talk, Word Problems

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Daily Learning Objectives with *Do Now Activities*
Students will be able to…   - Describe the difference between a relation and function   *Think about the word function. When have you heard it used in math and what does it mean?*   - Identify the domain and range of a relation   - Analyze graphs of real-world situations   *Interpret the given graph for context and answer the questions.*   - Examine and explain patterns that describe linear functions as well as nonlinear functions   *How do you determine whether a function is linear or nonlinear?*   - Create a graph from equations that represent functions   *Describe similarities between the graph you drew and the function you are given.*   - Write and describe equations that represent functions   - Calculate values of a function using function notation   *Give an example of an equation in function notation and explain how you know it's in function notation.*

Instructional Strategies/Differentiated Instruction
- Whole-group instruction   - Graphic organizers   - Creating authentic connections for students   - Rephrasing and restatement of information and concepts   - Guided notes   - Student-led instruction   - Small group instruction   - Independent problem-solving   - Collaborative problem-solving   - Cross-curricular problem solving (independent and collaborative)   - Accountable Talk   - Manipulatives   - Word walls with visuals   - Homework

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Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Do Now Activity
- Warm-ups (SBAC prep)
- ABCD Cards
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Student-led instruction
- Homework
- Performance Task - Hot Air Balloon
  Future Rubric Assessment in 2021-2022

SUMMATIVE ASSESSMENTS:

- Quiz – EU 1 and 2
- Unit 5 Test – IAB: Functions
- Performance Task - Hot Air Balloon

Unit Task

Unit Task Name: Hot Air Balloon

Description: Students will use information learned during this unit about how functions are used to describe mathematical relationships (EU 1), how real-world situations can be represented in a variety of ways (EU 2), and how function notation is a mathematical way of representing functions (EU 3) to create a graph of a hot air balloon trip. Students will be given times and heights of the hot air balloon and must graph them on a graph. Once the hot air balloon trip is graphed on the coordinate plane, they will be instructed to use the graph to answer a series of questions about the trip. They will need to go into depth about each answer in order to show a true understanding of the concepts.

Evaluation: Summative Assessment and Future Rubric in 2021-2022 school year

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Unit Resources
- Flipped Google Classroom Videos   - Worksheets   - Calculator   - Laptops   - SBAC Prep Online   - Kahn Academy   - Match Fishtank   - Map.Mathshell.org   - Online resources