SECONDARY MATH CASE STUDY

Mathematics Standard for Algebra 1

What are the students learning?

Grade level standard: HSE-CED-A.1 - Create equations and inequalities in one variable and use them to solve problems.

Example Learning Progression for Secondary Math

WA-AIM Access Points			Teacher adjusted	Grade Level Standard
Less Complex	**Intermediate**	**More Complex**	**Further Complexity**	**Grade Level Standard**
Student will identify an algebraic equation involving addition and subtraction (up to 20) that represents a modeled real-world situation.	Student will solve a one-step algebraic equation involving addition and subtraction representing a real-world situation	Student will write and solve a one-step algebraic equation representing a real-world situation.	Create equations in one variable and use them to solve problems in real-world situations (not yet inequalities)	HSE-CED-A.1 - Create equations and inequalities in one variable and use them to solve problems.

Educator adapts instruction to meet the needs of students and deepen learning toward grade level standard

How could I teach this standard in general education to all students?

- **Concrete or representations**: Use manipulatives such as counters or blocks to visually demonstrate how to form equations. For instance, if students are solving for x in the equation x + 3 = 7, they could use blocks or algebra tiles to represent the equation physically. This helps students grasp the concept of balancing equations in a tactile or visual way.
- **Interactive technology**: Incorporate math software or apps that allow students to explore equations and inequalities through interactive activities. For instance, tools like Polypad Algebra Tiles allow students to represent and solve algebraic equations using virtual algebra tiles, balance scales allow them to explore equality and inequality, and Desmos enables students to manipulate equations in real-time and see the effects graphically. This can aid in understanding the relationship between algebraic expressions and their graphical representations.
- **Project-based learning:** Assign a project where students must investigate a real-world problem that can be modeled with equations or inequalities. Get creative! For instance, students could analyze data related to local environmental issues (like water usage) or even data related to their favorite athlete and create equations to represent their findings. This method encourages critical thinking and application of math in meaningful contexts.

- **Role-playing:** Create role-playing activities where students act out scenarios that require the use of equations or inequalities. For instance, they could simulate a market scenario where they negotiate prices using inequalities to express limits and budgets. This method makes the learning process dynamic and engages students' social skills.
- **Visual storytelling**: Encourage students to create a comic strip or storyboard that illustrates a problem involving equations or inequalities. By telling a story visually, they can deepen their understanding of the problem-solving process and the relevance of math in everyday life.

How could I measure understanding of the standard for students with significant cognitive disabilities?

Start with how you measure student understanding for all students and adapt from there. For example, if students are given word problems to build algebraic equations that they will then solve, start there for your students who have significant cognitive disabilities. If the student requires scaffolds to support their engagement, you might give them fewer word problems altogether and use the WA-AIM Access Point Framework to design scaffolded supports and prompts. If a student needs scaffolds at a certain Access Point for one standard, don't assume they will need this level of scaffolding for every other standard.

Further Complexity towards the Grade-Level Standard

Students may be able to do more than the WA-AIM Most Complex Access Point. In this case, it is essential to challenge them to reach toward the grade level content standard.

In this case, they may be solving equations and inequalities that look very similar to what is required in the grade-level curriculum; however, the equations may be simplified (e.g., only involving addition and subtraction) and the student may require the use of supportive strategies and materials. For example, this problem shows a mathematical problem that requires the student to build an algebraic equation and solve for a variable *x*.

Problem:

> Jordan has $45 saved up. They want to buy snacks and a bus ticket for a scouts trip. The total cost needs to be no more than $60. How much can Jordan spend on snacks? Let *x* represent the amount Jordan can spend on snacks.
>
> $45 + x \leq 60$

A student could use various strategies to solve for the inequality, including the use of a calculator, a hundreds chart, or number line.

If the student requires additional scaffolding, consider the More Complex Access Point.

More Complex (WA-AIM Access Point)

To measure the student's demonstration of the standard according to the More Complex Access Point, the student is required to not only solve the one-step algebraic equation but write it out as well. The More Complex Access Point says: "Student will write and solve a one-step algebraic equation representing a real-world situation."

Given the word problem:

> Jamie is at the store buying fruit. She picks up a bag of apples. Then, Jamie decides to return 2 apples to the shelf. Jamie has 12 apples left. How many apples did Jamie start with?

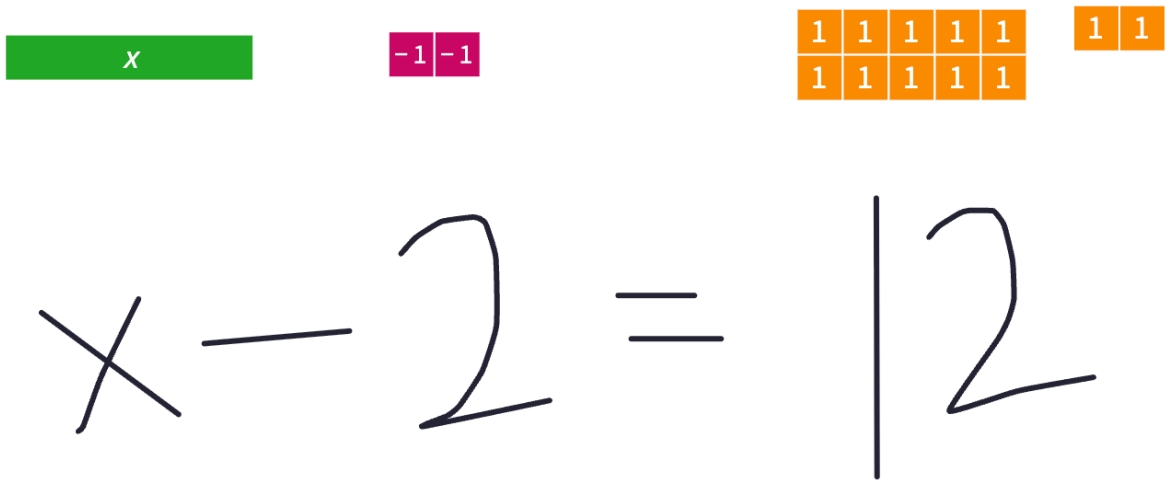
The student would need to write out the algebraic equation based on the word problem. This may involve them writing the equation without supports. It may also involve them putting pre-selected numbers and symbols together in an equation frame or selecting the equation from a choice of 3-5.

Equation frame example:

x	-	2	=	12

After the student develops an equation, they will then solve it. The student may use various strategies to solve the algebraic equation. For example, they could use more traditional problem-solving methods by balancing out the equation, using algebra tiles (either virtual or tangible), or act out various options for x to determine which one is correct.

Algebra tiles example:



[4]

If the student requires additional scaffolds beyond the More Complex Access Point, consider using the Intermediate Access Point.

Intermediate (WA-AIM Access Point)

To measure the student's Intermediate Access Point understanding of the standard, the WA-AIM Access Point says the "student will solve a one-step algebraic equation involving addition and subtraction representing a real-world situation." In this case, they can take the real-world situation from the More Complex Access Point and solve it to find out how many apples were in Jamie's first bag of apples. See the More Complex Access Point for ideas on options for solving the equation through balancing the equation, using algebra tiles, or by acting it out. Students may need repeated

[4] Virtual Algebra Tiles. Available at https://polypad.amplify.com/p#algebra

exposure to various strategies to be able to consistently solve algebraic equations.

Word Problem:

> Jamie is at the store buying fruit. She picks up a bag of apples. Then, Jamie decides to return 2 apples to the shelf. How many apples did Jamie start with?

Student Answer:

$x - 2 = 12$

If the student continues to require additional scaffolding given the Intermediate Access Point, consider the Less Complex Access Point.

Less Complex (WA-AIM Access Point)

The Less Complex Access Point for this standard is to "identify an algebraic equation involving addition and subtraction (up to 20) that represents a modeled real-world situation."

To measure this Access Point aligned to the standard, students with significant cognitive disabilities will need a modeled real-world situation. For example, take this word problem about a person at a grocery store.

Word Problem:

> Jamie is at the store buying fruit. She picks up a bag of apples. Then, Jamie decides to return 2 apples to the shelf. There are 12 pieces of fruit at the end. Which equation will help you find how many apples were in the bag to start?

Throughout the word problem, work with the student to act out the problem. This may include the use of real-world objects (e.g., apples), photos, or representations of objects (e.g., manipulatives). Students may build their algebraic equations in various ways, including writing, using an equation frame (example shown) with number and symbol cards, or using tools like algebra tiles (example shown).

If assessing the standard, you may also offer the student choices regarding which equation represents the word problem.

- $x + 4 = 2$
- $x - 2 = 12$ (correct answer)
- $2x + 4 - 6 = 10$

Reducing Barriers for Learners who have Significant Cognitive Disabilities in Large Group Lessons

Make reducing barriers an ongoing practice embedded in the instructional process - take a few minutes to think about your process! Is there a barrier related to:

- **Interest or engagement?** Think about how to incorporate the student's lived experiences, culture, and interests into word problems, instruction, and materials.
- **Background knowledge?** Think about how to highlight key ideas (e.g., similarities and differences) and define key vocabulary (e.g., compare, contrast) in a way that's engaging and not stigmatizing.
- **Showing what they know?** Think about having options for how they use learning tools (e.g., graphic organizers) and technology to communicate what they know and what they've learned.

For example, one possible barrier with this algebra standard may occur when information is presented in a way that prevents students from reading or understanding the information, like when a student does not grasp that a variable (such as *x*) represents an unknown value.

Ideas to reduce this barrier could include classroom educators:

- Continuing to act out word problems in a concrete way. For example, in a word problem where a person is shopping in a grocery store and they grab a bag of fruit with an unknown quantity, a teacher might demonstrate the word problem with an actual bag.
- Writing out the equation with a bag drawn in place of the variable or writing out the word *bag* in place of the variable letter.
- Use engaging word problems that include objects that are interesting to students.

Expanded Learning Progression for Secondary Math

	WA-AIM Access Points			Teacher adjusted	Grade Level Standard
	Less Complex	**Intermediate**	**More Complex**	**Further Complexity**	**Grade Level Standard**
Student Skill	Student will identify an algebraic equation involving addition and subtraction (up to 20) that represents a modeled real-world situation.	Student will solve a one- step algebraic equation involving addition and subtraction representing a real-world situation.	Student will write and solve a one-step algebraic equation representing a real-world situation.	Student will write and solve one-variable equations and inequalities involving addition and subtraction that model real-world situations.	HSE-CED-A.1 - Create equations and inequalities in one variable and use them to solve problems.
Complexity Details	• Matching with visuals • Addition and subtraction only	• Simple real-world scenarios • Solve for single operations/whole numbers	• Basic word problems • Write and solve single operations.	• Word problems requiring one-variable equations and inequalities • Write and solve single operations.	• Multiple operations and inequalities
Success Criteria Ex.	• Matches equations to situations • Recognizes equation structure	• Solves equations correctly • Shows systematic work • Explains solution step	• Translates words to equations • Solves independently • Verifies solutions	• Translates words to equations • Solves independently • Verifies solutions	• Solves one variable equations and inequalities independently • Verifies solutions
Instructional Strategy Examples	Visual Supports • Use large real-world manipulative • Picture cards for equations Scaffolds • Pre-made equation cards • Fill in the blank templates • Word banks Technology • Interactive equation builders	Visual Supports • Balance scale models • Step by step solution guides • Use algebra tiles Scaffolds • Equation solving mats • Guided practice worksheets • Think-aloud Technology • Virtual manipulatives • Self-checking apps	Visual Supports • Color coded word problems • Equation building templates Scaffolds • Keyword highlighting guides • Problem solving checklists • partner work • simplified text complexity Technology • Virtual manipulatives • Digital word problem creators	Visual Supports • Multi-step problem flowcharts • Strategic reference cards Scaffolds • Guided worksheets • Solution planning templates • Small group instruction Technology • Virtual manipulatives • Math modeling software	Visual Supports • Multi-step problem flowcharts • Strategic reference cards Scaffolds • Guided worksheets • Solution planning templates • Small group instruction Technology • Graphing calculators • Math modeling software

TEAM UNIT PLANNING EXERCISE

Secondary Math Case Study

Increasing Student Access and Progress in Grade Level Standards by Adjusting Complexity

Found within the Reaching Every Learner Companion Tools document, the **Team Unit Planning Exercise Template** is designed to help educators apply the *Reaching Every Learner* approach in their planning and instruction. Grounded in the Universal Design for Learning (UDL) framework, it supports the creation of accessible, inclusive, and appropriately challenging units for all students.

Educators and teams can use these tools during co-planning, lesson design, and ongoing instructional adjustments to meet diverse learner needs.

This case study demonstrates how to use the **Team Unit Planning Exercise Template** to support students with significant cognitive disabilities in making progress in grade-level standards within a unit. It maps to the Expanded Learning Progression for Secondary Math (found on page 29) and can be a helpful process when building out the **Expanded Learning Progression Template**.

Section 1: Whole Class

Unit Content Overview: Begin by writing a clear, short description of your unit's core content. This statement should capture the essential learning that will take place and provide a foundation for planning inclusive instruction for all learners**.**

Students will develop skills in translating real-world situations into mathematical equations and inequalities, focusing on creating and solving one-variable expressions that model authentic scenarios while building conceptual understanding of algebraic relationships.

Standards Alignment: Document the grade-level standards and corresponding WA-AIM Access Points that will be addressed in this unit. Include both content standards and any relevant supporting standards that will help guide instruction and measurement of student learning.

Grade Level and Supporting Standard(s)

HSE-CED-A.1 - Create equations and inequalities in one variable and use them to solve problems.

Are there WA-AIM Access Points for the Standard(s)? If Yes, detail them in Section 1 of the Team Planning Exercise:

- More Complex: Student will write and solve a one-step algebraic equation representing a real-world situation.
- Intermediate: Student will solve a one- step algebraic equation involving addition and subtraction representing a real-world situation
- Less Complex: Student will identify an algebraic equation involving addition and subtraction (up to 20) that represents a modeled real-world situation.

Learning Outcomes: Think about the unit's standards in terms of transferable understanding. What are the 2–4 fundamental skills that represent the learning all students should achieve through this unit.

For each learning outcome, develop 2–3 success criteria to demonstrate multiple ways a student could demonstrate their learning.

Prompt: Success criteria should be:

- *Observable and measurable*
- *Allow for multiple demonstration methods*
- *Support differentiated instruction*
- *Connect to real-world applications*
- *Enable student self-assessment to the extent appropriate*

Learning Outcome 1: Students can identify and represent mathematical relationships from simple real-world situations using equations or inequalities.

- Identify important information in word problems by highlighting or listing the given values and what needs to be found
- Choose the correct variable and operation symbols to represent the relationship described in the problem
- Write a complete equation or inequality that matches the word problem

Learning Outcome 2: Students can solve one-variable equations and inequalities using structured supports and preferred problem-solving methods.

- Show each step of the solution process clearly, using available tools or supports
- Check work by plugging the answer back into the original equation or inequality
- Explain whether the answer is reasonable using words, numbers, or pictures

Core Instructional Approaches: Describe the primary teaching strategies and learning activities planned for the whole class.

Prompt: Focus on methods that naturally incorporate the multiple means of engagement, representation, and expression from UDL to support all learners from the start.

Instruction will blend concrete and abstract representations through:

- Starting with visual patterns and physical models before moving to symbolic notation
- Using manipulatives and graphic organizers to organize information
- Incorporating technology tools for visualization and calculation
- Implementing structured peer discussions about problem-solving strategies
- Creating opportunities for students to develop and share multiple solution methods

What instructional strategies and activities can be used to increase access and progress in the standard?

Students will access algebraic concepts through:

- Physical manipulatives representing variables (algebra tiles, balance scales)
- Color-coding for different parts of equations
- Step-by-step visual guides for equation solving
- Real-world scenarios connected to student interests and experiences
- Technology tools that provide immediate feedback and visual representations

Section 2: Planning for Students with Significant Cognitive Disabilities

Access, Engagement and Action Analysis: What is one barrier to learning we anticipate for students with significant cognitive disabilities?

- Is it related to how student interest or engagement is addressed in the instruction?
- Is it related to how the student's background knowledge (e.g., vocabulary) is addressed in the learning environment?
- Is it related to options available for how students can show what they know?

Some students may struggle with fluently decoding the symbols within the unit (+, - , <, >, ≤, ≥, =) this is connected to background knowledge. Other students may struggle to with the abstract representation of mathematical scenarios.

Brainstorm one way to remove this barrier: What is one way you might remove the identified barrier in the learning environment?

- A cheat sheet that decodes the common symbols within the unit that can be made available, customized and faded
- Beginning instruction with visual patterns and physical models before moving to symbolic. Tying instruction and problem solving to real world models

Complexity Adjustment Planning: Use this space to brainstorm how the content and tasks can be adjusted so that students can access the grade level standard(s) at different complexity levels. Once the list is built, then order it by complexity to create a continuum of complexity for how students can deepen their understanding in the unit.

Prompt: Consider how abstract concepts can be made more concrete and complex tasks broken into manageable components. Collaboration between general education and special education staff will enhance this exercise.

- Matching simple equations to real world situations
- Recognizing equation structure and symbols
- Begin by solving one step equations
    - Identifying concrete "missing value" problems using familiar contexts
    - Break equation creation into explicit steps with visual supports
    - Focus on addition and subtraction and single operations with whole numbers
    - Introduce division and multiplication
    - Introduce inequalities
- Write and solve one step equations from basic world problem
    - Focus addition and subtraction and single operations with whole numbers
    - Introduce division and multiplication
    - Introduce inequalities
    - Multiple operations and inequalities

Bank of Support Strategies: Outline a bank of instructional strategies that will assist students with significant cognitive disabilities to access and make meaningful progress in the learning activities. Consider visual supports, scaffolds and technology.

- Create equation-building templates with visual cues
- Use personalized reference sheets with common problem types
- Provide calculators, multiplication charts, or manipulatives for calculation support
- Use structured partner work with thoughtfully assigned roles and small group instruction
- Create step-by-step checklists or problem solving flow charts for problem-solving procedures
- Provide a range of visual supports (manipulatives, picture cards with equations, balance scales, algebra tiles)

Ongoing Planning for Individualized Support Strategies: Use this space as you are planning and refining instruction to document the individual support strategies students are needing. This box is intentionally shaded as educators may choose to leave this blank initially and instead update this over time.

Remember: For students who have an IEP, accommodations, modifications and support strategies that are determined to be needed may already be documented.

Progress Monitoring Approach Describe how you will measure learning for students with significant cognitive disabilities. Include multiple ways students can demonstrate understanding and how data will be gathered to inform instructional decisions.

Prompt: The progress monitoring approaches outlined should tie back to the learning outcomes and success criteria you identified in section 1.

Evidence of learning could be collected through:

- Video recordings of students explaining their thinking
- Digital portfolios showing progression from concrete to abstract representations
- Student demonstrations using manipulatives
- Modified assessments with reduced answer choices
- Performance tasks with real-world applications
- Exit tickets with visual support options
- Student demonstrating skill across multiple contexts/environments