Unit 01 Linear Functions

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 1**
Length: **11 days**
Status: **Published**

Brief Summary of Unit

The major work of this chapter is transformations of functions, building new functions from existing functions, a topic that students explored in Algebra 1 using a variety of functions. The goal is to 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. Modeling with linear functions and solving linear systems in three variables are also included in this chapter. In the first two sections, students review transformations of linear, absolute value, and quadratic functions. After reviewing six basic parent functions, students will transform the functions and then compare transformed functions to parent functions. Students will review modeling with linear functions in the third section. This involves writing linear functions from given information and finding lines of fit. Students will find a line of fit using two points, the line of best fit using linear regression, and then compare estimates using each model. In the last section, students extend prior work with systems of equations to solve linear systems in three variables. It is assumed that students will be using graphing technology in this course. In this first chapter, many fundamental skills for using graphing technology are integrated throughout the sections.

Revised Date: June 2024

Standards

Diversity and Inclusion: Students will focus on equity, inclusion, and tolerance when analyzing the comparison of various quantities regarding characteristics of people. Equality will also be highlighted which can be associated with both numerical representations and the connection between people. This can be associated with treating people fairly and equally.

MATH.9-12.S.ID.B.6.a	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. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
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.S.ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
MATH.9-12.A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MATH.9-12.A.CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
MATH.9-12.F.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

MATH.9-12.F.IF.C.7.a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MATH.9-12.A.REI.C.6	Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
MATH.9-12.F.IF.C.7.b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
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).

Essential Questions

- What makes a relationship between two variables linear?
- Why are linear functions useful in the real world?

Enduring Understandings

- Linear functions represent situations involving a constant rate of change.
- The characteristics of linear functions and their representations are useful in solving real world problems.

Students Will Know

- Students will know how to describe transformations of parent functions.
- Students will know how to identify parent functions and transformations.
- Students will know how to model with linear functions.
- Students will know how to solve linear systems.

Students Will Be Skilled At

- Students will be skilled at comparing linear equations to solve real life problems.
- Students will be skilled at determining a line of fit and line of best fit.
- Students will be skilled at graphing transformations of functions.
- Students will be skilled at identifying the function family to which a function belongs.
- Students will be skilled at solving linear systems in three variables algebraically.
- Students will be skilled at solving real life problems using systems of equations in three variables.
- Students will be skilled at understanding how translations, reflections, stretches, and shrinks affect the graphs of functions.
- Students will be skilled at visulalizing solutions of linear systems in three variables.
- Students will be skilled at writing equations of linear functions.
- Students will be skilled at writing functions that represent transformations of absolute value functions.
- Students will be skilled at writing functions that represent transformations of linear functions.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Albert/AP Classroom and/or Big Ideas Math unit assessments
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

Unit 1 Linear Functions (3 weeks)

1.1 Day 1

- Introduce parent functions: constant, linear, absolute value and quadratic. Students should create and graph functions from tables of parent functions. Introduce vertical translations and identify equations given graphs.

1.1 Day 2

- Show the remaining transformations (horizontal translation, vertical stretch, reflection over x-axis)

1.2

- Apply multiple transformations to linear and absolute value functions. Identify the equation of a given graph. Graph a given function.
- Apply transformations on a non-parent function and find a new equation.

Mid Chapter Quiz (review and quiz day)

1.3 Day 1

- Graph linear equations.
- Find equations of lines given the graph.
- Compare linear equations to real life problems

1.3 Day 2

- Plot data to find line of fit using straightedge, calculating the slope and solving for the y-intercept.
- Use technology to the find the line of Best fit.
- Interpret correlation coefficient. Use line of fit or best fit to predict.

1.4 2 days

- Discuss intersection(s) of linear systems in three variables.
- Use algebra to solve systems of linear equations in three variables.

Second half Chapter Quiz (review and quiz day)

SGO or PSAT practice in between

Chapter Test

Materials

Core instructional materials: Core Book List including Big Ideas Math Algebra 2 2022

Supplemental materials: Khan Academy, Edia, and DeltaMath

- District approved textbook and ancillary materials
- Online resources: Khan Academy, Delta Math, Edia, Ed Puzzle
- Teacher created activites
- Teacher created notes

Suggested Strategies for Modifications

QSAC Accomodations for Algebra 2/Intro to Trig CP