



Incorporate universal Design for Learning (UDL)

MATH

TAKEN FROM CONTENT MODULES AND CURRICULA RESOURCE GUIDES



UNIVERSAL DESIGN FOR LEARNING: Coordinate Plane *Content Module*

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/ No Hand Use	Lacks Basic Numeracy Concepts	Motivational/ Attention Issues
Representation	Use graphs and coordinate planes with raised lines and textures	Use computer representation of figures that can be manipulated with switch; create a grid (coordinate plane) on a large surface on the floor that the student can walk over or ride over in wheelchair to find ordered pairs	Color code equations and corresponding parts of a graphing calculator to support students correctly entering equations	Incorporate technology including computer representations, videos, animations, and talking calculators
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer	Student scans and selects points on a graph that represent ordered pairs; use a switch to indicate correct answers; use an eye gaze board to select answer; phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc.	Student selects graphs versus drawing them; selection of correct answer is done after a model; student answers "yes/no" questions regarding slope, quadrants, etc.	Have students create graphs using high interest manipulative (e.g. stickers for ordered pair coordinates)
Engagement	Teach students to use their hands to scan the raised graph or parts of the coordinate plane	Use a computer with AT where the student can click to answer; use figures that are large enough to accommodate the movements that the student is able to make; pair student with another student without a physical impairment and have them work together	Student uses talking calculator and graphing calculator	

UNIVERSAL DESIGN FOR LEARNING: Equations Content Module

(UDL in planning, and provide for additional differentiated instruction when teaching equations.)

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/attention.	Lack of or extremely limited use of speech.
Representation	Use a graphing calculator so students can just plug in the equation; raise the lines of the graphed linear equation or of the grid when graphing; add corresponding textures (e.g., Velcro) to equations and calculators; have students scan raised lines with hands to discriminate between the different kinds of slope (i.e., negative, positive, zero, and undefined)	Student scans an array of possible options and use a switch to select the appropriate slope or ordered pair; graph linear equations on the computer that can be manipulated with switch	Create personally-relevant word problems; use graphing calculators or computer software to find slopes or graph equations; Have student use graphing calculator; color code equations and corresponding parts of calculator to support students correctly entering equations; use conversion tables with pictures or objects to points on a line	Provide customized display of information Consistent model by utilizing modes of communication used by students (point to symbols representing concepts, operations) Teacher model competent use of AAC during instruction
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer	Use a switch to indicate correct answers; use an eye gaze board to select answer; use a blink response to complete a table to find points on a line given the equation; phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc...	Student selects numbers versus writing them; selection of correct answer is done after a model; student points to each part of the equation when asked to touch the slope or the y-intercept Have students graph linear equations using high interest manipulatives (e.g., computer software, on an iPad, using their favorite color)	Provide options for modes of communication: Incorporate responses into student's AAC device or eye gaze array Phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc Choose response by pointing to or selecting object or item Use a blink response to count tiles or select answer; count tiles/cubes out loud having student move in some voluntary way (e.g., nod head, tap

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/attention.	Lack of or extremely limited use of speech.
				hand, tap foot) to count along
Engagement	Teach students to use their hands to scan the raised lines or grid of a graph; use graphing calculator and add texture to support entering linear equations	Use a computer with AT where the student can click to answer; use manipulatives that are large and easily manipulated; pair student with another student without a physical impairment and have them work together to solve linear equations or complete tables	Student uses graphing calculator, limit ordered pairs to numerals less than 10, use bright colors to represent the ordered pairs that are the coordinates of a point on the line. Find dilations of local buildings and use those dilations to make a scale model of the neighborhood; create personally-relevant word problems about highly preferable activities (e.g., going to the mall; food)	Recruit interest with modes of communication: Allow students to choose items or subjects that are relevant to them via AAC devices, symbols, or eye gaze array

UNIVERSAL DESIGN FOR LEARNING: Expressions *Content Module*

Some examples of options for teaching expressions to students who may present instructional challenges due to:

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No Hand Use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
Representation	Add corresponding textures (e.g., Velcro) to manipulatives representing each term in the expression.	Student scans an array of possible options and uses a switch to select the appropriate terms, coefficients, or exponents.	Use objects to represent numbers in the expression; color code similar terms within the expression.	Create personally-relevant word problems or stories to pair with expressions.
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer.	Uses a switch to indicate correct answers; uses an eye gaze board to select answer; "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc.	Student selects numbers or terms versus writing them; selection of correct answer is done after a model.	Student simplifies expressions using computer software or other technology.
Engagement	Add corresponding textures (e.g., Velcro) to manipulatives representing each term in the expression.	Use a computer with AT where the student can click to answer; use manipulatives that are large and easily manipulated; pair student with another student without a physical impairment and have them work together to simplify expressions.	Use objects to represent numbers in the expression; color code similar terms within the expression.	Include personally-relevant contexts for simplifying the expressions.

UNIVERSAL DESIGN FOR LEARNING: Fractions and Decimals Content Module

Some examples of options for teaching Fractions and Decimals to students who may present instructional challenges due to:

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No Hand Use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
Representation	Use a talking calculator when solving equations; use a ruler with raised measurement lines, use objects to represent fractions and decimals; use raised lines to represent portions of the whole object. Use items that are velcroed together to represent the whole and have the student separate the whole into parts.	Count the parts of fractions or decimals using a step by step process which progresses through numbers; student scans an array of possible options and uses a switch to select the number to identify the numerator; use computer representation of figures that can be manipulated with switch; place fraction representations on a slant board or eye gaze board; create a grid on a large surface on the floor that the student can walk over or ride over in wheelchair.	Use fraction and decimal manipulatives that can be separated and placed on a number line. Have student use talking calculator to count along. Students can use one to one correspondence to match equal number of parts on representation of fraction or decimals. Color code equations and corresponding parts of calculator to support students correctly entering equations.	Find fractions of motivating objects (e.g., pizza, coloring markers in a box, piece of a Lego set). Incorporate technology including computer representations, videos, animations, and talking calculators. Use token economy system that embeds fractions ("you earned $\frac{1}{4}$ of your Lego piece, you have $\frac{3}{4}$ left and then you get Lego time.")
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer; teach tangible symbols that mean fraction and decimal.	Student scans and selects number that represents numerator or denominator; uses a switch to indicate correct answers; use an eye gaze board to select answer; use a blink response to count parts or select answer; phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc; count parts of fractions out loud having student move in some voluntary way (e.g., nod head, tap hand, tap foot) to count along.	Student selects numbers versus writing them; selection of correct answer is done after a model; student points to each part of a fraction or decimal while teacher or peer counts aloud; student answers "yes/no" questions regarding fractions or decimals after parts have been counted aloud (e.g., 1,2,3,4. There are 4 colored parts. Is this the number we write as the numerator?); matches the parts of a fraction to the correct number (matches 4 to 4).	Have students express fractions using high interest manipulative (e.g., Legos, stickers of favorite characters, a fraction of an iPod, or jewelry beads).

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No Hand Use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
Engagement	Teach students to use their hands to scan the raised parts of each whole item; use talking calculator for computing the area; start with simple, clearly defined fractions; use items that are familiar and reinforcing to students.	Use bright colors to call attention to numerators; use a computer with AT where the student can click to answer; use figures that are large enough to accommodate the movements that the student is able to make; pair student with another student without a physical impairment and have them work together to create fraction and decimal representations.	Student uses talking calculator, limit fractions and decimals to numerals less than 10, use bright colors to represent fractions and numerals.	Use token economy system that embeds fractions ("you earned $\frac{1}{4}$ of your Lego piece, you have $\frac{3}{4}$ left and then you get Lego time.")

UNIVERSAL DESIGN FOR LEARNING: Perimeter, Area and Volume *Content Module*

For Perimeter

Some examples of options for teaching Perimeter to students who may present instructional challenges due to:

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No hand use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
Representation	Use pieces of card stock to make a box; raise edges of shape using Velcro; use a talking calculator when solving formulas; use a ruler with raised letters or Braille representation.	Count the tiles when determining area using a step by step process; which progresses through numbers; student scans an array of possible options and uses a switch to select the number to complete the equation template.	Use a trundle wheel to measure the length of the sides; color code the equation template and calculator buttons so students can solve equation by matching colors; use a talking calculator.	Use a talking calculator to solve perimeter equation; find the perimeter of motivating objects (e.g., swimming pool).
Expression	Student states answer or scans raised numbers to select correct answer.	Student scans and selects number that represents answer; uses a switch to indicate correct answers.	Using number cards that include dots representing each number; student selects numbers versus writing them.	Same as above.
Engagement	Use different types of textures to raise edges of box side or cardstock	Pair student with another student without a physical impairment and have them decorate the box together.	Talking calculator; use number cards which include dots or objects to represent the number; color code measurement of the box with number presented within an array.	Same as above.

For Area and Surface Area

Some examples of options for teaching Area and Surface Area to students who may present instructional challenges due to:

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No Hand Use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
Representation	Use raised lines on figures (e.g., yarn; Wikisticks); use boxes, plates, and other objects that are familiar to the student (e.g., clock, desk); use rulers with raised numbers; make shapes out of materials with texture like carpet or Velcro.	Use computer representation of figures that can be manipulated with switch.	Use boxes, plates, and other real objects; place cubes on surface to count area (e.g., square inches).	Use materials with novelty, textures. Have an immediate effect (e.g., find area of CD and then play it). Find surface area of box and open it to get prize. Include a personally relevant story about an area problem.
Expression	Student states answer or scans raised numbers to select correct answer.	Student scans and selects number that represents answer; uses a switch to indicate correct answers.	Student selects numbers versus writing them.	Have student write answers with novel pencil or use an iPad; determine area of "fun" objects (e.g., table with a party table cloth, cover of their favorite book).
Engagement	Teach students to use their hands to scan the area of each item. Use talking calculator for computing the area.	Teach students to click and select shapes and numbers to indicate area.	Have measures affixed to object that student learns to place into equation template; student uses calculator to solve equation.	Assign the area computations as a job task. Student is "paid" 1 minute on computer for each one completed.

For Volume

Some examples of options for teaching Volume to students who may present instructional challenges due to:

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No Hand Use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
Representation	Provide empty containers filled with cubes; clearly define volume as the cubes inside the containers.	Count the cubes when determining volume using a step by step process which progresses through numbers; student scans an array of possible options and uses a switch to select the number to complete the equation template; use computer representation of figures that can be manipulated with switch; place shapes or coordinate planes on a slant board or eye gaze board.	Use cubes that are numbered and can be removed once counted and placed on a number line.	Use materials with novelty, textures. Have an immediate effect (e.g., find volume of x-box and then play it). Include a personally relevant story about an volume problem; use a talking calculator to solve volume equation; find the volume of motivating objects.
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer;	Student scans and selects number that represents answer; uses a switch to indicate correct answers; use an eye gaze board to select answer; use a blink	Student selects numbers versus writing them; selection of correct answer is done after a model; student points to each cube while teacher or	Have student write answers with novel pencil or use an iPad; determine volume of "fun" objects (e.g., TV, box of favorite cereal).

Principles of UDL	Visual Impairment or Deaf/Blind	Physical Impairment: Little/No Hand Use	Lacks Basic Numeracy Concepts	Motivational/Attention Issues
	<p>teach a symbol that means "volume" (e.g., four plastic cubes glued together).</p>	<p>response to count cubes or select answer; phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc.; count cubes out loud having student move in some voluntary way (e.g., nod head, tap hand, tap foot) to count along.</p>	<p>peer counts aloud; student answers "yes/no" questions regarding volume after tiles have been counted aloud (e.g., 1,2,3,4. The volume of this square is 9 cubic inches, is that correct?); matches the volume to the correct number (matches 9 to 9).</p>	
Engagement	<p>Teach students to place cubes in empty containers. Teach that the volume can be counted by removing the cubes one at a time to count them.</p>	<p>Use a computer with AT where the student can click to answer; use figures that are large enough to accommodate the movements that the student is able to make; pair student with another student without a physical impairment and have them complete the problem together.</p>	<p>Have measures affixed to object that student learns to place into equation template; student uses talking calculator to solve equation; limit area to numbers less than 10.</p>	<p>Assign the area computations as a job task; student is "paid" 1 minute on computer for each one completed.</p>

UNIVERSAL DESIGN FOR LEARNING: Radicals and Exponents *Content Module*

Some examples of options for teaching radicals and exponents to students who may present instructional challenges due to:

Principles of UDL	Visual Impairment or Deaf/Blind	Physical impairment: Little/ no hand use	Lacks basic numeracy concepts	Motivational/ attention issues
Representation	Add corresponding textures (e.g., Velcro) to equations and calculators; add texture to exponents (e.g., raised numbers) and to radicals	Student scans an array of possible options and uses a switch to select the appropriate terms	Use a talking graphing calculator so students can just plug in the equation	Create personally relevant word problems or stories
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer	Use a switch to indicate correct answers; use an eye gaze board to select answer; "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc.	Student selects numbers or terms versus writing them; selection of correct answer is done after a model	Student solves problems with radicals or exponents using computer software or other technology
Engagement	Use a talking calculator possibly a talking graphing calculator so students can enter radicals and exponents as they appear in the equation.	Use a computer with AT where the student can click to answer; use manipulatives that are large and easily manipulated; pair student with another student without a physical impairment and have them work together	Use objects to represent numbers in the problem; color code problem and calculator buttons to assist in solving radicals and exponent problems	Include personally relevant contexts for radicals and exponents (e.g., their growth as they get older)

UNIVERSAL DESIGN FOR LEARNING: Ratios and Proportions *Content Module*

Some examples of options for teaching ratios and proportions to students who may present instructional challenges due to:

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/ attention	Lack of or extremely limited use of speech
Options for Representation	<p>Provide auditory options:</p> <ul style="list-style-type: none"> - Talking calculator - Text-to-speech software or voice recordings to read aloud story problems - Single message sequence voice-output devices to count aloud - Captioning software that presents auditory information visually <p>Provide tactile options:</p> <ul style="list-style-type: none"> - Object cues, using miniature objects or other tangible symbols to assist with problem comprehension and operations - Create numbers and symbols out of tactile materials - When demonstrating graphical linear representations of ratios, raise the grid by using glue over grid, puffy paint, or wiki sticks to represent proportional relationship (Students will need the grid raised to count x- and y-axis and another texture or height for the line representing the proportional relationship). <p>Provide visual and manipulative options to scaffold representation of concepts:</p> <ul style="list-style-type: none"> - Color code problems and corresponding parts of calculator to support students correctly entering information - Have students physically demonstrate ratios using manipulatives or concrete objects (e.g., pencils to students). 	<p>Reduce Physical Effort:</p> <ul style="list-style-type: none"> - Place materials on slant board or eye gaze array - Display flip chart, interactive white board or other teaching materials at student eye level - Student can scan an array of possible options and use a switch to select the answer - Use computer representation of figures that can be manipulated with switch - Demonstrating ratios verbally (e.g., 4: 3 can be demonstrated by saying beep beep beep beep: bam bam bam) 	<p>Illustrate through multiple media:</p> <ul style="list-style-type: none"> - Utilize interactive whiteboard - Incorporate interactive websites that provide nonlinguistic tools for exploring math concepts: <ul style="list-style-type: none"> o Math Open Reference Click here o There are many resources listed here: Click here - Use a talking calculator 	<p>Provide customized display of information:</p> <ul style="list-style-type: none"> - Consistent model by utilizing modes of communication used by students (point to symbols representing concepts, operations) - Teacher model competent use of AAC during instruction

Options for Expression	<p>Vary the methods for response by:</p> <ul style="list-style-type: none"> – Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer – Provide manipulatives for student to respond or contribute to interaction – Student states answer by selecting picture or symbol – Students can use talking calculator to assist with counting number of items in each ratio unit – Give students a ratio with two different types of counters/manipulatives for each ratio unit (i.e., 2:4 would be represented with 2 pennies and 4 bear counters). Have students create the same ratio with two different types of counters (i.e., 2 paper clips and 4 pencils). Provide student with response options or AAC device. 	<p>Provide options for responses/expression:</p> <ul style="list-style-type: none"> – Student selects numbers versus writing them – Selection of correct answer is done after a model – Ratios can be recognized without counting. Display ratios that are the same and one not the same and use the example/non example script to help students identify similar ratios. – Rather than indicating ratios by number, with simple ratios, have students indicate proportional relations by stating same or not same. <p>Optimize access to tools/alternatives for responding:</p> <ul style="list-style-type: none"> – Provide symbols, objects, manipulatives, and pictures for matching/ student responses – Use computer/interactive whiteboard to show ratios so student can interact using a switch or eye gaze. 	<p>Provide multimedia options for responses/expression:</p> <ul style="list-style-type: none"> – Allow the student to make selections by pointing to, gazing at, or selecting answers on the interactive white board – Utilize a switch or adapted computer mouse – Have student write answers with novel pencil or use a tablet computer – Students can demonstrate understanding of ratios by eye gazing to proportional ratios, using technology to create ratios (computer games or lessons that can be completed using a switch) 	<p>Provide options for modes of communication:</p> <ul style="list-style-type: none"> – Incorporate responses into student's AAC device or eye gaze array – Phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc. – Choose response by pointing to or selecting object or item – Use a blink response select answer
Options for Engagement	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> – Digital/talking representations, videos, talking calculators – Interactive websites <p>Increase personal relevance:</p> <ul style="list-style-type: none"> – Use items that are familiar and reinforcing to students – Incorporate high preference items into story problems, as well as student names <p>Provide tactile options for engagement:</p> <ul style="list-style-type: none"> – Use concrete items of interest to demonstrate ratios and try to incorporate tactile surfaces for students with visual impairment 	<p>Recruit interest by increasing personal relevance:</p> <ul style="list-style-type: none"> – Ensure that engaging and high preference content is visible and accessible to student – Use figures that are large enough to accommodate the movements that the student is able to make – Pair student with another student without a physical impairment and have them complete hands on activities together – Use items of high interest when demonstrating ratios – Have student do a scavenger hunt with favorite items to locate constant ratios (e.g., if student enjoys Legos, have her collect several Lego bricks that have the same number of studs). 	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> – Digital/talking representations, videos, talking calculators <p>Provide options for sustaining effort and persistence:</p> <ul style="list-style-type: none"> – Break tasks down to maximize student attention – Use high interest items that demonstrate a constant ratio such as a favorite car (1 car 4 wheels), robot (1 robot two extending arms), or DVD (1 DVD to one hole in the center of the disk) – Vary demands and materials to maintain interest <p>Increase personal relevance:</p> <ul style="list-style-type: none"> – Use items that are familiar and reinforcing to students – Incorporate high preference items into story problems, as well as student names 	<p>Recruit interest with modes of communication:</p> <ul style="list-style-type: none"> – Allow students to choose items or subjects that are relevant to them via AAC devices, symbols, or eye gaze array



1 brick : 8 studs

- Use personally relevant items. Consider a tangible token economy system which follows a ratio (e.g., for every 3 tokens, Johnny earns five minutes of listening to Bob Dylan; use CD's to represent minutes).

6.2 Incorporate UDL: Universal Design of Learning When Teaching Data Analysis

Some examples of options for teaching Data Analysis to students who may present instructional challenges due to:

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/attention.	Lack of or extremely limited use of speech.
Options for Representation	<p>Provide auditory options</p> <ul style="list-style-type: none"> - Text-to-speech software or voice recordings to read aloud story problems - Single message sequence voice-output devices to count aloud - Captioning software that presents auditory information visually - Provide student with tally counter that they can click for each count of the data value - Use talking calculator <p>Provide tactile options:</p> <ul style="list-style-type: none"> - Object cues, using miniature objects or other tangible symbols to assist with problem comprehension - Create graphs out of tactile materials - Use raised textured surfaces to demonstrate bars on graphs <p>Provide visual and manipulative options to scaffold representation of concepts:</p> <ul style="list-style-type: none"> - Provide manipulatives for quantities, such a Cuisenaire rods or counting cubes 	<p>Reduce Physical Effort</p> <ul style="list-style-type: none"> - Place materials on slant board or eye gaze array - Display flip chart, interactive white board or other teaching materials at student eye level - Student can scan an array of possible options and use a switch to select the quantity to complete the graph - Use computer representation of figures that can be manipulated with switch - Create large scale graphs on walls or floor so that students can easily navigate to or gesture towards components of the graphs 	<p>Illustrate through multiple media</p> <ul style="list-style-type: none"> - Display data and graphs on the interactive whiteboard - Incorporate interactive websites that provide nonlinguistic tools for exploring math concepts: <p>Illustrations Click here</p> <p>Math Open Reference Click here</p> <p>There are many resources listed here: Click here</p> <ul style="list-style-type: none"> - Have students create graph related to personal interests such as sports, music, movies, food, etc. - Allow student to select topic for survey. - Make activity hands-on. 	<p>Provide customized display of information</p> <ul style="list-style-type: none"> - Consistently model by utilizing modes of communication used by students (point to symbols representing concepts, operations) - Teacher model competent use of AAC during instruction

	<ul style="list-style-type: none"> - Use Wiki sticks to raise grid lines - Provide actual or miniature objects that represent each category or concept demonstrated in graphs - Color code bars and data points with unit on x-axis - Use numbers between 1-10 and provide number line which visually shows numbers getting larger. - Use pictures for axis labels. 			
Options for Expression	Vary the methods for response by: <ul style="list-style-type: none"> - Student states answer or scans raised numbers to select correct answer - Provide manipulatives for student to respond or contribute to interaction - Student states answer by selecting picture or symbol - Use voice output devices for student to select the correct answer - Visually impaired student may dictate how to draw bars, order data, or graph linear equation - Student may also use talking calculator to solve for mean and range 	Provide options for responses/expression: <ul style="list-style-type: none"> - Student selects numbers versus writing them - Selection of correct answer is done after a model - Students identify values by matching numbers in data set to answer questions - Ask questions that allow them to answer "more", "most", "less", or "least" instead of exact numeral values. Optimize access to tools/ alternatives for responding <ul style="list-style-type: none"> - Provide symbols, objects, manipulatives, and pictures for matching/ student responses 	Provide multimedia options for responses/expression: <ul style="list-style-type: none"> - Allow the student to make selections by pointing to, gazing at, or selecting answers on the interactive white board - Utilize a switch or adapted computer mouse - Have student write answers with novel pencil or use a tablet computer - Use software that creates visually dynamic graphs to display and interpret data 	Provide options for modes of communication: <ul style="list-style-type: none"> - Incorporate responses into student's AAC device or eye gaze array - Phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc. - Choose response by pointing to or selecting object or item - Use a blink response to count tiles or select answer

		<ul style="list-style-type: none"> – Let students use software to develop visual representations of the data they have created – Students may use speech-to-text software to input data. 		<ul style="list-style-type: none"> – Count tiles/cubes out loud having student move in some voluntary way (e.g., nod head, tap hand, tap foot) to count along
Options for Engagement	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> – Digital /talking representations, videos, talking calculators – Interactive websites <p>Increase personal relevance:</p> <ul style="list-style-type: none"> – Use items that are familiar and reinforcing to students – Incorporate high preference items into story problems, as well as student names – Use items or activities of interest to represent within data sets <p>Provide tactile options for engagement:</p> <ul style="list-style-type: none"> – Use different types of textures to raise edges of box side or cardstock – Use a variety of interesting textures and colors to create graphs 	<p>Recruit interest by increasing personal relevance:</p> <ul style="list-style-type: none"> – Ensure that engaging and high preference content is visible and accessible to student – Use graphs that are large enough to accommodate the movements that the student is able to make – Pair student with another student without a physical impairment and have them complete hands on activities together – Use electronic or computerized voting software for students to gather and collect data 	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> – Digital /talking representations, videos, talking calculator – Allow students to use technology to calculate mean, median, mode, and range (e.g., Microsoft Excel®) <p>Provide options for sustaining effort and persistence</p> <ul style="list-style-type: none"> – Break tasks down to maximize student attention – Vary demands and materials to maintain interest – Provide reinforcement and incorporate interests as often as possible in data analysis activities. – Allow student to be in charge of sampling and data collection. <p>Increase personal relevance:</p> <ul style="list-style-type: none"> – Use items that are familiar and reinforcing to students. – Incorporate high preference items into story problems, as well as student names 	<p>Recruit interest with modes of communication:</p> <ul style="list-style-type: none"> – Allow students to choose items or subjects that are relevant to them via AAC devices, symbols, or eye gaze array

6.2 Incorporate Universal Design for Learning (UDL in planning, and provide for additional differentiated instruction when teaching equations.) **Equations**

Some examples of options for teaching equations to students who may present instructional challenges due to:

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/attention.	Lack of or extremely limited use of speech.
Options for Representation	<p>Provide auditory options</p> <ul style="list-style-type: none"> - Talking calculator when solving equations - Text-to-speech software or voice recordings to read aloud story problems - Single message sequence voice-output devices to count aloud - Captioning software that presents auditory information visually <p>Provide tactile options:</p> <ul style="list-style-type: none"> - Object cues, using miniature objects or other tangible symbols to assist with problem comprehension and operations - Tactile equation mat - Create numbers and symbols out of tactile materials such as sandpaper or wiki stix <p>Provide visual and manipulative options to scaffold representation of concepts:</p> <ul style="list-style-type: none"> - Color code equations and corresponding parts of calculator to support students correctly entering equations - Provide manipulatives for quantities, such as Cuisenaire rods. 	<p>Reduce Physical Effort</p> <ul style="list-style-type: none"> - When reading word problems, student can scan array of key math operation words and select correct key word and operation for equation <ul style="list-style-type: none"> o Place equations and graphic organizers on slant board or eye gaze board - Display flip chart, interactive white board or other teaching materials at student eye level - Utilize a switch instead of a computer mouse or software that allows the mouse to be controlled with the students' head rather than their hands 	<p>Illustrate through multiple media</p> <ul style="list-style-type: none"> - Utilize interactive whiteboard - Incorporate interactive websites that provide nonlinguistic tools for exploring math concepts: <p>Illuminations: Click here</p> <p>Math Open Reference: Click here</p> <p>There are many resources listed here: Click here</p> <ul style="list-style-type: none"> - Use virtual manipulatives and technology to show equations - Incorporate computer representations, videos, and animations 	<p>Provide customized display of information</p> <ul style="list-style-type: none"> - Consistent model by utilizing modes of communication used by students (point to symbols representing concepts, operations) - Teacher model competent use of AAC during instruction

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/attention.	Lack of or extremely limited use of speech.
Options for Expression	<p>Vary the methods for response by:</p> <ul style="list-style-type: none"> - Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer <ul style="list-style-type: none"> o Provide manipulatives for student to respond or contribute to interaction - Student states answer by selecting picture or symbol - Allow students who are deaf to videotape their answers/ process descriptions. 	<p>Provide options for responses/expression:</p> <ul style="list-style-type: none"> - Student selects numbers versus writing them; matches numerals and operation symbols to equation - Choose response by pointing to, eye gazing, or selecting object or item - Place operations and symbols and/or equations on electronic whiteboard and have student use switch to select correct answer or create equation <p>Optimize access to tools/ alternatives for responding:</p> <ul style="list-style-type: none"> - Provide symbols, objects, manipulatives, and pictures for matching/ student responses 	<p>Provide multimedia options for responses/expression:</p> <ul style="list-style-type: none"> - Allow the student to make selections by pointing to, gazing at, or selecting answers on the interactive white board - Utilize a switch or adapted computer mouse 	<p>Provide options for modes of communication:</p> <ul style="list-style-type: none"> - Incorporate responses into student's AAC device or eye gaze array - Phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc - Choose response by pointing to or selecting object or item - Use a blink response to count tiles or select answer; count tiles/cubes out loud having student move in some voluntary way (e.g., nod head, tap hand, tap foot) to count along

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/attention.	Lack of or extremely limited use of speech.
Options for Engagement	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> - Digital/talking representations, videos, interactive websites <p>Increase personal relevance:</p> <ul style="list-style-type: none"> - Use items that are familiar and reinforcing to students. - Incorporate high preference items into story problems, as well as student names 	<p>Recruit interest by increasing personal relevance:</p> <ul style="list-style-type: none"> - Ensure that engaging and high preference content is visible and accessible to student - Highlight key words in story problems - When creating response options make them large enough and separate them far enough so that student can make clear eye gaze or head nod to make intentional selection - Provide opportunities to work with typically developing peer on items (teach peer how to interpret student's responses) 	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> - Digital/talking representations, videos, talking calculators - Use of computer representations, videos - Provide manipulatives that may be of high interest to the student and use high interest scenarios in word problems <p>Provide options for sustaining effort and persistence:</p> <ul style="list-style-type: none"> - Break tasks down to maximize student attention - Token economy system that embeds equations (You have 2 Justin Bieber tokens. You need 5 total. How many more do you need to earn before you can listen to a song?) - Vary demands and materials to maintain interest - Follow equation unit with a community-based instruction field trip which require the skills learned to be used 	<p>Recruit interest with modes of communication:</p> <ul style="list-style-type: none"> - Allow students to choose items or subjects that are relevant to them via AAC devices, symbols, or eye gaze array

6.2b Incorporate UDL: Universal Design of Learning When Teaching Fractions and Decimals

	Visual Impairment or Deaf/Blind	Physical impairment: Little/no hand use	Lacks basic numeracy concepts	Motivational/attention issues
Representation	Use a talking calculator when solving equations or converting fractions to decimals and vice versa; use objects to represent fractions and decimals (e.g., Cuisenaire rods®); use raised lines to represent portions of the whole object. Create fraction models using cardboard (rectangular and circular) with textured surfaces to indicate parts. Use items that are velcroed together to represent the whole and have the student separate the whole into parts. Another option would be to use snap cubes.	Count the parts of fractions or decimals using a step by step process which progresses through numbers; student scans an array of possible options and uses a switch to select the number to identify the numerator; use computer representation of fractions that can be manipulated with switch; place fraction representations on a slant board or eye gaze board; create a grid on a large surface on the floor that the student can walk over or ride over in wheelchair.	Use fraction and decimal manipulatives that can be separated and placed on a number line. Use real world objects that have been partitioned to represent fractions (e.g., graham cracker, candy bar). Students can use one to one correspondence to match equal number of parts on representation of fraction or decimals. Color code equations and corresponding parts of calculator to support students correctly entering numerals and equations.	Find fractions of motivating objects (e.g., pizza, coloring markers in a box, pieces of a Lego set). Incorporate technology including computer representations, videos, animations, and talking calculators. Use token economy system that embeds fractions (e.g., "You earned $\frac{1}{4}$ of your Lego piece, you have $\frac{3}{4}$ left and then you get Lego time.)
Expression	Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer; teach tangible symbols that mean fraction and decimal.	Student scans and selects number that represents numerator or denominator; uses a switch to indicate correct answers; use an eye gaze board to select answer; use a blink response to count parts or select answer; phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc.; count parts of fractions out loud having student move in some voluntary way (e.g., nod head, tap hand, tap foot) to count along.	Student selects numerals and fractions versus writing them; selection of correct answer is done after a model; student points to each part of a fraction or decimal while teacher or peer counts aloud; student answers "yes/no" questions regarding fractions or decimals after parts have been counted aloud (e.g., 1,2,3,4. There are 4 colored parts. Is this the number we write as the numerator?); matches the parts of a fraction to the correct number (matches 4 to 4).	Have students express fractions using high interest manipulatives (e.g., Legos, food items such as chocolate bar or graham crackers, stickers of favorite characters, or jewelry beads). Provide students with response options that keep them engaged (e.g., options provided on AAC device, tablet, response cards, or interactive whiteboard.)

	Visual Impairment or Deaf/Blind	Physical impairment: Little/no hand use	Lacks basic numeracy concepts	Motivational/attention issues
Engagement	Teach students to use their hands to scan the raised or textured parts of each whole item; use textures or concrete objects to represent fractions; start with simple, clearly defined fractions; use items that are familiar and reinforcing to students.	Use bright colors to call attention to numerators; use a computer with AT where the student can click to answer; use figures that are large enough to accommodate the movements that the student is able to make; pair student with another student without a physical impairment and have them work together to create fraction and decimal representations.	Student uses talking calculator and AAC device or other response board, limit fractions and decimals to numerals less than 10, use bright colors to represent fractions and numerals, use familiar objects to represent fractions.	Use visuals and concrete representations and technology. Provide frequent opportunities for responding. Use token economy system that embeds fractions ("you earned $\frac{1}{4}$ of your Lego piece, you have $\frac{3}{4}$ left and then you get Lego time.").

6.2 Incorporate Universal Design for Learning (UDL) in planning, and provide for additional Differentiated Instruction when Teaching Measurement and Geometry

Some examples of options for teaching Measurement and Geometry to students who may present instructional challenges due to:

Principles of	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/ attention.	Lack of or extremely limited use of speech.
Options for Representation	<p>Provide auditory options:</p> <ul style="list-style-type: none"> - Talking calculator when solving equations - Text-to-speech software or voice recordings to read aloud story problems - Single message sequence voice-output devices to count aloud - Captioning software that presents auditory information visually <p>Provide tactile options:</p> <ul style="list-style-type: none"> - Object cues, using - miniature objects or other tangible symbols to assist with problem comprehension and operations - Tactile equation mat - Create numbers and symbols out of tactile materials - Raise edges of shape using Velcro or puffy paint - Use a ruler with raised numbers, Braille representation, or paperclips/popsicle sticks indicating inch/cm marks - Use raised lines on figures (e.g., yarn; wiki sticks) 	<p>Reduce Physical Effort :</p> <ul style="list-style-type: none"> - Place materials on slant board or eye gaze array - Display flip chart, interactive white board or other teaching materials at student eye level - Count the tiles when determining area using a step- by-step process which progresses through numbers - Student can scan an array of possible options and use a switch to select the number to complete the equation template - Use computer representation of figures that can be manipulated with switch 	<p>Illustrate through multiple media:</p> <ul style="list-style-type: none"> - Utilize interactive whiteboard - Incorporate interactive websites that provide nonlinguistic tools for exploring math concepts: <p>Interactive 3-D shapes Click here</p> <p>Illuminations Click here</p> <p>Math Open Reference Click here</p> <p>There are many resources listed here: Click here</p> <ul style="list-style-type: none"> - Use materials that have an immediate effect (e.g., find area of CD and then play it) - Use a talking calculator to solve perimeter/area/ volume equation 	<p>Provide customized display of information:</p> <ul style="list-style-type: none"> - Consistent model by utilizing modes of communication used by students (point to symbols representing concepts, operations) - Teacher model competent use of AAC during instruction

Principles of	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/ attention.	Lack of or extremely limited use of speech.
	<ul style="list-style-type: none"> - Make shapes out of materials with texture like carpet or Velcro - Use tiles with raised numbers or dots <p>Provide visual and manipulative options to scaffold representation of concepts:</p> <ul style="list-style-type: none"> - Color code equations and corresponding parts of calculator to support students correctly entering equations - Provide manipulatives for quantities, such as Cuisenaire rods or counting cubes - Provide empty containers with cubes and clearly define volume as the cubes inside the containers 			

Principles of	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/ attention.	Lack of or extremely limited use of speech.
Options for Expression	<p>Vary the methods for response by:</p> <ul style="list-style-type: none"> - Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer <ul style="list-style-type: none"> o Provide manipulatives for student to respond or contribute to interaction - Teach a symbol that means "area" for student to use (e.g., four- 1x1 ceramic tiles glued onto foam board) or "volume" (e.g., four plastic cubes glued together) - Student states answer by selecting picture or symbol 	<p>Provide options for responses/expression:</p> <ul style="list-style-type: none"> - Student selects numbers versus writing them; matches numerals and operation symbols to equation - Selection of correct answer is done after a model <ul style="list-style-type: none"> o Student points to each tile while teacher or peer counts aloud - Student answers "yes/no" questions regarding area after tiles have been counted aloud (e.g., 1,2,3,4. The area of this square is 4 square inches, is that correct?) - Matches the area to the correct number (matches 4 to 4) <p>Optimize access to tools/ alternatives for responding:</p> <ul style="list-style-type: none"> - Provide symbols, objects, manipulatives, and pictures for matching/ student responses 	<p>Provide multimedia options for responses/expression:</p> <ul style="list-style-type: none"> - Allow the student to make selections by pointing to, gazing at, or selecting answers on the interactive white board - Utilize a switch or adapted computer mouse <ul style="list-style-type: none"> o Have student write answers with novel pencil or use a tablet computer - Determine area of "fun" objects (e.g., table with a party table cloth, cover of their favorite book) 	<p>Provide options for modes of communication:</p> <ul style="list-style-type: none"> - Incorporate responses into student's AAC device or eye gaze array - Phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc. - Choose response by pointing to or selecting object or item <ul style="list-style-type: none"> o Use a blink response to count tiles or select answer - Count tiles/cubes out loud having student move in some voluntary way (e.g., nod head, tap hand, tap foot) to count along

Principles of	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/ skill or motivation/ attention.	Lack of or extremely limited use of speech.
Options for Engagement	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> - Digital /talking representations, videos, talking calculators - Interactive websites <p>Increase personal relevance:</p> <ul style="list-style-type: none"> - Use items that are familiar and reinforcing to students - Incorporate high preference items into story problems, as well as student names <p>Provide tactile options for engagement:</p> <ul style="list-style-type: none"> - Use different types of textures to raise edges of box side or cardstock - Change the “feel” of a tile that has been counted to make it easier for the student to feel what has been counted and what has not 	<p>Recruit interest by increasing personal relevance:</p> <ul style="list-style-type: none"> - Ensure that engaging and high preference content is visible and accessible to student - Use figures that are large enough to accommodate the movements that the student is able to make - Pair student with another student without a physical impairment and have them complete hands on activities together 	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> - Digital /talking representations, videos, talking calculators <p>Provide options for sustaining effort and persistence:</p> <ul style="list-style-type: none"> - Break tasks down to maximize student attention - Token economy system that embeds equations (You have 2 Justin Bieber tokens. You need 5 total. How many more do you need to earn before you can listen to a song?) - Vary demands and materials to maintain interest - Assign the area, perimeter, and volume computations as a job task; student is “paid” 1 minute on computer for each one completed. <p>Increase personal relevance:</p> <ul style="list-style-type: none"> - Use items that are familiar and reinforcing to students. - Incorporate high preference items into story problems, as well as student names - Allow students to make posters for favorite sports team (middle MASSI) 	<p>Recruit interest with modes of communication:</p> <ul style="list-style-type: none"> - Allow students to choose items or subjects that are relevant to them via AAC devices, symbols, or eye gaze array


6.2 Incorporate UDL: Universal Design of Learning When Teaching Ratios & Proportions

Some examples of options for teaching Measurement and Geometry to students who may present instructional challenges due to:

Principles of UDL	Sensory Differences such as Blindness, Visual Impairment, Deafness, or Deaf/Blindness	Physical Disability or Motor Differences (such as weakness or motor planning difficulty)	Extremely limited evidence of experience/skill or motivation/attention.	Lack of or extremely limited use of speech.
Representation	<p>Provide auditory options</p> <ul style="list-style-type: none"> - Talking calculator - Text-to-speech software or voice recordings to read aloud story problems - Single message sequence voice-output devices to count aloud - Captioning software that presents auditory information visually <p>Provide tactile options:</p> <ul style="list-style-type: none"> - Object cues, using - miniature objects or other tangible symbols to assist with problem comprehension and operations - Create numbers and symbols out of tactile materials - When demonstrating graphical linear representations of ratios, raise the grid by using glue over grid, puffy paint, or 	<p>Reduce Physical Effort</p> <ul style="list-style-type: none"> - Place materials on slant board or eye gaze array - Display flip chart, interactive white board or other teaching materials at student eye level - Student can scan an array of possible options and use a switch to select the answer - Use computer representation of figures that can be manipulated with switch - Demonstrating ratios verbally (e.g., 4: 3 can be demonstrated by saying beep beep beep beep: bam bam bam) 	<p>Illustrate through multiple media</p> <ul style="list-style-type: none"> - Utilize interactive whiteboard - Incorporate interactive websites that provide nonlinguistic tools for exploring math concepts: <p>Illuminations Click here</p> <p>Math Open Reference Click here</p> <p>There are many resources listed here: Click here</p> <p>Use a talking calculator</p>	<p>Provide customized display of information</p> <ul style="list-style-type: none"> - Consistent model by utilizing modes of communication used by students (point to symbols representing concepts, operations) - Teacher model competent use of AAC during instruction

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	<p>wiki sticks to represent proportional relationship (Students will need the grid raised to count x- and y-axis and another texture or height for the line representing the proportional relationship).</p> <p>Provide visual and manipulative options to scaffold representation of concepts:</p> <ul style="list-style-type: none"> - Color code problems and corresponding parts of calculator to support students correctly entering information - Have students physically demonstrate ratios using manipulatives or concrete objects (e.g., pencils to students). 			
Expression	<p>Vary the methods for response by:</p> <ul style="list-style-type: none"> - Student states answer or scans raised numbers to select correct answer; use voice output devices for student to select the correct answer - Provide manipulatives for student to respond or contribute to interaction - Student states answer by selecting picture or symbol. - Students can use talking calculator to assist with 	<p>Provide options for responses/expression:</p> <ul style="list-style-type: none"> - Student selects numbers versus writing them - Selection of correct answer is done after a model - Ratios can be recognized without counting. Display ratios that are the same and one not the same and use the example/non example script to help students identify similar ratios. 	<p>Provide multimedia options for responses/expression:</p> <ul style="list-style-type: none"> - Allow the student to make selections by pointing to, gazing at, or selecting answers on the interactive white board - Utilize a switch or adapted computer mouse - Have student write answers with novel pencil or use a tablet computer 	<p>Provide options for modes of communication:</p> <ul style="list-style-type: none"> - Incorporate responses into student's AAC device or eye gaze array - Phrase questions so that they require a "yes/no" response, these can easily be answered using an eye gaze, head turn, two switches, etc. - Choose response by pointing to or

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	<p>counting number of items in each ratio unit.</p> <ul style="list-style-type: none"> - Give students a ratio with two different types of counters/ manipulatives for each ratio unit (i.e., 2:4 would be represented with 2 pennies and 4 bear counters). Have students create the same ratio with two different types of counters (i.e., 2 paper clips and 4 pencils). Provide student with response options or AAC device. 	<ul style="list-style-type: none"> - Rather than indicating ratios by number, with simple ratios, have them indicate proportional relations by stating same or not same. <p>Optimize access to tools/ alternatives for responding:</p> <ul style="list-style-type: none"> - Provide symbols, objects, manipulatives, and pictures for matching/ student responses - Use computer/interactive whiteboard to show ratios so student can interact using a switch or eye gaze. 	<ul style="list-style-type: none"> - Students can demonstrate understanding of ratios by eye gazing to proportional ratios, using technology to create ratios (computer games or lessons that can be completed using a switch) 	<p>selecting object or item</p> <ul style="list-style-type: none"> - Use a blink response select answer
Engagement	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> - Digital /talking representations, videos, talking calculators - Interactive websites <p>Increase personal relevance:</p> <ul style="list-style-type: none"> - Use items that are familiar and reinforcing to students. - Incorporate high preference items into story problems, as well as student names <p>Provide tactile options for engagement:</p>	<p>Recruit interest by increasing personal relevance:</p> <ul style="list-style-type: none"> - Ensure that engaging and high preference content is visible and accessible to student - Use figures that are large enough to accommodate the movements that the student is able to make - Pair student with another student without a physical impairment and have them complete hands on activities together - Use items of high interest when demonstrating ratios. 	<p>Recruit interest by providing choices:</p> <ul style="list-style-type: none"> - Digital /talking representations, videos, talking calculators <p>Provide options for sustaining effort and persistence:</p> <ul style="list-style-type: none"> - Break tasks down to maximize student attention - Use high interest items that demonstrate a constant ratio such as a favorite car (1 car 4 wheels), robot (1 robot two extending arms), or DVD (1 DVD to one hole 	<p>Recruit interest with modes of communication:</p> <p>Allow students to choose items or subjects that are relevant to them via AAC devices, symbols, or eye gaze array</p>

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	<p>Use concrete items of interest to demonstrate ratios and try to incorporate tactile surfaces for students with visual impairment</p>	<p>– Have student do a scavenger hunt with favorite items to locate constant ratios (e.g., if student enjoys Legos, have her collect several Lego bricks that have the same number of studs).</p>  <p>1 brick : 8 studs</p>	<p>in the center of the disk).</p> <ul style="list-style-type: none"> – Vary demands and materials to maintain interest <p>Increase personal relevance:</p> <ul style="list-style-type: none"> – Use items that are familiar and reinforcing to students. – Incorporate high preference items into story problems, as well as student names <p>Use personally relevant items. Consider a tangible token economy system which follows a ratio (e.g., for every 3 tokens, Johnny earns five minutes of listening to Bob Dylan; use CD's to represent minutes).</p>	