Unit 1: Equations and Inequalities

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **4 Weeks**
Status: **Published**

Unit Rationale

A unit on equations and inequalities in Algebra 1 is fundamental for building students' algebraic skills and logical reasoning. This unit focuses on understanding how to solve and apply equations and inequalities, which are central concepts in algebra and critical for various real-world applications. Here's a detailed rationale for including a unit on equations and inequalities:

1. Foundation of Algebraic Skills

- **Core Concepts:** Equations and inequalities form the basis of algebra. Mastery of these concepts is crucial for solving more complex problems in algebra and other areas of mathematics.
- **Logical Reasoning:** Solving equations and inequalities involves logical reasoning and systematic problem-solving techniques, which are essential skills in mathematics and beyond.

2. Problem-Solving Skills

- **Systematic Approach:** Learning to solve equations and inequalities helps students develop a systematic approach to problem-solving, which is applicable in various contexts.
- **Application of Operations:** Students practice applying mathematical operations (addition, subtraction, multiplication, and division) to manipulate and solve equations and inequalities, reinforcing their arithmetic skills.

3. Real-World Applications

- **Modeling Situations:** Equations and inequalities are used to model real-world situations, such as budgeting, pricing, and constraints in design. Understanding these concepts allows students to create mathematical models for practical problems.
- **Decision Making:** Inequalities, in particular, are used to represent constraints and conditions in real-world scenarios, helping students make informed decisions based on given limitations.

4. Preparation for Advanced Topics

- **Foundation for Future Learning:** Proficiency in solving equations and inequalities prepares students for more advanced mathematical concepts, such as functions, systems of equations, and quadratic equations.
- **Introduction to Functions:** Understanding how to solve equations is foundational for learning about functions, as many functions are defined by equations.

5. Development of Critical Thinking

- **Reasoning and Justification:** Solving equations and inequalities requires students to justify their steps and reasoning, which enhances their critical thinking and analytical skills.
- **Error Analysis:** Learning to identify and correct errors in solving equations and inequalities helps

students develop persistence and attention to detail.

6. Graphical Interpretation

- **Graphing Solutions:** Graphing equations and inequalities introduces students to visualizing solutions and understanding how different representations (graphs, tables, equations) are related.
- **Intersection of Solutions:** For systems of equations and inequalities, students learn to interpret and solve for the intersection points, which is crucial for understanding complex relationships between variables.

7. Enhancing Mathematical Literacy

- **Understanding Symbols:** Working with equations and inequalities helps students become familiar with mathematical symbols and notation, which is essential for reading and interpreting mathematical texts.
- **Confidence Building:** Successfully solving equations and inequalities builds students' confidence in their mathematical abilities and prepares them for more challenging problems.

8. Preparation for Standardized Testing

- **Test Preparation:** Equations and inequalities are frequently tested on standardized exams. Mastery of these topics is essential for performing well on tests such as the SAT, ACT, and state assessments.

By including a unit on equations and inequalities, educators provide students with essential algebraic skills that are foundational for further mathematical learning and practical applications. This unit helps students build a strong base in algebra, enhances their problem-solving abilities, and prepares them for future mathematical concepts and real-world challenges.

Topic 1 Solving Equations and Inequalities

Essential Questions

What general strategies can you use to solve simple equations?

- How do you create equations with a variable on both sides and use them to solve problems?
- How is rewriting literal equations useful when solving problems?
- How are the solutions of an inequality different from the solutions of an equation?
- What are the compound inequalities and how are their solutions represented?
- Why does the solution for absolute value equations or inequality typically result in a pair of equations or inequalities?

Pre-Assessments

1- Beginning of the Year Assessment- Assessment Sourcebook

2- Topic Readiness Assessments available at SavvasRealize.com

Instructional Plan

Lesson 1.1 Solving Linear Equations

Student Learning Intentions or We are learning to … (WALT)

- We are learning to explain that each step in solving a linear equation follows from the equality in the previous step.
- We are learning to create and solve linear equations with one variable using the properties of equality.

Student Success Criteria … "I can statements"

- I can use linear equations to solve mathematical and real-world problems using the properties of equality.
- I can create and solve linear equations with one variable.

Instructional Strategies and Activities

- Habits of Mind: How did you determine which operations are needed to solve the problem?
- Student textbook page 5-11
- Vocabulary: like terms, properties of equality, solution of an equation, identity

Formative Assessments

- 1-1 Lesson Quiz (printable or available online)

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-1
- Additional Practice 1-1
- Enrichment 101
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials

- Assignment Guide: Basic 10-25, 27-37 (odd), 38-45; Advanced 10-15, 17-27 (odd), 26-45

Reflections and Suggested Modifications

Vocabulary: equivalent equations, inverse operations, isolate, solution of an equation, variable.

Common Error: skipping steps when writing equations, confusing integer rules for addition/subtraction and multiplication/division, leaving variable negative

Lesson 1.2 Solving Equations With a Variable on Both Sides

Student Learning Intentions or We are learning to … (WALT)

- We are learning to use the properties of equality to solve linear equations with a variable on both sides.
- We are learning to identify whether linear equations have one solution, infinitely many solutions, or no solution.

Student Success Criteria … "I can statements"

- I can write and solve equations with a variables of both sides to solve problems.

Instructional Strategies and Activities

- Habits of Mind: What assumptions did you make that helped you work through the Explore and Reason?
- Student textbook page 12-17
- Vocabulary: identity, infinite

Formative Assessments

- 1-2 Lesson Quiz (printable or available online)

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-2
- Additional Practice 1-2
- Enrichment 1-2
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials
- Assignment Guide: Basic 10-27, 29-39 odd, 41-50; Advances 10-15, 17-27 odd, 28-50

Reflections and Suggested Modifications

Vocabulary: equivalent equations, inverse operations, isolate, solution of an equation, variable.

Common Error: review of the distributive property, multiply all terms by the number outside the parenthesis, not gathering all the common terms to one side of the equation

Lesson 1.3 Literal Equations and Formulas

Student Learning Intentions or We are learning to … (WALT)

- We are learning to rearrange formulas and equations to highlight a quantity of interest by isolating the variable using the same reasoning used to solve equations.
- We are learning to use formulas and equations to solve problems.

Student Success Criteria … "I can statements"

- I can rewrite and use literal equations to solve problems

Instructional Strategies and Activities

- Habits of Mind: How is solving equations with numbers the same as solving equations with only variables?
- Student textbook page 18-23
- Vocabulary: formula, literal equation

Formative Assessments

- 1-3 Lesson Quiz (printable or available online)

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-3
- Additional Practice 1-3
- Enrichment 1-3
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials
- Assignment Guide: Basic 9-18, 19-27 odd, 28-35; Advanced 9-12, 13-17 odd, 19-35

Reflections and Suggested Modifications

Vocabulary: formula, literal equation

Common Error: divide the entire equation when isolating the variable

Lesson 1.4 Solving Inequalities in One Variable

Student Learning Intentions or We are learning to … (WALT)

- We are learning to create and solve inequalities in one variable.
- We are learning to interpret solutions to inequalities within the context
- We are learning to identify inequalities as true or false based on the number of solutions.

Student Success Criteria … "I can statements"

- I can solve and graph inequalities.

Instructional Strategies and Activities

- Habits of Mind: What strategy did you use to answer the questions? What other strategy might you have used?
    - How is solving an inequality with variables on one side similar to and different from solving an inequality with variables on both sides?
- Student textbook page 24-30
- Vocabulary: inequality, equivalent inequalities, inequality, properties of inequality, solution to an inequality

Formative Assessments

- 1-4 Lesson Quiz (printable or available online)
- Mathematical Modeling: Collecting Cans
- Khan Academy

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-4
- Additional Practice 1-4
- Enrichment 1-4
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials
- Assignment Guide: Basic 10-14, 16-22 even, 23-32, 33-41 odds, 44-50; Advanced 10-14, 15-27 odd, 29-32, 34-42 even, 43-50

Reflections and Suggested Modifications

Vocabulary: inequalities, inequality symbols, no solution, infinite solutions

Common Error: rules of inequality, when dividing or multiplying by a negative number the inequality sign switches, when graphing on a number line the variable needs to be on the left side for the shading to match the direction of the inequality sign. open/closed circles, greater than and less than

Lesson 1.5 Compound Inequalities

Student Learning Intentions or We are learning to … (WALT)

- We are learning to create and solve a system of inequalities
- We are learning to interpret the solution to a compound inequality within a modeling context.

Student Success Criteria … "I can statements"

- I can write and solve compound inequalities

Instructional Strategies and Activities

- Habits of Mind: If the solution to an inequality includes all the values that are between two values, how can you show that on a numberline? 36
- Student textbook page 31-36
- Vocabulary: graph, subset, solution of an inequality

Formative Assessments

- 1-5 Lesson Quiz (printable or available online)

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-5
- Additional Practice 1-5
- Enrichment 1-5
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials
- Assignment Guide: Basic 10-27, 29-39 odd, 41-50; Advances 10-15, 17-27 odd, 28-50

Reflections and Suggested Modifications

Vocabulary: compound inequality (or vs. and)

Common Error: attend to precision with the proper inequality relationship, when to use or versus and, shading accurately, direction of the inequality changes only when you divide or multiply BOTH sides by a negative (not when a negative exists within the equation).

Lesson 1-6 Absolute Value Equations and Inequalities

Student Learning Intentions or We are learning to … (WALT)

- We are learning to solve absolute value equations and inequalities
- We are learning to use absolute value equations and inequalities to solve problems.

Student Success Criteria … "I can statements"

- I can write and solve absolute value equations and inequalities.

Instructional Strategies and Activities

- Habits of Mind: How do relationships between two items within a situation relate to one another?
    - How is solving an absolute value equations similar to solving a regular equations? How is it different?
        - Consider having this as a journal prompt, use a graphic organizer
    - What do you notice about absolute value inequalities that is similar to compound inequalities?
- Student textbook page 37-43
- Vocabulary: absolute value,

Formative Assessments

- 1-6 Lesson Quiz (printable or available online)
- p44- 47 Topic Reviews

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-6
- Additional Practice 1-6
- Enrichment 1-6
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials
- Assignment Guide: Basic 1

Reflections and Suggested Modifications

Vocabulary: absolute value, equation, inequality

Common Error: only finding one solution for an absolute value equation, paying attention to absolute value with inequalities to see whether it is an "and" "or" situation which will change the graphing of the inequality,

especially when reversing the inequality for a negative absolute value.

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

*SCIOP/WIDA levels will allow the teacher to determine what supports are appropriate. Reach out to the MLL teacher for suggestions.

Native language support: The teacher provides auditory or written content to students in their native language. Sentence Stems

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front-loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

*Always reference the students IEP for specific accommodations or modification per student need.

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature

circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

*Always reference the students IEP for specific accommodations or modification per student need.

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

*Reach out to the Student Support team for assistance.

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to

have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.

Topic 2: Linear Equations

Essential Questions

Why is it useful to have different forms of linear equations?

- What information does the slope-intercept form of a linear equation reveal about a line?
- What information does the point-slope form of a linear equation reveal about a line?
- What information does the standard form of a linear equation reveal about a line?
- How can the equations of lines help you identify whether the lines are parallel, perpendicular, or neither?

Pre-Assessments

Topic Readiness Assessments available at SavvasRealize.com

Instructional Plan

Lesson 1.7 Slope-Intercept Form

Student Learning Intentions or We are learning to … (WALT)

- We are learning to write linear equations in two variables using slope-intercept form to represent relationships between two quantities.
- We are learning to interpret the slope and the intercept of a linear model.

Student Success Criteria … "I can statements"

- I can write and graph linear equations using slope-intercept form.

Instructional Strategies and Activities

- Habits of Mind: What do you notice about the relationship among the amount of the down payment, the number of payments, and the time it takes to pay off the loan?
- What do the numbers represent in the linear equation in slope-intercept form?
- How does the slope of a line given in slope-intercept form with a fractional coefficient of x compare to the slope of a line with a whole number coefficient of x? (understanding that 0 is a horizontal line- the closer to zero, the closer to a flat line)
- Student textbook page 51-56

Formative Assessments

- 1-7 Lesson Quiz (printable or available online)
- Textbook Pages: Basic 13-27, 29, 31, 33, 35-40; Advanced 13-17, 19, 21, 23, 25, 27-30

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-7
- Additional Practice 1-7
- Enrichment 1-7
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials

Reflections and Suggested Modifications

Vocabulary: slope-intercept form, y-intercept, slope, liner equation, horizontal, vertical, coefficient

Common Error: thinking a slope will be negative if the points are negative, confusing negative and positive slope, keeping y in the numerator and x in the denominator, making sure to graph x by moving right or left and y moving up or down, calculating slope, since slope is the steepness of a line you need to calculate height first, knowing that (0,2) is the intercept "b" and NOT (2.0).

Lesson 1.8 Point-Slope Form

Student Learning Intentions or We are learning to … (WALT)

- We are learning to write and graph linear equations in point-slope form.
- We are learning to analyze different forms of a line to interpret the slope and y-intercept of a linear model in the context of data.

Student Success Criteria … "I can statements"

- I can write and graph equations in point-slope form.

Instructional Strategies and Activities

- Habits of Mind: How could you represent the equations to show whether both equations are valid? Explain why the equation of a vertical line cannot be written in point-slope form.
- Student textbook page 57-62

Formative Assessments

- 1-8 Lesson Quiz (printable or available online)
- Textbook Pages: Basic 11-24, 26, 27, 29, 31, 33, 35-41; Advanced 11-13, 15, 17, 19, 21, 23, 25, 27-41

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-8
- Additional Practice 1-8
- Enrichment 1-8
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials

Reflections and Suggested Modifications

Vocabulary: point-slope form, independent variable, dependent variable, vertical, horizontal

Common Error: reversing the independent and dependent variable when given data (science connection), Slope is "rise over run" or vertical distance over horizontal distance, when subtracting a negative make it positive

Lesson 1.9 Standard Form

Student Learning Intentions or We are learning to … (WALT)

- We are learning to write and graph linear equations in standard form.
- We are learning to use linear equations in standard form to interpret the x- and y-intercepts in the context of given data.

Student Success Criteria … "I can statements"

- I can write and graph linear equations in standard form.

Instructional Strategies and Activities

- Habits of Mind:
  - Why is it helpful to use a graph rather than a table to answer questions? Are there any disadvantages to using a graph?
  - What is the relationship between the sign of the slope and the quantities in the problem?
  - Given a linear equation in standard form, can you always find the x- and y-intercepts? Explain.
  - How can you tell when every point on the graph is a solution to the problem?
- Student textbook page 64-68
- p 69 Mathematical Modeling: How Tall is Tall?
  - We are learning to use mathematical modeling to represent a problem situation and to propose a solution.
  - We are learning to test and verify the appropriateness of math models
  - We are learning to explain why the results from their mathematical models might not align exactly with the problem situation.

Formative Assessments

- 1-9 Lesson Quiz (printable or available online)
- Textbook Pages: Basic 10-28, 29-39 odd, 41-46; Advanced 10-14, 15-27 odd, 29-46

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-9
- Additional Practice 1-9
- Enrichment 1-9
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials

Reflections and Suggested Modifications

Vocabulary: one-variable system x= or y = is a point; two-variable system (x, y): line on the coordinate plane

Common Error: Students forget to eliminate decimal or fractional values when rewriting an equation in standard form; whatever is done to one side of the equation must be done to the other side

Lesson 1.10 Parallel and Perpendicular Lines

***Note: an entire unit is dedicated to properties and proofs of parallel and perpendicular lines (TOPIC 7)**

Student Learning Intentions or We are learning to … (WALT)

- We are learning to write equations to represent lines that are parallel or perpendicular to a given line.
- We are learning to graph lines to show an understanding of the relationship between the slopes of parallel and perpendicular lines.
- We are learning to solve real-world problems that involve parallel or perpendicular lines.

Student Success Criteria … "I can statements"

- I can write equations of parallel and perpendicular lines.

Instructional Strategies and Activities

- Habits of Mind:
    - Why do you have to use the term nonvertical when working with parallel and perpendicular lines?
    - Explain the advantages of using the slope-intercept form of an equation when determining if two lines are perpendicular or parallel to each other.
- Student textbook:

Formative Assessments

- 1-10 Lesson Quiz (printable or available online)
- Textbook Pages: Basic 10-24, 26, 28-34; Advanced 10-15, 17, 19-34

Instructional Materials and Resources

- enVisions Math
- Reteach to Build Understanding 1-10
- Additional Practice 1-10
- Enrichment 1-10
- Math Literacy and Vocabulary
- Digital Resources and Video Tutorials

Reflections and Suggested Modifications

Vocabulary: parallel lines, perpendicular lines, reciprocal, opposite reciprocal

Common Error: confusing the classification of parallel versus perpendicular lines, thinking all intersecting lines are perpendicular, recognizing of the 90-degree angle in an intersecting line, forgetting to take the OPPOSITE reciprocal (changing the sign of the slope) for the new slope of the new equation of the line.

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

*SCIOP/WIDA levels will allow the teacher to determine what supports are appropriate. Reach out to the MLL teacher for suggestions.

Native language support: The teacher provides auditory or written content to students in their native language. Sentence Stems

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front-loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

*Always reference the students IEP for specific accommodations or modification per student need.

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

*Always reference the students IEP for specific accommodations or modification per student need.

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

*Reach out to the Student Support team for assistance.

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.

Standards Addressed

New Jersey Student Learning Standards: Content Area

MATH.7.EE	Expressions and Equations
MATH.7.EE.A	Use properties of operations to generate equivalent expressions
MATH.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MATH.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MATH.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy

Diversity, Equity, and Inclusion

NCTM: Access and Equity in Mathematics Education

A Pathway to Equitable Math Instruction

Provide students with opportunities to give feedback to teachers about the classroom and instruction.

• Verbal Example: Fist to five, How well do you understand what we talked about today? Fist to five, How well did I teach this today?

• Classroom Activity: Exit tickets or surveys that ask students to identify how well teachers taught, what helped them learn, what got in the way of their learning, etc.

Treat mathematics as a language that everyone is learning while authentically centering students home languages.

• Classroom Strategies: Color-coding ideas, learning vocabulary in student languages, visual and kinesthetic learning, representations of learning without words.

• Classroom Activity: Multilingual Frayer Models for
definitions or concepts

Incorporate true culturally relevant pedagogy, practice, and curriculum.

• Verbal Example: What are some of your family traditions that you are proud of? Would you be okay if we brought some of those into the classroom?

• Classroom Activity: Use Ankara fabric to teach mathematical concepts such as tessellations, fractions, area, percentages, etc.

Incorporate the history of mathematics into lessons.
• Verbal Example: Why do you think we call it Pythagorean's theorem, when it was used before he was even born? What should we call it instead?
• Classroom Activity: Learn about different bases and numerical ideas: Base 2, binary and connections to computer programming, how the Yoruba of Nigeria used base 20, and how the Mayans conceptualized the number 0 before the first recording of it

Solicit student ways of thinking and processing.
• Verbal Example: How might you all go about this? What do you notice?
• Classroom Activity: Incorporate explorations, where students interact with mathematics in a way that allows them to "discover" or experience mathematics.

Reorganize your classroom teaching around concepts, and teach them more like a web rather than discrete sets of knowledge.
• Verbal Example: How does this connect to what you've learned in the past? How can you use that knowledge today?
• Classroom Activity: Learning webs that connect content

Start with more complex math problems and scaffold as necessary.
• Verbal Example: If we wanted to build a rocket, what are all the things we might need to know before we get started? Along the way, we decided that we want the rocket to reach the moon. What do we need to consider now?
• Classroom Activity: When solving equations, start with the most complex problem, generate ideas for how to solve it, and use the simpler equations as examples to support those ideas.

Offer a variety of ways to demonstrate thinking and knowledge.
• Verbal Example: Show your thinking with words, pictures, symbols.

Ask other questions that will demonstrate learning when it is not clear to you how students know the answer.
• Verbal Example: If you were working with a fellow mathematician who was absent this day, what might you tell them to help them learn it?

Learn about, engage with, and incorporate ethnomathematics.
• Verbal Example: Reflect on your day so far. What math have you already used today?
• Classroom Activity: Community walks to engage with slope.

Co-construct knowledge in the classroom.
• Verbal Example: Let's get into partners and do a think pair-share. We will incorporate everyone's ideas and try to synthesize them.
• Classroom Activity: Have students create mathematical definitions in their own words in groups, and bring the groups together to co-construct mathematical definitions as a class

Choose problems that have complex, competing, or multiple answers.
• Verbal Example: Come up with at least two answers that might solve this problem.
• Classroom Activity: Challenge standardized test questions by getting the "right" answer, but justify other answers by unpacking the assumptions that are made in the problem.
• Classroom Activity: Deconstructed Multiple Choice
- given a set of multiple choice answers, students discuss why these answers may have been included (can also be used to highlight common mistakes).

Identify what is right about the thinking, and highlight the mistake in what is factually or procedurally accepted.
• Verbal Example: You recognized that you had to combine the constants 27 and 9, could you explain your thinking?
• Classroom Activity: Error Analysis worksheets that highlight what is the right idea behind the mistake.

Using thoughtful questioning to solicit mathematical thoughts rather than telling.

• Verbal Example: What would a mathematician who is confused ask about this question?

• Classroom Activity: After students demonstrate knowledge of a topic, have them play a game where they have to explain their topic to a fellow mathematician and a skeptic. Develop their own reflective questioning/explaining in all three roles.

Create multiple ways of participating that honor myriad ways of thinking and being.
• Verbal Example: For this section, feel free to work alone, in pairs, trios, or quads (let them choose).
• Classroom Activity: Community circles or storytelling circles, incorporating dance, music, song, call and response, and other cultural ways of communicating.

Climate Change

Math Climate Change Companion Guide

• S.ID.B.6a Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
Climate Change Example: Students may use linear or exponential functions fitted to geoscience data to solve problems and analyze the results from global climate models to make an evidence-based forecast of the current rate of global climate change.

• F.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
Climate Change Example: Students may use function notation to determine the amount of carbon dioxide produced by burning a given number of molecules of ethane (gasoline), m, where c(m) is the number of molecules of carbon dioxide.
• F.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
Climate Change Example: Students may relate the domain of a function c(m) representing the amount of carbon dioxide produced by burning m molecules of ethane (gasoline), to its graph in order to determine the appropriate domain for c(m).
• F.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Climate Change Example: Students may calculate the average rate of change of a function c(m) presented symbolically or as a table, where c(m) represents the amount of carbon dioxide produced by burning a given

number of molecules of ethane (gasoline).

• A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.
• A.CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Climate Change Example: Students may represent constraints describing the economic impact of climate change by equations, inequalities, and/or by systems of inequalities, and interpret solutions as viable or nonviable options.
• A.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law to highlight resistance R.
Climate Change Example: Students may rearrange formulas related to the economic impact of climate change to highlight a quantity of interest, using the same reasoning as in solving equations.

• N.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Climate Change Example: Students may use units to guide the solution of multi-step problems about how variations in the flow of energy into and out of the Earth's systems result in climate change. Note: Changes in climate are limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.
• N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
Climate Change Example: Students may define appropriate quantities for a descriptive model of how variations in the flow of energy into and out of Earth's systems result in climate change. Note: changes in climate are limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.

21st Century Life and Career

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of Computer Science and Design Thinking

CS.9-10.3A-AP-14	Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables.
CS.9-10.3A-AP-17	Decompose problems into smaller components through systematic analysis, using

constructs such as procedures, modules, and/or objects.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math

ELA.K-12.L.SS	System and Structure of Language: By the end of grade 12, demonstrate command of grammar and usage, capitalization, punctuation, and spelling.
ELA.K-12.L.KL	Knowledge of Language: By the end of grade 12, apply knowledge of language and command of vocabulary to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
ELA.K-12.R.CR	Close Reading of Text: By the end of grade 12, read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
ELA.K-12.W.AW	Argumentative Writing: By the end of grade 12, write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Integration of Career Readiness. Life Literacies and Key Skills

TECH.9.4.2.CI	Creativity and Innovation
TECH.9.4.2.CT	Critical Thinking and Problem-solving
TECH.9.4.2.GCA	Global and Cultural Awareness
TECH.9.4.2.IML	Information and Media Literacy