Unit 3: Equations and Inequalities in One Variable

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **9 Weeks**
Status: **Published**

Module 6: Solve Linear Equations

Unit Rationale

Understanding how to solve linear equations is a foundational skill in algebra and critical for the development of mathematical reasoning. In this unit, students will explore how to solve equations of the form ax+b=cax + b = cax+b=c, where the goal is to isolate the variable and determine its value. This skill is essential not only for success in 7th-grade mathematics but also for future topics in algebra, geometry, and real-world problem-solving situations.

This unit is strategically placed in the curriculum to strengthen students' ability to manipulate algebraic expressions and solve equations, which are key steps toward more advanced mathematical concepts. Students will learn to use a variety of methods, such as inverse operations, the distributive property, and combining like terms, to solve both one-step and multi-step linear equations. These methods will enhance their ability to work with equations efficiently and accurately.

The relevance of solving linear equations extends beyond the classroom. The skills developed in this unit are critical for making informed decisions in a variety of real-life scenarios, such as budgeting, planning, and understanding relationships between variables in science, business, and technology. By mastering this skill, students will be equipped to solve real-world problems involving unknown quantities, which is essential for effective problem-solving in both personal and professional settings.

Throughout the unit, students will focus on critical Standards for Mathematical Practice, including:

- **MP1**: Make sense of problems and persevere in solving them.
- **MP2**: Reason abstractly and quantitatively.
- **MP6**: Attend to precision.
- **MP7**: Look for and make use of structure.

By the end of this unit, students will be able to confidently solve linear equations and apply this skill to solve problems in various mathematical and real-world contexts. They will also be prepared to tackle more complex algebraic concepts, such as inequalities and systems of equations, paving the way for future success in mathematics.

Essential Questions

- **What are linear equations, and why is it important to solve them?**

- **How can we use inverse operations to isolate the variable and solve an equation?**
- **In what ways do we apply properties like the distributive property and combining like terms when solving linear equations?**
- **How can we check if our solution to a linear equation is correct?**
- **How do linear equations represent real-world situations, and how can we use them to solve practical problems?**
- **What strategies can we use to solve one-step, two-step, and multi-step linear equations efficiently?**
- **How do we handle equations that involve parentheses or fractions?**
- **How can we use linear equations to model and solve problems in various fields like science, economics, or technology?**

Pre-Assessments

Benchmark assessments are given within the first semester using HMH Into Math.

1. Readiness Check (Diagnostic Assessment)
- Found at the beginning of each module/unit.
- Assesses prerequisite skills necessary for success in the upcoming lessons.
- Usually includes a mix of multiple-choice and short answer items.
- Great for determining small-group needs or identifying which students might benefit from additional support.

2. Diagnostic Assessments in Ed: Your Friend in Learning
- Online assessments tied to Into Math.
- Adaptive in nature (depending on your district's setup) and aligned with the lesson standards.
- Can provide recommendations for intervention or enrichment based on results.

3. Module Quizzes (Pre-Use)
- While designed for post-instruction, some teachers use the Module Quiz or Mid-Module Checkpoint as a pre-assessment to gauge student background knowledge.
- Use selectively, focusing on concepts that build directly on prior grades' standards.

4. Lesson-Specific Checks
- Some lessons include "Are You Ready?" sections or warm-ups that can double as informal pre-assessments.
- Often appear in the Teacher Edition or digital platform and can be used as bell-ringers or exit tickets.

Instructional Plan

Lesson 1: Write Two-Step Equations for Situations

Student Learning Intentions (WALT)

We Are Learning To (WALT):

- Translate real-world situations into two-step linear equations.
- Solve two-step equations to find unknown values.
- Check solutions by substituting back into the original context.

Student Success Criteria (I can statements)

- **I can** define a variable to represent an unknown quantity.
- **I can** write a two-step equation that represents a real-world situation.
- **I can** solve the equation using inverse operations.
- **I can** check my solution to make sure it makes sense in the problem.

Instructional Strategies and Activities

Introduction (10 mins)

- **Engage** students with a real-world hook:
  Example: "You join a club with a $20 fee and pay $5 each meeting. After 6 meetings, you spent $50. How many meetings did you attend?"
- **Discussion:**
  - What is unknown?
  - How are the numbers related?
- **Mini-Anchor Chart:** Quick notes on “How to Set Up Two-Step Equations.”

Guided Practice (20 mins)

- **Model 2 examples**:
    - Read the situation aloud.
    - Highlight key words and numbers.
    - Define the variable together.
    - Write and solve the equation step-by-step.
- **Collaborative Work:**
    - Solve 2-3 problems as a class using whiteboards or interactive notebooks.
- Encourage **Think-Pair-Share**: students discuss their setup before solving.

Independent Practice (20 mins)

- Students complete a **short practice sheet** (5–7 word problems) where they:
    - Write the two-step equation.
    - Solve for the variable.
    - Check their answers.
- **Choice option:** Some students may choose to **create their own real-world problem** and swap with a partner to solve.

Closing and Reflection (10 mins)

- **Exit Ticket:**
    - Write your own two-step equation based on a situation you make up.
- **Share-Out:**
    - Volunteers explain how they knew what operations to use.
- **Reflect:**
    - “What steps helped you the most today when writing your equations?”

Formative Assessments

- Observation during guided practice.
- Check independent practice sheets.
- Review exit tickets for understanding of setup and solution.

Instructional Materials and Resources

- HMH Into Math textbook and online resources (Module 6, Lesson 1).
- Whiteboards and markers.
- Anchor Chart: "Steps to Writing Two-Step Equations."
- Practice handout (teacher-created or from HMH Resources).

Reflections and Suggested Modifications

Reflections:

- Which students needed more support with identifying operations?
- Did students struggle more with writing or solving the equations?
- Were the real-world examples engaging enough?

Suggested Modifications:

- **Scaffolded Examples:** Provide sentence frames for struggling students:
  ("The cost is ___ plus ___ times the number of ___.")
- **Visual Supports:** Use bar models or diagrams for students who need more visual representation.
- **Challenge Extension:** For fast finishers, introduce equations with variables on both sides.
- **Small Group Support:** Pull a small group to rework key examples if needed.

Lesson 2: Apply Two-Step Equations to Solve Real-World Problems

Student Learning Intentions (WALT)

We Are Learning To (WALT):

- Apply two-step equations to solve real-world problems.
- Model word problems with two-step equations accurately.
- Interpret the solution within the context of the original problem.

Student Success Criteria (I can statements)

- **I can** identify key information from a real-world problem.
- **I can** create a two-step equation that models the problem.
- **I can** solve the equation to find the unknown.
- **I can** explain what my solution means in real life.

Instructional Strategies and Activities

Introduction (10 mins)

- **Activate Prior Knowledge:**
  Quick review:
    - What are two-step equations?
    - How do we set them up?
- **Real-World Warm-up:**
  Pose a problem like:
  "You save $10 each week after spending $5 on coffee. After 4 weeks, you have $20. How much did you start with?"
- Discuss briefly: "What are we trying to find?"

Guided Practice (20 mins)

- **Model 2-3 Real-World Examples Together:**
    1. Read the situation carefully.

2. Identify important numbers and relationships.
3. Define the variable and write the equation.
4. Solve and explain what the solution means.

- **Collaborative Problem Solving:**
  Students work with a partner to solve a new word problem, explaining reasoning aloud.

Independent Practice (20 mins)

- Students work individually on a set of **real-world two-step word problems** (5–8 problems).
  - Emphasize writing an equation, solving, and interpreting.
- **Challenge:**
  Students who finish early can create a real-world problem, exchange with a partner, and solve each other's problems.

Closing and Reflection (10 mins)

- **Quick Write:**
  "What's one thing you have to watch out for when solving real-world problems with two-step equations?"
- **Whole-Class Share:**
  Pick 2–3 students to share their quick writes.
- **Review Big Ideas:**
  - Set up carefully.
  - Solve step-by-step.
  - Always interpret your answer in the real-world context!

Formative Assessments

- Monitor student work during guided practice and partner work.
- Review independent practice for correct setup and interpretation.
- Exit tickets/quick writes for understanding.

Instructional Materials and Resources

- HMH Into Math textbook and online tools (Module 6, Lesson 2).
- Whiteboards, markers.
- Real-world problem sets (from HMH or teacher-created).
- Graphic organizer: "Steps for Solving Real-World Problems."

Reflections and Suggested Modifications

Reflections:

- Were students able to connect the equation to the problem situation easily?
- Did students accurately interpret their final answer?

Suggested Modifications:

- **Sentence Starters:**
  ("Let __ be the number of ___. The total is ___.")
- **Graphic Organizers:** Help students plan their equations before solving.
- **Extended Thinking:**
  Ask students: *"If the situation changed, how would your equation change?"*
- **Small Group Reteach:** Reteach using visuals or simple charts for students needing extra support.

Lesson 3: Solve Multi-Step Linear Equations

Student Learning Intentions (WALT)

We Are Learning To (WALT):

- Solve multi-step linear equations using inverse operations.
- Simplify expressions by combining like terms and using the distributive property.
- Check solutions by substituting back into the original equation.

Student Success Criteria (I can statements)

- **I can** combine like terms to simplify an equation.
- **I can** use the distributive property to simplify equations.
- **I can** solve multi-step equations using inverse operations.
- **I can** check my solution by substituting it back into the equation.

Instructional Strategies and Activities

Introduction (10 mins)

- **Review Prior Knowledge:**
  Quick mini-quiz:
  - Combine like terms (e.g., 3x+4x3x + 4x3x+4x)
  - Use distributive property (e.g., 2(x+5)2(x + 5)2(x+5))
- **Hook Question:**
  "How would you solve an equation that has parentheses AND like terms? What should we do first?"
- Build a mini-anchor chart: **Steps for Solving Multi-Step Equations**.

Guided Practice (20 mins)

- **Model 2–3 Examples Together:**
  1. Distribute if needed.
  2. Combine like terms on each side.
  3. Isolate the variable using inverse operations.
  4. Solve and check.
- **Think Alouds:** Walk through common mistakes (e.g., forgetting negative signs).
- **Partner Practice:** Students solve a multi-step equation in pairs, discussing each step.

Independent Practice (20 mins)

- Students work individually on **a set of multi-step equations** (6–8 problems):
    - Some requiring distribution.
    - Some requiring combining like terms.
    - Some with variables on both sides (if ready).
- **Differentiation:**
    - **Support:** Highlight like terms for some students.
    - **Challenge:** Add a few equations with variables on both sides.

Closing and Reflection (10 mins)

- **Class Discussion:**
    - "What strategy helps you most when solving multi-step equations?"
- **Exit Ticket:**
  Students solve 1 multi-step equation and explain each step in a sentence.

Formative Assessments

- Monitor group work and partner discussions.
- Review independent practice for accuracy.
- Analyze exit tickets for understanding of process and precision.

Instructional Materials and Resources

- HMH Into Math textbook and digital tools (Module 6, Lesson 3).
- Whiteboards and markers.
- Anchor chart: "Steps for Solving Multi-Step Equations."
- Highlighters (optional for combining like terms).

Reflections and Suggested Modifications

Reflections:

- Which step (distribution, combining like terms, solving) caused the most confusion?
- Did students consistently check their answers?

Suggested Modifications:

- **Color Coding:** Use colors to group like terms and highlight distributed terms.
- **Step-by-Step Templates:** Provide a "solve and check" graphic organizer.
- **Small Group Support:** Focus on distribution or combining terms in isolation first.
- **Extended Challenge:** Introduce equations that require moving variables to the same side.

Lesson 4: Examine Special Cases

Student Learning Intentions (WALT)

We Are Learning To (WALT):

- Identify and solve linear equations that result in **special cases**:
    - **No solution**
    - **Infinitely many solutions**
- Understand what it means when an equation is true or false for all values.

Student Success Criteria (I can statements)

- **I can** recognize when an equation has no solution.
- **I can** recognize when an equation has infinitely many solutions.
- **I can** explain why an equation has a special case based on the steps of solving.
- **I can** check my answer logically by substituting or analyzing the structure.

Instructional Strategies and Activities

Introduction (10 mins)

- **Launch with a Riddle:**
  "What happens if you solve an equation and end up with 5 = 7?"
  (*Is that possible? What does it mean?* 🤔)

- **Objective Discussion:**
  Introduce the idea that **not all equations have a single solution** — some have none, and some have infinitely many.

Guided Practice (20 mins)

- **Model Examples Together:**

  1. Solve an equation that leads to **no solution** (e.g., $2x+3=2x+52x + 3 = 2x + 52x+3=2x+5$).

  2. Solve an equation that leads to **infinitely many solutions** (e.g., $3(x-2)=3x-63(x - 2) = 3x - 63(x−2)=3x−6$).

- **Key Strategy:**

  - If variables cancel out and you get a FALSE statement (like 5 = 7) → **No solution**.

  - If variables cancel out and you get a TRUE statement (like 4 = 4) → **Infinitely many solutions**.

- **Guided Student Work:**
  Students solve 2–3 examples with you, predicting the type of solution before fully solving.

Independent Practice (20 mins)

- Students complete a **Special Cases Sorting Activity**:

  - Given 10–12 equations, students solve each and sort them into:
    - 🔷 **One Solution**
    - 🔷 **No Solution**
    - 🔷 **Infinitely Many Solutions**

- **Optional Challenge:**
  Create their own example of an equation with no solution and one with infinitely many solutions.

Closing and Reflection (10 mins)

- **Class Discussion:**

    - "How can you tell early if an equation will have a special case?"
- **Exit Ticket:**
    - Solve a quick special case equation.
    - Write one sentence explaining if it has no solution, one solution, or infinitely many solutions and why.

Formative Assessments

- Student responses during guided practice and discussion.
- Sorting activity results.
- Exit tickets showing conceptual understanding.

Instructional Materials and Resources

- HMH Into Math textbook and online tools (Module 6, Lesson 4).
- "Special Cases Sort" handout or digital version.
- Whiteboards and markers for modeling and student practice.

Reflections and Suggested Modifications

Reflections:

- Could students predict the type of solution before fully solving?
- Did they confuse "no solution" vs. "infinitely many" — if so, why?

Suggested Modifications:

- **Anchor Chart or Poster:** Simple visual showing
    - No Solution → False Statement (like $5=75=75=7$)
    - Infinitely Many Solutions → True Statement (like $4=44=44=4$)
- **Color Coding:** Highlight when variables cancel out.
- **Sentence Starters:**

- *"After simplifying, I see that..."*
- *"The sides are not equal, so there is no solution."*

- **Small Group Support:** Extra practice on distributing and combining like terms accurately.

Lesson 5: Apply Linear Equations

Student Learning Intentions (WALT)

We Are Learning To (WALT):

- Apply linear equations to solve real-world and mathematical problems.
- Represent and solve multi-step problems with variables on one or both sides of the equation.

Student Success Criteria (I can statements)

- **I can** set up and solve a linear equation to represent a real-world situation.
- **I can** interpret the meaning of the solution in the context of the problem.
- **I can** explain my steps and reasoning clearly when solving problems.

Instructional Strategies and Activities

Introduction (10 mins)

- **Real-World Hook:**
  "If two different cell phone companies charge different monthly rates, how can you figure out when their total costs are the same?"

- **Connect to Previous Learning:**
  Review solving multi-step equations and special cases — students will now **apply** these skills to real-life situations.

Guided Practice (20 mins)

- **Model Real-World Problems:**
  Example:
  Company A charges $25 per month plus $5 per GB of data. Company B charges $10 per month plus

$8 per GB. After how many GBs of data will the costs be equal?

- Walk through setting up the equation, solving, and **interpreting the solution**:
    - Define variables.
    - Write the equation.
    - Solve the equation.
    - Answer in a complete sentence explaining the meaning.
- **Partner Work:**
  Students solve a second real-world problem with a partner.

Independent Practice (20 mins)

- Students work independently on **a set of real-world application problems** (4–6 problems).
- Problems include:
    - Geometry (e.g., perimeter, area equations).
    - Financial literacy (e.g., savings plans, costs).
    - Distance/rate/time problems.
- **Differentiation:**
    - **Support:** Provide scaffolds like sentence frames ("Let ___ represent ___").
    - **Challenge:** Problems with decimals, fractions, or variables on both sides.

Closing and Reflection (10 mins)

- **Group Discussion:**
    - How does solving an equation help us solve a real-world problem?
    - Why is it important to **interpret** the solution, not just find "x"?
- **Exit Ticket:**
    - One short word problem where students set up and solve an equation, and explain the meaning of their answer.

Formative Assessments

- Observation during guided and partner practice.
- Independent problem set accuracy.
- Exit ticket showing understanding of setup, solution, and interpretation.

Instructional Materials and Resources

- HMH Into Math textbook and online tools (Module 6, Lesson 5).
- Real-world problem sets (created or from textbook).
- Whiteboards or notebooks for practice.

Reflections and Suggested Modifications

Reflections:

- Were students able to **identify variables** and **represent** the problem with an equation easily?
- Did they explain their solutions in the context of the problem accurately?

Suggested Modifications:

- **Sentence Frames:** For setting up equations ("Let ___ represent ___; The equation is ___ because...").
- **Visual Aids:** Diagrams for geometry problems.
- **Extended Challenge:** Students create their **own real-world problem** and swap with a partner to solve.
- **Small Group Intervention:** Focus on problems with multi-step set-ups or variables on both sides.

Modifications and/or Accommodations

English Language Learners (ELL)

- **Native Language Support**:
    - The teacher provides auditory or written content to students in their native language.

- **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 subject matter.
- **Front-Loading Vocabulary**:
    - The teacher front-loads vocabulary by providing students with a list of important vocabulary words they will need to know for a lesson before it is taught. Including pictures with vocabulary words is also beneficial for students.

Special Education Students

- **Chunking**:
    - The teacher presents information in a way that is easy for students to understand and remember. Chunking organizes information into meaningful units to prevent working memory overload, which can be helpful for students with special needs.
- **Checking for Understanding**:
    - It is important to consistently check for understanding, especially for students who have accommodations, to ensure they comprehend the concepts 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, giving them adequate time to process their thoughts.
- **Oral Reading**:
    - The teacher will read work aloud to students, which can include class work, tests, and literature circles.
- **Timers**:
    - The teacher uses timers to help students manage time when completing tasks, especially for students who struggle to finish tasks within time limits.

Students with 504 Plans

- **Chunking**:

- The teacher organizes information into manageable units to ensure students with 504 plans are not overwhelmed by excessive detail.

- **Checking for Understanding**:
  - Teachers will continuously check for understanding, ensuring students with accommodations comprehend the lesson content.

- **Extra Time**:
  - Students with 504 plans are given extra time to complete assignments, ensuring they have ample time to process information.

Gifted & Talented Strategies

- **Extensions/Enrichments**:
  - Teachers provide gifted and talented students with enrichment projects that challenge them to deepen their understanding, apply knowledge, or produce something in relation to what they have learned.

- **Modify/Change Activities**:
  - Teachers monitor and adjust activities for students who need more of a challenge. This may involve additional reading, problem-solving, writing, or project work, allowing gifted students to progress at an accelerated rate compared to their peers.

Students at Risk of School Failure

- **Directions or Instructions**:
  - Directions/instructions are provided in limited numbers, both verbally and in simple written format. Teachers may ask students to repeat the instructions to ensure understanding and check back to ensure they haven't forgotten.

- **Peer Support**:
  - Peers can build confidence by helping others. Teachers can set up a system where specific students are assigned to assist at-risk students with clarification before approaching the teacher.

- **Alternate or Modified Assignments**:
  - Teachers should consider modifying assignments for students at risk by simplifying tasks, reducing length, or offering alternative delivery modes (e.g., oral reports instead of written assignments).

- **Increase One-on-One Time**:
  - Teachers should check in with at-risk students regularly, even for brief periods, to offer support

and guidance as needed.

- **Contracts**:
    - A working contract helps prioritize tasks and ensures completion. Students and teachers can track progress together by marking off completed tasks with checkmarks or symbols, encouraging accountability.
- **Hands-On Tasks**:
    - Provide concrete, hands-on activities to support at-risk students. This may include using tools like calculators or counters in math or having students use audio recordings for comprehension tasks instead of reading themselves.
- **Tests/Assessments**:
    - Tests can be administered orally, or broken into smaller sections. Teachers may administer parts of a test in the morning, after lunch, and on subsequent days if necessary.
- **Seating**:
    - Seat students near a helping peer or with quick access to the teacher. For students with hearing or vision issues, seat them at the front for better access to instruction.

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

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 asking 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
    - How the Mayans conceptualized the number 0 before the first recording of it

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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. This 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.

Use 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.

Math Climate Change Companion Guide

- **G.MG.A.2 Apply concepts of density based on area and volume in modeling situations** (e.g., persons per square mile, BTUs per cubic foot).
- **Climate Change Example**:
    - Students may apply the concept of population density of different urban areas, including calculations of population density, and discuss different environmental factors (e.g., air and water quality, waste disposal, energy consumption) that might be exacerbated by increased population density.

New Jersey Student Learning Standards: Content Area

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MATH.9-12.A.REI	Reasoning with Equations and Inequalities

21st Century Life and Career

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of Career Readiness. Life Literacies and Key Skills

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.
CRP.K-12.CRP11	Use technology to enhance productivity.

Integration of Computer Science and Design ThinkingNew Section

CS.9-12.8.1.12.AP.1 Design algorithms to solve computational problems using a combination of original and existing algorithms.

CS.9-12.8.1.12.AP.5 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

LA.RH.9-10.8	Assess the extent to which the reasoning and evidence in a text support the author's claims.
LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

Module 7: Solve Problems Using Inequalities

Unit Rationale

Understanding how to solve problems using inequalities is a crucial skill in both algebra and real-life problem-solving. In this unit, students will explore how to solve and graph inequalities of the form ax+b>cax + b > cax+b>c or ax+b≤cax + b \leq cax+b≤c, where the goal is to determine the set of values for the variable that satisfy the inequality. This skill is not only important for success in 7th-grade mathematics but also serves as a foundational concept for more advanced topics in algebra, geometry, and other applied mathematical fields.

This unit is placed strategically in the curriculum to help students build a deeper understanding of **mathematical reasoning** and how inequalities are used to represent real-world situations. Students will learn to solve inequalities through methods similar to solving equations, using inverse operations and maintaining the direction of the inequality symbol when multiplying or dividing by negative numbers. They will also develop the ability to **graph inequalities** on a number line, which is an essential skill for visualizing solutions.

The relevance of inequalities extends beyond the classroom. Inequalities are often used to describe situations where there are **limits** or **constraints**, such as determining minimum or maximum values in budgeting, calculating acceptable ranges for measurements, or solving problems related to temperature, speed, and time. By mastering inequalities, students will gain the skills necessary to analyze situations with constraints and make informed decisions in personal, academic, and professional contexts.

Throughout the unit, students will focus on critical Standards for Mathematical Practice, including:

- **MP2**: Reason abstractly and quantitatively.
- **MP4**: Model with mathematics.
- **MP6**: Attend to precision.
- **MP7**: Look for and make use of structure.

By the end of this unit, students will be able to confidently solve inequalities, represent solutions on a number line, and apply these skills to real-world problems. They will also be prepared for future mathematical challenges, such as solving systems of inequalities and working with absolute value equations, setting the

stage for success in more advanced mathematics.

Essential Questions

- **How can inequalities be used to represent real-world situations?**
- **What is the relationship between solving inequalities and solving equations?**
- **How do the rules for solving inequalities differ from those for solving equations, especially when multiplying or dividing by negative numbers?**
- **What strategies can be used to graph the solutions of inequalities on a number line?**
- **How can we use inequalities to model constraints and limitations in real-life problems?**
- **How can we determine whether a specific value satisfies an inequality?**
- **What is the significance of the inequality symbol, and how do we interpret it in different contexts?**
- **How can understanding inequalities help us make decisions in everyday life (e.g., budgeting, measurements, and planning)?**

Pre-Assessments

Benchmark assessments are given within the first semester using HMH Into Math.

1. Readiness Check (Diagnostic Assessment)
- Found at the beginning of each module/unit.
- Assesses prerequisite skills necessary for success in the upcoming lessons.
- Usually includes a mix of multiple-choice and short answer items.
- Great for determining small-group needs or identifying which students might benefit from additional support.

2. Diagnostic Assessments in Ed: Your Friend in Learning
- Online assessments tied to Into Math.
- Adaptive in nature (depending on your district's setup) and aligned with the lesson standards.
- Can provide recommendations for intervention or enrichment based on results.

3. Module Quizzes (Pre-Use)
- While designed for post-instruction, some teachers use the Module Quiz or Mid-Module Checkpoint as a pre-assessment to gauge student background knowledge.
- Use selectively, focusing on concepts that build directly on prior grades' standards.

4. Lesson-Specific Checks
- Some lessons include "Are You Ready?" sections or warm-ups that can double as informal pre-assessments.
- Often appear in the Teacher Edition or digital platform and can be used as bell-ringers or exit tickets.

Instructional Plan

Lesson 1: Understand and Apply Properties to Solve One-Step Inequalities

Student Learning Intentions (WALT)

- **We are learning to**:
    - Solve one-step inequalities using the addition, subtraction, multiplication, and division properties of inequality.
    - Understand the relationship between solving inequalities and solving equations.
    - Apply the correct inequality symbol when solving.

Student Success Criteria (I can statements)

- **I can** solve one-step inequalities using inverse operations.
- **I can** recognize when to flip the inequality symbol (e.g., when multiplying or dividing by a negative number).
- **I can** check if a number is a solution to an inequality.
- **I can** graph the solution of a one-step inequality on a number line.

Instructional Strategies and Activities

1. **Introduction (15 mins)**
    - **Activate Prior Knowledge**: Briefly review solving one-step equations as students will use similar methods to solve inequalities.
    - **Direct Instruction**: Explain the properties of inequalities (addition, subtraction, multiplication, and division). Emphasize the key difference when multiplying or dividing by negative numbers.
    - **Modeling**: Solve examples of one-step inequalities step by step on the board. Discuss how the inequality symbol is treated when applying different operations (e.g., flipping the symbol when dividing by a negative number).
2. **Guided Practice (20 mins)**
    - Provide students with several one-step inequalities to solve as a class. Use think-alouds to model the thought process, ensuring students understand why they are applying specific operations.
    - Engage students with questions like: "What happens if we divide by a negative number?" and "How do we know if our solution is correct?"
    - Have students work in pairs to solve a set of one-step inequalities and share their reasoning.
3. **Independent Practice (15 mins)**
    - Provide a worksheet with one-step inequalities for students to solve independently. This should include a mix of addition, subtraction, multiplication, and division problems, as well as some problems requiring the inequality symbol to flip.
    - Encourage students to graph the solutions on a number line.
4. **Closing and Reflection (10 mins)**
    - **Class Discussion**: Ask students to share their strategies for solving one-step inequalities.
    - **Exit Ticket**: Have students answer a couple of questions on a sticky note or whiteboard (e.g., "What is the rule for when to flip the inequality symbol?").

Formative Assessments

- **Observations during Guided Practice**: Walk around the classroom and monitor students' progress during guided and independent practice. Provide support as needed.
- **Exit Ticket**: Assess students' understanding by reviewing their responses to the exit ticket. Focus on their ability to explain when and why the inequality symbol changes.
- **Peer Review**: In pairs, students can check each other's work for accuracy and discuss any mistakes to deepen their understanding.

Instructional Materials and Resources

- Whiteboard/Markers
- Projector (for displaying examples)
- Worksheets with one-step inequalities (including problems with a variety of operations)
- Number line graphic organizers for students to graph solutions
- **Online Resources**: Interactive practice problems on platforms like Khan Academy or Desmos for extra practice
- **Manipulatives**: Counters or number lines to visualize operations for students who benefit from tactile learning.

Reflections and Suggested Modifications

- **Reflections**:
  - Did students demonstrate an understanding of when and why the inequality symbol changes?
  - Were students able to successfully graph solutions to inequalities?
  - Did all students have sufficient support during guided practice?
- **Suggested Modifications**:
  - For students who need additional support, provide **guided notes** that outline key steps when solving one-step inequalities.
  - Offer **extended time** or modified worksheets for students who require more time to process the information.
  - For advanced students, provide **extension activities** with multi-step inequalities or real-world problems involving inequalities (e.g., budget constraints, temperature limits).
  - Consider using **technology** to provide interactive examples and immediate feedback for students who need more practice.

Lesson 2: Write Two-Step Inequalities for Situations

Student Learning Intentions (WALT)

- **We are learning to**:

- Write two-step inequalities to represent real-world situations.
- Translate verbal descriptions into algebraic inequalities.
- Understand the process of using both addition/subtraction and multiplication/division in the context of inequalities.

Student Success Criteria (I can statements)

- **I can** write two-step inequalities based on real-world scenarios.
- **I can** identify key information in a word problem to form the inequality.
- **I can** check if my inequality correctly represents the situation.
- **I can** solve two-step inequalities after writing them.

Instructional Strategies and Activities

1. **Introduction (15 mins)**
   - **Review One-Step Inequalities**: Begin with a quick review of one-step inequalities to ensure students understand how to solve them.
   - **Explain Two-Step Inequalities**: Introduce the concept of two-step inequalities, which involve two operations (addition, subtraction, multiplication, or division). Emphasize the importance of performing the operations in the correct order (first addition/subtraction, then multiplication/division).
   - **Modeling**: Walk through a sample word problem where students have to write and solve a two-step inequality (e.g., "John has $50 and wants to buy some books. Each book costs $8. Write an inequality to show how many books he can buy if he doesn't want to spend more than $50."). Discuss how to identify the variable, constants, and operations needed to form the inequality.
2. **Guided Practice (20 mins)**
   - **Interactive Class Problem**: Present several real-world scenarios and work with the class to write the corresponding two-step inequalities. Discuss the logic behind each step, highlighting the importance of translating each part of the problem into algebraic expressions.
   - **Pair Work**: Have students work in pairs to translate and solve another real-world scenario into a two-step inequality. For example: "You have $120 and want to buy two tickets to a concert and some snacks. If each ticket costs $40 and snacks cost $20, write an inequality to represent how much you can spend."
3. **Independent Practice (15 mins)**
   - Provide students with a worksheet of word problems that require them to write and solve two-

step inequalities. Ensure that the problems vary in complexity and involve different operations.

    - Have students work independently but encourage them to use the strategies discussed in class to break the problem into manageable steps.

4. **Closing and Reflection (10 mins)**

    - **Class Discussion**: Ask students to share their solutions and how they approached writing the inequalities. Discuss any challenges they encountered in translating words into mathematical expressions.

    - **Exit Ticket**: Have students write a two-step inequality for a new real-world scenario on an index card or whiteboard, then solve it. For example: "A store offers a 10% discount on all items. You have $100. Write an inequality to find how much you can spend before the discount is applied."

Formative Assessments

- **Observations during Guided Practice**: Walk around the classroom to monitor how well students are writing and solving their inequalities. Offer support as needed and check for common errors.
- **Exit Ticket**: Review students' exit ticket responses to assess their ability to write and solve a two-step inequality.
- **Peer Review**: Have students pair up and check each other's work, explaining their reasoning to one another. This reinforces the importance of understanding the steps involved.

Instructional Materials and Resources

- Whiteboard/Markers
- Projector (for displaying examples)
- Worksheets with real-world word problems requiring two-step inequalities
- **Number lines** for students to visualize solutions after solving inequalities
- **Online Resources**: Interactive tools (such as Desmos or Khan Academy) for extra practice and feedback
- **Manipulatives**: Counters or visual aids for students who benefit from concrete examples.

Reflections and Suggested Modifications

- **Reflections**:

- Were students able to correctly identify the key components of a word problem and translate them into an inequality?
- Did students demonstrate a solid understanding of the relationship between the inequality and the operations used to solve it?
- How effectively did students engage with the real-world applications of inequalities?

- **Suggested Modifications**:
  - **For students needing extra support**, provide a graphic organizer that helps break down each part of the word problem (e.g., identifying what the variable represents, what operations are needed, etc.).
  - **For advanced students**, introduce more complex real-world problems, such as those involving fractions or decimals, and have them create and solve inequalities with multiple steps.
  - Offer **extended time** for students who need it and allow for more practice with the problems to solidify their understanding.
  - Consider **group work** for students who benefit from collaborative problem-solving and discussions.

Lesson 3: Apply Two-Step Inequalities to Solve Problems

Student Learning Intentions (WALT)

- **We are learning to**:
  - Apply two-step inequalities to solve real-world problems.
  - Translate complex word problems into two-step inequalities.
  - Solve two-step inequalities and interpret the solutions in context.

Student Success Criteria (I can statements)

- **I can** translate real-world situations into two-step inequalities.
- **I can** solve two-step inequalities by performing the appropriate operations in the correct order.
- **I can** interpret the solution of a two-step inequality and explain its meaning in the context of the problem.
- **I can** check my solutions for accuracy and reasonableness.

Instructional Strategies and Activities

1. **Introduction (10 mins)**
    - **Review of Previous Lessons**: Quickly review the steps to solving two-step inequalities and the process for writing them from real-world situations.
    - **Introduce the Goal**: Explain that today's focus will be on applying two-step inequalities to solve word problems, emphasizing the importance of interpreting and checking the results in context.
2. **Guided Practice (20 mins)**
    - **Modeling a Problem**: Present a real-world scenario where students must write and solve a two-step inequality. For example:
      "Sarah has $200 to spend. She wants to buy a concert ticket for $50 and some souvenirs. Write an inequality to represent how much she can spend on souvenirs and solve it."
        - First, identify the total amount Sarah has ($200) and the cost of the ticket ($50).
        - Write the inequality: 50+x≤20050 + x \leq 20050+x≤200, where xxx is the amount Sarah can spend on souvenirs.
        - Solve for xxx: x≤150x \leq 150x≤150. Sarah can spend up to $150 on souvenirs.
    - **Guided Practice Problem**: Provide a similar word problem for students to solve as a class. Walk them through the steps, discussing how to write the inequality, solve it, and interpret the result.
3. **Independent Practice (20 mins)**
    - **Problem-Solving Task**: Distribute a set of word problems that require students to write and solve two-step inequalities. Include problems involving budgeting, time, and measurements. Examples might include:
        - "You have $120 to spend on books and school supplies. The total cost of books is $60, and school supplies cost $15. Write an inequality to find out how much money you can spend on school supplies and solve it."
        - "A restaurant offers a special deal: you can spend up to $40 on dinner, but the cost of drinks is $5. Write an inequality to show how much you can spend on food and solve it."
    - Have students work independently and solve the problems step by step. As they work, encourage them to write their solutions clearly and check their answers for reasonableness.
4. **Closing and Reflection (10 mins)**
    - **Class Discussion**: After completing the problems, ask students to share their solutions and how they approached each problem. Discuss any common errors and how to avoid them.
    - **Exit Ticket**: Ask students to write a two-step inequality for a new scenario, then solve it and

explain what the solution represents. For example: “A family has $500 for a vacation. They’ve already booked their flights for $300. How much can they spend on accommodations and food?”

- Review the exit tickets to assess understanding and provide individual feedback.

Formative Assessments

- **Observations during Guided Practice**: Monitor students as they work through the guided problem to ensure they are applying the correct steps and interpreting their results accurately.
- **Exit Ticket**: Evaluate students’ ability to write and solve a two-step inequality based on a new scenario. This provides a quick check of their understanding.
- **Class Discussion**: Listen for correct use of mathematical terminology and reasoning during the class discussion to gauge students’ grasp of the concept.

Instructional Materials and Resources

- Whiteboard/Markers
- Projector (for displaying examples)
- Worksheets with real-world word problems that require two-step inequalities
- **Number lines** for students to graph their solutions (if applicable)
- **Online Tools**: Websites like Desmos or Khan Academy for interactive practice
- **Manipulatives**: For visual learners, counters or models to represent the problems concretely.

Reflections and Suggested Modifications

- **Reflections**:
  - Were students able to successfully apply their understanding of two-step inequalities to solve real-world problems?
  - How well did students interpret the solutions of the inequalities in the context of the problems?
  - Did students check their solutions for reasonableness?
- **Suggested Modifications**:
  - **For students needing additional support**, provide a step-by-step guide on how to write and solve inequalities. Consider using graphic organizers to help break down the word problem into

smaller parts.

- **For advanced students**, provide word problems that involve fractions, decimals, or more complex scenarios (e.g., discounts, taxes, etc.).
- For students who benefit from more practice, create additional word problems that are similar to those they struggled with, offering more opportunities for reinforcement.
- **Group work**: Pair students who are struggling with those who are excelling to provide peer support. This will also allow for collaborative problem-solving.

Modifications and/or Accommodations

English Language Learners (ELL)

- **Native Language Support**:
  - The teacher provides auditory or written content to students in their native language.
- **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 subject matter.
- **Front-Loading Vocabulary**:
  - The teacher front-loads vocabulary by providing students with a list of important vocabulary words they will need to know for a lesson before it is taught. Including pictures with vocabulary words is also beneficial for students.

Special Education Students

- **Chunking**:
  - The teacher presents information in a way that is easy for students to understand and remember. Chunking organizes information into meaningful units to prevent working memory overload, which can be helpful for students with special needs.
- **Checking for Understanding**:
  - It is important to consistently check for understanding, especially for students who have

accommodations, to ensure they comprehend the concepts 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, giving them adequate time to process their thoughts.
- **Oral Reading**:
    - The teacher will read work aloud to students, which can include class work, tests, and literature circles.
- **Timers**:
    - The teacher uses timers to help students manage time when completing tasks, especially for students who struggle to finish tasks within time limits.

Students with 504 Plans

- **Chunking**:
    - The teacher organizes information into manageable units to ensure students with 504 plans are not overwhelmed by excessive detail.
- **Checking for Understanding**:
    - Teachers will continuously check for understanding, ensuring students with accommodations comprehend the lesson content.
- **Extra Time**:
    - Students with 504 plans are given extra time to complete assignments, ensuring they have ample time to process information.

Gifted & Talented Strategies

- **Extensions/Enrichments**:
    - Teachers provide gifted and talented students with enrichment projects that challenge them to deepen their understanding, apply knowledge, or produce something in relation to what they have learned.
- **Modify/Change Activities**:
    - Teachers monitor and adjust activities for students who need more of a challenge. This may involve additional reading, problem-solving, writing, or project work, allowing gifted students to progress at an accelerated rate compared to their peers.

Students at Risk of School Failure

- **Directions or Instructions**:
    - Directions/instructions are provided in limited numbers, both verbally and in simple written format. Teachers may ask students to repeat the instructions to ensure understanding and check back to ensure they haven't forgotten.
- **Peer Support**:
    - Peers can build confidence by helping others. Teachers can set up a system where specific students are assigned to assist at-risk students with clarification before approaching the teacher.
- **Alternate or Modified Assignments**:
    - Teachers should consider modifying assignments for students at risk by simplifying tasks, reducing length, or offering alternative delivery modes (e.g., oral reports instead of written assignments).
- **Increase One-on-One Time**:
    - Teachers should check in with at-risk students regularly, even for brief periods, to offer support and guidance as needed.
- **Contracts**:
    - A working contract helps prioritize tasks and ensures completion. Students and teachers can track progress together by marking off completed tasks with checkmarks or symbols, encouraging accountability.
- **Hands-On Tasks**:
    - Provide concrete, hands-on activities to support at-risk students. This may include using tools like calculators or counters in math or having students use audio recordings for comprehension tasks instead of reading themselves.
- **Tests/Assessments**:
    - Tests can be administered orally, or broken into smaller sections. Teachers may administer parts of a test in the morning, after lunch, and on subsequent days if necessary.
- **Seating**:
    - Seat students near a helping peer or with quick access to the teacher. For students with hearing or vision issues, seat them at the front for better access to 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 asking 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
        - How the Mayans conceptualized the number 0 before the first recording of it

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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. This 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.

Use 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.

Math Climate Change Companion Guide

- **G.MG.A.2 Apply concepts of density based on area and volume in modeling situations** (e.g., persons per square mile, BTUs per cubic foot).

- **Climate Change Example**:
  - Students may apply the concept of population density of different urban areas, including calculations of population density, and discuss different environmental factors (e.g., air and water quality, waste disposal, energy consumption) that might be exacerbated by increased population density.

New Jersey Student Learning Standards: Content Area

MATH.7.EE	Expressions and Equations
MATH.7.EE.B.4.b	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

21st Century Life and Career

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP7	Employ valid and reliable research strategies.

Integration of Career Readiness. Life Literacies and Key Skills

PFL.9.1.4.B	Money Management
PFL.9.1.4.G	Insuring and Protecting

Integration of Computer Science and Design Thinking

	A computing system is composed of software and hardware.

Computers store data that can be retrieved later. Data can be copied, stored in multiple locations, and retrieved.

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

SOC.K-12.1	Developing Questions and Planning Inquiry
SCI.9-12.5.2.12	All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.