

Lakewood School District Curriculum Guide

8th Grade	Content Area: Mathematics
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Original Adoption: 2023 NJSLs English Language Arts and English as a Second Language (8-21-24); Math NJSLs Mathematics (8-21-24); 2020 NJSLs Science, Social Studies, Career Readiness, Life Literacies & Key Skills, Computer Design & Thinking, Visual & Performing Arts, World Language, Comprehensive Health and Physical Education (5-11-22)

Created By:

Recommended Pacing Guide

Unit 1: Solving Equations	26 days
Unit 2: Graphing Linear Equations	35 days
Unit 3: System of Equations	21 days
Unit 4: Functions	14 days
Unit 5: Number System	28 days
Unit 6: Geometry	18 days
Unit 7: Statistics and Probability	4 days

Alignment with State Mandates

The following colors are used throughout this document to indicate areas in which the curriculum is aligned with the following NJSA requirements:

- Holocaust and genocides ([N.J.S.A. 18A:35-28](#))
- History and contributions of African-Americans (Amistad Law) ([N.J.S.A. 18A:35-4.43](#))
- Highlight and promote diversity and inclusion (Diversity & Inclusion Law) ([N.J.S.A. 18A:35-4.36a](#))
- History of disabled and LGBT persons included in middle and high school curriculum ([Section 18A:35-4.35](#))
- Climate Change - to prepare students to understand how and why climate change happens, the impact it has on our local and global communities and to act in informed and sustainable ways. Please [click here](#) for specific examples (by subject).

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Unit 1: Solving Equations	26 days
<u>New Jersey Learning Standards-Mathematics</u>	
8.EE.7	<i>Solve linear equations in one variable.</i>
8.EE.7a	<i>Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).</i>
8.EE.7b	<i>Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.</i>

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful

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MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
● L.KL.8.2	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
● SL.AS.8.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Science Standards	
● MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
● MS-PS3-5	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Computer Science & Design Thinking	
8.1 Computer Science	
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
8.2 Design Thinking	
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. 	

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- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>
- [https://www.iready/teacher toolbox.org](https://www.iready/teacher%20toolbox.org)

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- iReady
- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

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<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● <i>In order to identify the inverse operation, the operation done to x must first be identified.</i> ● <i>Performing the inverse operation results in the additive or multiplicative identity.</i> ● <i>Expressions on both sides of the equation must first be simplified before collecting the variable on one side of the equation.</i> ● <i>An equation with no solution means that there does not exist any value for x which will make the equation true.</i> ● <i>An equation with all real numbers as its solution means that any number will make the equation true.</i> 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● <i>What is a variable?</i> ● <i>What is a solution to an equation?</i> ● <i>How can a balance scale be used to solve equations?</i>
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Students will know that linear equations in one variable can have one solution, no solution, or infinitely many solutions, and they will know how each type is recognized through algebraic simplification. ● Students will know how to successively rearrange an equation into simpler equivalent forms using properties of equality, the distributive property, and combining like terms. ● Students will know that an equation resulting in $x = a$ represents one solution, $a = a$ represents infinitely many solutions, and $a = b$ (with different numbers) represents no solution. ● Students will know how to solve linear equations with rational number coefficients, including fractions and negatives, by isolating the variable through inverse operations. ● Students will know how to apply the distributive property and combine like terms correctly in order to simplify and solve multi-step equations. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Differentiate between expressions and equations ● Solve variable equations (with integer coefficients) equations by reasoning about the inverse operation ● Determine whether an equation has 1, 0 or infinitely many solutions

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● 8.EE: Equations and Expressions ● 8.NS: The Number System ● 8.F: Functions ● 8.G: Geometry 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● http://www.coolmath.com/ ● http://www.mobymax.com/

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- [8.S: Statistics & Probability](#)

- <https://www.tenmarks.com/>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- [Mathematicians](#)
- <https://www.radicalmath.org/math-social-justice>
- [Alan Turing Gizmos Grades 6-8](#)
- [African Americans in Math](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups

- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
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Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
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- Tiered Activities
- Manipulatives/Concrete Models

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- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 2: Graphing Linear Equations	35 days
<u>New Jersey Learning Standards-Mathematics</u>	
8.EE.5	<i>Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i>
8.EE.6	<i>Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.</i>

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8.F.2	<i>Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i>
8.F.4	<i>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.</i>

<u>Standards of Mathematical Practices</u>	
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MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects
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Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
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● SL.AS.8.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Science Standards	
● MS-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
● MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process

Computer Science & Design Thinking	
8.1 Computer Science	
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
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Career Readiness, Life Literacies & Key Skills

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9.1 Personal Financial Literacy

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Summative Assessments:

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Benchmark Assessments:

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Knowledge & Skills

Enduring Understandings:

- *A linear relationship can be presented in graph, scenario, equation or table.*
- *A graph of a linear equation is all the solutions (x, y) to that equation.*
- *Linear relationships have an initial value and a constant rate of change*
- *Linear relationships with initial value of 0 are proportional relationships*
- *The rate of change of a proportional relationship can be found in multiple places on the graph*

Essential Questions:

- *How can I tell if a relationship between x and y is a linear relationship?*
- *What is the slope of the line?*
- *How can I identify the slope and y intercept of a line based on the associated scenario?*

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<ul style="list-style-type: none"> ● <i>The slope of the line a/b can be understood as a for every b or can be understood as a/b for every 1.</i> 	
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Students will know that proportional relationships can be represented in graphs, tables, equations, and descriptions, and that the unit rate represents the slope of the graph. ● Students will know that slope is constant for any two points on a line ● Students will know that linear equations of the form $y = mx$ represent lines through the origin, with a y-intercept at b. ● Students will know how to compare functions across representations (graphs, tables, equations, and scenarios). ● Students will know how to create a linear function that models a real-world or mathematical situation using rate of change and initial value. ● Students will know how to identify the rate of change (slope) and initial value (y-intercept) from tables, graphs, equations, or context. ● Students will know how to interpret slope and intercept in context, explaining what they mean in the real-world situation being modeled. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Understand ratios and rates ● Understand linear equations with two variables ● Find the equation of the line from a table ● Determine the rate of change and initial value of a linear function and interpret their meaning within context. ● Identify and analyze proportional relationships ● Accurately compare and contrast multiple representations of functions (graphs, tables, equations, scenarios) to draw conclusions about behavior, change, and structure. ● Construct a linear function that models a real-world scenario, given a description, table, or graph

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● 8.EE: Equations and Expressions ● 8.NS: The Number System ● 8.F: Functions ● 8.G: Geometry ● 8.S: Statistics & Probability 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● http://www.coolmath.com/ ● http://www.mobymax.com/ ● https://www.tenmarks.com/ ● https://www.ixl.com/math ● https://nj.digitalitemlibrary.com/home ● https://www.radicalmath.org/math-social-justice ● Alan Turing Gizmos Grades 6-8 ● African Americans in Math

Suggested Accommodations**English Language Learners:**

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- Visual Cues
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- Technology Integration
- Hands-On/Experiential Activities
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- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
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504 Plans:

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Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 3: System of Equations

21 days

[New Jersey Learning Standards-Mathematics](#)

8.EE.8:

Analyze and solve pairs of simultaneous linear equations.

- a. 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.*
- b. Solve systems of two linear equations in two variables using the substitution method and estimate solutions by graphing the equations. Solve simple cases by inspection. For example: by inspection, conclude that $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. Solve $3x + y = 30$ and $y = 2x$ using the substitution method*
- c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

[Standards of Mathematical Practices](#)

MP1. Make sense of problems and persevere in solving them

- Find meaning in problems
- Look for entry points
- Analyze, conjecture and plan solution pathways
- Monitor and adjust
- Verify answers
- Ask themselves the question: “Does this make sense?”

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MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
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MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

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<u>Interdisciplinary Connections</u>	
ELA Standards	
<ul style="list-style-type: none"> ● L.KL.8.2 	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
<ul style="list-style-type: none"> ● SL.AS.8.6. 	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Science Standards	
<ul style="list-style-type: none"> ● MS-ETS1-2 	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
<ul style="list-style-type: none"> ● MS-ESS3-4 	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.

<u>Computer Science & Design Thinking</u>
<p><u>8.1 Computer Science</u></p> <ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
<p><u>8.2 Design Thinking</u></p> <ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. ● 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

<u>Career Readiness, Life Literacies & Key Skills</u>
<p><u>9.1 Personal Financial Literacy</u></p> <ul style="list-style-type: none"> ● 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.” ● 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products. ● 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.
<p><u>9.4 Life Literacies & Key Skills</u></p> <ul style="list-style-type: none"> ● 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. ● 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Oral Questioning ● Student Conference 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Teacher-Created Projects ● https://www.illustrativemathematics.org/

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<ul style="list-style-type: none"> ● Self-Assessment ● Hand Signals ● Communicators ● Graphic Organizers ● Teacher Observation ● DOL ● Quiz Classwork ● NJSLA Released questions ● Problem of the Day 	<ul style="list-style-type: none"> ● https://www.khanacademy.org/ ● https://www.engageny.org ● https://www.iready/teacher toolbox.org
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● iReady ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment

Knowledge & Skills	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● <i>The solution to a system of equations is the (x, y) value that makes BOTH equations true.</i> ● <i>A solution to a system of equations must have both coordinates in order to be a solution.</i> ● <i>A system of equations that is always true for any x and its corresponding y is said to have all real numbers as its solution.</i> ● <i>A system of equations that is NEVER true for any x is said to have no solutions.</i> 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● <i>What is a system of equations?</i> ● <i>What is the solution of a system of equations?</i> ● <i>How can I determine the best method to solve a system of equations?</i> ● <i>Why is the point of intersection on a system of equations the solution?</i>
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● That a system of linear equations consists of two equations whose solution is the point that makes both equations true. ● That the point of intersection of two lines on a graph represents the solution to the system. ● That system can have one solution, no solution, or infinitely many solutions, depending on the relationship between the two lines. ● That equations with the same slope but different intercepts have no solution because the lines are parallel. ● That equations with the same slope and same intercept have infinitely many solutions because they 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Graph linear equations that are not in $y = mx + b$ form by solving for y. ● Solve systems of equations graphically and algebraically ● Analyze a system of equations and determine the best method to solve ● Identify when a system of equations has no solutions or infinitely many solutions when solving both algebraically and graphically. ● Solve a system of equations word problems algebraically and graphically.

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represent the same line.

- That the substitution method can be used to solve systems by replacing one variable with an equivalent expression from the other equation.
- How to apply systems of equations to real-world problems, such as comparing cost plans, analyzing trends, or determining when two quantities are equal.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- [8.EE: Equations and Expressions](#)
- [8.NS: The Number System](#)
- [8.F: Functions](#)
- [8.G: Geometry](#)
- [8.S: Statistics & Probability](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <http://www.coolmath.com/>
- <http://www.mobymax.com/>
- <https://www.tenmarks.com/>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [Alan Turing Gizmos Grades 6-8](#)
- [African Americans in Math](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

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- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems

- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

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- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

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Unit 4: Functions	14 days
<u>New Jersey Learning Standards-Mathematics</u>	
8.F.1	<i>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.</i>
8.F.3	<i>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. For example, the function $A=s^2$ giving the area of a square as a function of its side lengths is not linear because its graph contains points (1, 1), (2, 4), and (3, 9), which are not on a straight line.</i>
8.F.5	<i>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.</i>

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful

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MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
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Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
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Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
● L.KL.8.2	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
● SL.AS.8.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Science Standards	
● MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
● MS-ESS2-4	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

Computer Science & Design Thinking	
8.1 Computer Science	
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
8.2 Design Thinking	
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. 	

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- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks: <ul style="list-style-type: none"> ● Oral Questioning ● Student Conference ● Self-Assessment ● Hand Signals ● Communicators ● Graphic Organizers ● Teacher Observation ● DOL ● Quiz Classwork ● NJSLA Released questions ● Problem of the Day 	Alternative Assessments: <ul style="list-style-type: none"> ● Teacher-Created Projects ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● https://www.engageny.org ● https://www.iready/teacher toolbox.org
Summative Assessments: <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	Benchmark Assessments: <ul style="list-style-type: none"> ● iReady ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment

Knowledge & Skills

Enduring Understandings: <ul style="list-style-type: none"> ● <i>A function has only one output for every input</i> ● <i>A function can be represented as an equation, table, set mapping or graph</i> ● <i>A linear function has a constant rate of change</i> 	Essential Questions: <ul style="list-style-type: none"> ● <i>What is a function?</i> ● <i>What does it mean for a function to be increasing/decreasing?</i> ● <i>How can I determine if a relation is a function?</i>
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<ul style="list-style-type: none"> ● <i>A proportional function has an initial value of 0 and a constant rate of change</i> ● <i>A function is increasing when the ys get larger as the xs get larger</i> 	<ul style="list-style-type: none"> ● <i>How can I determine if a relation is a linear function or a proportional function?</i>
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● A function assigns exactly one output for each input, and its graph represents all ordered pairs that satisfy the relationship. ● Linear functions can be written in the form $y=mx+b$ and produce straight-line graphs, while nonlinear functions (like $y=x^2$) do not. ● The slope (m) represents the rate of change between two quantities, and the y-intercept (b) represents the initial value in a real situation. ● How to recognize whether a function is increasing, decreasing, constant, linear, or nonlinear by examining a graph or verbal description. <p>That function behavior (rate of change, pattern, shape of graph) helps model real-world phenomena in fields such as science, climate studies, and economics.</p>	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Determine whether a graph, mapping, scenario, table, or set of ordered pairs represents a function by demonstrating for every input there is only one output. ● Create equations for function mappings ● Creating equations for function tables ● Creating equations for verbal descriptions of a function ● Analyze functions to determine their growth behavior ● Determine whether a function is linear, linear and proportional, or non-linear by looking at tables, equations and graphs. ● Determine whether a function is increasing or decreasing by looking at tables, equations and graphs.

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● 8.EE: Equations and Expressions ● 8.NS: The Number System ● 8.F: Functions ● 8.G: Geometry ● 8.S: Statistics & Probability 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● http://www.coolmath.com/ ● http://www.mobymax.com/ ● https://www.tenmarks.com/ ● https://www.ixl.com/math ● https://nj.digitalitemlibrary.com/home ● https://www.radicalmath.org/math-social-justice ● Alan Turing Gizmos Grades 6-8 ● African Americans in Math

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- Visual Models
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- Provide additional time

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- Technology Integration
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Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures

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- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 5: Number System	28 days
<u>New Jersey Learning Standards-Mathematics</u>	
8.NS.1	<i>Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number</i>
8.NS.2	<i>Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i>
8.NS.A.3	<i>Understand that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.</i>
8.EE.1	<i>Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.</i>
8.EE.2	<i>Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.</i>
8.EE.2a	<i>Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.</i>
8.EE.2b	<i>Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares). For example, simplify $\sqrt{8}$ to $2\sqrt{2}$.</i>

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8.EE.3	<i>Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger.</i>
8.EE.4	<i>Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology</i>

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
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MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
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8th Grade	Content Area: Mathematics
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MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects
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● SL.AS.8.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Science Standards	
● MS-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
● MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Computer Science & Design Thinking	
8.1 Computer Science	
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
8.2 Design Thinking	
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. ● 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). 	

Lakewood School District Curriculum Guide

8th Grade

Content Area: Mathematics

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>
- [https://www.iready/teacher toolbox.org](https://www.iready/teacher_toolbox.org)

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- iReady
- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Rational and irrational numbers behave predictably and can be compared, approximated, and located on the number line.
- Decimal expansions reveal important structure about whether a number is rational or irrational.

Essential Questions:

- How can we determine whether a number is rational or irrational from its decimal expansion?
- How can approximations help us compare irrational numbers and estimate quantities in mathematics and science?
- Why do exponent rules work, and how do they help us simplify expressions?

Lakewood School District Curriculum Guide

8th Grade	Content Area: Mathematics
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<ul style="list-style-type: none"> Exponent properties allow us to efficiently represent, manipulate, and compare very large or very small quantities. Square roots and cube roots connect algebra to real-world measurement, physical phenomena, and scientific modeling. Scientific notation is essential for interpreting data across science fields such as astronomy, biology, and earth science. Operations on numbers maintain logical structure: rational operations remain rational, and combining rational and irrational numbers follows consistent rules. 	<ul style="list-style-type: none"> How do square roots and cube roots arise naturally in geometry, physics, and measurement? Why is scientific notation necessary when representing extremely large or extremely small values? How do operations on rational and irrational numbers shape the structure of the number system?
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<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> That rational numbers have repeating or terminating decimals, while irrational numbers have nonrepeating, nonterminating decimal expansions. How to approximate irrational numbers and locate them on a number line using rational benchmarks. That operations with rational numbers remain rational, and operations combining rational and irrational numbers follow predictable patterns. Exponent properties (product, quotient, zero, and negative exponent rules) and how to apply them to simplify expressions. <p>That square roots and cube roots represent numbers whose squares or cubes equal a given value, and that roots of non-perfect squares are irrational.</p> <ul style="list-style-type: none"> How to rewrite numbers in scientific notation and convert between scientific and standard form. How to use scientific notation to interpret and compare very large or very small quantities, including orders of magnitude. That scientific notation is used across science fields to measure phenomena such as population size, atmospheric concentration, and microscopic or astronomical distances 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> Determine whether a number is rational or irrational by analyzing its decimal expansion. <ul style="list-style-type: none"> Approximate irrational numbers to a specific degree of precision and place them accurately on the number line. Apply exponent rules to generate equivalent expressions and simplify numerical problems. Represent and solve equations involving square roots and cube roots. Evaluate the reasonableness of numerical expressions that include irrational numbers. Convert between scientific notation and standard notation and perform operations (multiply, divide, add, subtract) in scientific notation. Compare quantities of vastly different sizes using powers of ten. Interpret scientific notation in real-world science contexts such as planetary distances, cell sizes, or climate data.
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Lakewood School District Curriculum Guide

8th Grade

Content Area: Mathematics

Suggested Activities/Resources:

- [8.EE: Equations and Expressions](#)
- [8.NS: The Number System](#)
- [8.F: Functions](#)
- [8.G: Geometry](#)
- [8.S: Statistics & Probability](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <http://www.coolmath.com/>
- <http://www.mobymax.com/>
- <https://www.tenmarks.com/>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [Alan Turing Gizmos Grades 6-8](#)
- [African Americans in Math](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice

- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
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- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
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- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
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Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
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- Summarize as you go
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Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
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8th Grade	Content Area: Mathematics
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Unit 6: Geometry	18 days
<u>New Jersey Learning Standards-Mathematics</u>	
8.G.1	<i>Verify experimentally the properties of rotations, reflections, and translations</i>
8.G.1a	<i>Lines are taken to lines, and line segments to line segments of the same length.</i>
8.G.1b	<i>Angles are taken to angles of the same measure.</i>
8.G.1c	<i>Parallel lines are taken to parallel lines</i>
8.G.2.	<i>Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.</i>
8.G.3	<i>Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.</i>
8.G.4	<i>Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them</i>
8.G.5	<i>Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i>
8.G.6	<i>Explain a proof of the Pythagorean Theorem and its converse.</i>
8.G.7	<i>Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</i>
8.G.8.	<i>Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</i>
8.G.9	<i>Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems</i>

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures

Lakewood School District Curriculum Guide

8th Grade	Content Area: Mathematics
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	<ul style="list-style-type: none"> ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections

ELA Standards	
<ul style="list-style-type: none"> ● L.KL.8.2 	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
<ul style="list-style-type: none"> ● SL.AS.8.6. 	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Lakewood School District Curriculum Guide

8th Grade	Content Area: Mathematics
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Science Standards	
<ul style="list-style-type: none"> ● MS-PS4-2 	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
<ul style="list-style-type: none"> ● MS-ETS1-4 	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
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Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
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Alternative Assessments:

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- [https://www.iready/teacher toolbox.org](https://www.iready/teacher_toolbox.org)

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8th Grade	Content Area: Mathematics
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Summative Assessments: <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	Benchmark Assessments: <ul style="list-style-type: none"> ● iReady ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment
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Knowledge & Skills

Enduring Understandings: <ul style="list-style-type: none"> ● <i>A rigid transformation does not change the size or angles of the original shape. It always results in congruent figures.</i> ● <i>A dilation changes the size and position of the original shape.</i> ● <i>A volume of a three dimensional figure is the measurement of how much 3D space is inside the figure.</i> ● <i>The surface area of a three dimensional figure is the measurement</i> 	Essential Questions: <ul style="list-style-type: none"> ● <i>What is the difference between a rigid and non-rigid transformation?</i> ● <i>What are the different kinds of rigid transformations?</i> ● <i>What is area? What is volume?</i> ● <i>What is the Pythagorean Theorem?</i> ● <i>What does it mean for two figures to be congruent or similar, and how can we verify these relationships?</i> ● <i>How can we use reasoning about angles and triangles to draw conclusions about geometric relationships?</i> ● <i>Why is the Pythagorean Theorem such a powerful tool in both mathematics and real-world applications?</i> ● <i>How do volume formulas for three-dimensional figures help us describe and solve real-world problems?</i> ● <i>How does coordinate geometry provide a bridge between algebraic reasoning and geometric concepts?</i>
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Content <i>Students will know...</i> <ul style="list-style-type: none"> ● Perform a given “rigid” transformation on a geometric figure by actually moving the figure ● Observe that performing any of the above “rigid” transformations will result in a congruent figure. ● Dilate a geometric figure. ● Look at images of dilated figures and state the scale factor. ● Describe a <i>series of</i> transformations from a given pre-image and image. ● Generalize the Pythagorean theorem and its converse ● Apply the Pythagorean Theorem. ● Find missing interior or exterior angles of a triangle 	Skills <i>Students will be able to ...</i> <ul style="list-style-type: none"> ● Perform and describe rotations, reflections, translations, and dilations on the coordinate plane. ● Determine whether two figures are congruent or similar by analyzing sequences of transformations. ● Use angle relationships to justify geometric statements and solve for unknown angle measures. ● Apply the Pythagorean Theorem and its converse to classify triangles and solve real-world distance problems. ● Calculate distances between two points using the coordinate geometry form of the Pythagorean Theorem. ● Use volume formulas to solve multi-step, real-world problems involving cylinders, cones, and spheres. ● Explain geometric transformations and
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<ul style="list-style-type: none"> ● Demonstrate that when triangles have the same angle measure they are similar. ● Apply properties of angles formed when a transversal cuts two parallel lines. ● Know the formulas for the volume of cones, cylinders and spheres and use them to solve real world and mathematical problems 	<p>relationships using correct mathematical vocabulary and reasoning.</p>
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Core Instructional & Supplemental Materials
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<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● 8.EE: Equations and Expressions ● 8.NS: The Number System ● 8.F: Functions ● 8.G: Geometry ● 8.S: Statistics & Probability 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● http://www.coolmath.com/ ● http://www.mobymax.com/ ● https://www.tenmarks.com/ ● https://www.ixl.com/math ● https://nj.digitalitemlibrary.com/home ● https://www.radicalmath.org/math-social-justice ● Alan Turing Gizmos Grades 6-8 ● African Americans in Math
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Suggested Accommodations

<p>English Language Learners:</p> <ul style="list-style-type: none"> ● Multi-Sensory Instruction ● Flexible Grouping ● Small Group Instruction ● Peer Buddies ● Graphic Organizers ● Chunking Information ● Scaffolded Questioning ● Manipulatives/Concrete Models ● Build Background/Vocabulary ● Math Word Wall/Word Bank ● Gradual Release Model ● Visual Cues ● Visual Models ● Technology Integration ● Hands-On/Experiential Activities ● Native language support when possible ● Sheltered English Instructional Strategies ● Provide additional time

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- Supplemental books
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Economically Disadvantaged:

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- Chunk texts
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Lakewood School District Curriculum Guide

8th Grade	Content Area: Mathematics
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Unit 7: Statistics & Probability	4 days
<u>New Jersey Learning Standards-Mathematics</u>	
8.SP.1.	<i>Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</i>
8.SP.2.	<i>Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.</i>
8.SP.3.	<i>Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height</i>
8.SP.4.	<i>Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?</i>

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
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8th Grade	Content Area: Mathematics
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MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
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● SL.AS.8.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Science Standards	
● MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
● MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Lakewood School District Curriculum Guide

8th Grade

Content Area: Mathematics

Computer Science & Design Thinking

8.1 Computer Science

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9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>
- [https://www.iready/teacher toolbox.org](https://www.iready/teacher_toolbox.org)

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- iReady
- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

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Knowledge & Skills

Enduring Understandings:

- *For positive correlated variables x and y , y will increase as x increases.*
- *For negatively correlated variables x and y , y will decrease as x decreases.*
- *For two variables that are neither positively or negatively correlated we will not see y increase or decrease as the x s get larger.*
- *The best fit line can help us make predictions about future y values for given x s.*

Essential Questions:

- *How does a two-way table show us the percentage of individuals that fall in each category?*
- *How can we tell by looking at the scatter plot if two variables are positively or negatively correlated or not correlated?*
- *What is the best fit line?*

Content

Students will know...

- Construct a scatter plot from a given data set with two variables.
- Describe scatter plots using terms such as linear or non-linear correlation, positive correlation, negative correlation outliers and clustering.
- Create best fit lines for scatter plots that appear to have linear correlations.
- Interpret the slope and y intercept of the best fit line in the context of the problem.
- Create and interpret a two- way table summarizing data on two categorical variables.
- Use relative frequencies calculated for rows or columns in a two-way table to describe possible association between the two variables.

Skills

Students will be able to ...

- Construct and interpret scatter plots to investigate relationships between two numerical variables, identifying patterns such as clustering, outliers, positive/negative association, linearity, or nonlinearity.
 - Determine whether a linear model is appropriate for a given scatter plot and informally draw a line of best fit that represents the overall trend.
 - Judge the fit of a linear model by assessing how closely data points cluster around the drawn line, noting when residuals appear large or inconsistent.
 - Use the equation of a line of best fit to solve real-world problems, interpreting the slope as the rate of change and the y -intercept as an initial value in context.
 - Explain how two quantitative variables are related by describing direction, strength, and type of association using correct statistical vocabulary.
 - Construct and interpret two-way tables to analyze categorical data, computing joint, marginal, and conditional relative frequencies.
 - Use relative frequencies to determine whether an association may exist between two categorical variables and justify conclusions using evidence from the table.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- [8.EE: Equations and Expressions](#)
- [8.NS: The Number System](#)
- [8.F: Functions](#)
- [8.G: Geometry](#)
- [8.S: Statistics & Probability](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <http://www.coolmath.com/>
- <http://www.mobymax.com/>

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- <https://www.tenmarks.com/>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [Alan Turing Gizmos Grades 6-8](#)
- [African Americans in Math](#)
- [Autumn Kent: Geometric Probability](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available

- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities

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- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background