

Math 8 Unit 5: Functions

Content Area: **Math**
Course(s):
Time Period: **Marking Period 3**
Length: **8 weeks**
Status: **Published**

Course Pacing Guide

Unit	MP/Trimester	Weeks
Integers, Equations, and Inequalities	1	8
Rational Numbers and Proportions	1/2	5
Geometry and Measurement	2/3	9
Transformations	3	4
Functions	3/4	7
Data Analysis and Probability	4	4

Unit Overview

This unit introduces students to the concept of functions, a heavily emphasized topic in Algebra 1. Students will write and graph linear functions, calculate the slope of a line, find slopes of parallel and perpendicular lines, and solve systems of linear equations. Students will use prior knowledge of literal equations to put equations in function form.

Enduring Understandings

A set of ordered pairs of numbers forms a relation.

A relation pairs numbers in one set, the domain, with numbers in a second set, the range.

A function is a relation in which each domain value is paired with only one range value.

An equation in two variables has infinitely many solutions: any ordered pair (x,y) that makes the equation true.

$y = 3x + 2$ is a linear equation since all the points lie along a line.

Finding the x-intercept and the y-intercept of a graph can be found by letting $y = 0$ and solving for x, and letting $x = 0$ and solving for y.

The slope of a line is the rate of change of the dependent variable with respect to the independent variable.

The equation $y = mx + b$ is known as the slope-intercept form of a line.

If the points on a scatter plot seem to lie roughly on a line, you can approximate the data by drawing a best-fitting line.

Function notation allows you to identify the independent and dependent variables in a function.

Two lines with the same slope are parallel and do not intersect.

The solution to a system of linear equations is the point which satisfies both equations, or the point of intersection of the two lines on the coordinate plane.

A linear inequality in two variables expresses an order relation, using one of the four inequality symbols.

Essential Questions

How can you tell from the graph of a relation that it is a function?

How would you graph $y = 4x + 1$?

How do you know when a function is (a) linear, (b) nonlinear, (c) increasing, (d) decreasing?

How do you find the y-intercept of a line from the equation of the line?

How can you calculate the slope of a line?

Explain how to use slope to analyze real-world graphs with straight line segments.

What is the slope-intercept form of an equation, and why is it called this name?

Describe the graph of a direct variation equation.

What information can you obtain from a linear model?

What information do you need to write the equation of a line?

Explain the difference between the graph of a discrete function and the graph of a continuous function.

What does the notation $f(-2)$ mean?

Why would you compare two different functional relationships?

For an ordered pair to be a solution of a linear system of equations, what must be true?

Explain why the solution of a system of linear equations obtained using an algebraic approach may differ from the result of a graphical approach.

How do you graph a linear inequality?

New Jersey Student Learning Standards (No CCS)

MA.8.EE.C.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
MA.8.EE.C.8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.
MA.8.EE.C.8c	Solve real-world and mathematical problems leading to two linear equations in two variables.
MA.8.F.A	Define, evaluate, and compare functions.
MA.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.
MA.8.F.A.2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.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.
MA.8.F.B	Use functions to model relationships between quantities.
MA.8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
MA.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.

Interdisciplinary Connections

6-8.MS-PS3-1.4.1	Construct and interpret graphical displays of data to identify linear and nonlinear relationships.
SCI.7-8.5.1.8.B.b	Mathematics and technology are used to gather, analyze, and communicate results.
SCI.7-8.5.2.8.E.1	Calculate the speed of an object when given distance and time.
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.C.CS4	Contribute to project teams to produce original works or solve problems.

Technology Standards

TECH.8.1.12.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.2.12.C.CS2	The application of engineering design.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

21st Century Themes/Careers

CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Financial Literacy Integration

PFL.9.1.8.A.2	Relate how career choices, education choices, skills, entrepreneurship, and economic conditions affect income.
PFL.9.1.8.A.6	Explain how income affects spending decisions.
PFL.9.1.8.B.9	Determine the most appropriate use of various financial products and services (e.g., ATM, debit cards, credit cards, check books).
PFL.9.1.8.D.1	Determine how saving contributes to financial well-being.
PFL.9.1.8.D.5	Explain the economic principle of supply and demand.
PFL.9.1.8.E.1	Explain what it means to be a responsible consumer and the factors to consider when making consumer decisions.
PFL.9.1.8.F.3	Relate the impact of business, government, and consumer fiscal responsibility to the economy and to personal finance.

Instructional Strategies & Learning Activities

- Provide access to online textbook
- Provide access to review problems/extra practice
- Provide access to answer keys for self-checking
- Tic-Tac-Toe
- Scavenger hunts

- Partner work
- Pair-Square
- Clock partners
- Supplemental worksheets
- Coordinate Planes
- Functions Murder Mystery

Differentiated Instruction

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Tiered Learning Targets
- Meaningful Student Voice & Choice
- Relationship-Building & Team-Building
- Self-Directed Learning
- Debate
- Student Data Inventories
- Game-Based Learning
- Grouping
- Rubrics
- Jigsaws
- Learning Through Workstations
- Concept Attainment
- Flipped Classroom
- Mentoring
- Assessment Design & Backwards Planning

Formative Assessments

- Daily homework checks
- Quiz
- Chapter Test
- Exit Tickets
- Warm-Ups

Summative Assessment

- Unit Test
- Unit Project

Benchmark Assessments

Students will take NJSLA Algebra 1 Benchmark B

Alternate Assessments

- Modified homework
- Modified quizzes
- Modified tests
- Modified projects

Resources & Technology

- Google docs, spreadsheets, slides

- TI graphing calculator
- Chromebooks
- Promethean board
- Websites: Desmos, Geogebra, EdPuzzle, Quizlet
- Google classroom

BOE Approved Texts

Holt Larson Pre-Algebra 9780547614830

Closure

- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Have students fill out a checklist with the objectives for the day.
- Have students complete an exit ticket without putting their name on it. Hand back exit tickets the next day in class and have students correct as a warm up.
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice,

Please," or "I Need Some Help!"

- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"

ELL

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaries
- Google Translate

Special Education

- Shorten assignments to focus on mastery of key concepts.
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the whiteboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.

- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for an additional credit grade.
- Average grades out when assignments are reworked, or grade on corrected work.

504

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support

- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

At Risk

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures

- Cue/model expected behavior
- Use peer supports and mentoring
- Chart progress and maintain data

Gifted and Talented

- Offer the Most Difficult First
- Pretest for Volunteers
- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking