



National Center and State Collaborative

NCSC Math Activities with Scripted Systematic Instruction (MASSI): Elementary Equations

January 2013



National Center and State Collaborative

The National Center and State Collaborative (NCSC) is applying the lessons learned from the past decade of research on alternate assessments based on alternate achievement standards (AA-AAS) to develop a multi-state comprehensive assessment system for students with significant cognitive disabilities. The project draws on a strong research base to develop an AA-AAS that is built from the ground up on powerful validity arguments linked to clear learning outcomes and defensible assessment results, to complement the work of the Race to the Top Common State Assessment Program (RTTA) consortia.

Our long-term goal is to ensure that students with significant cognitive disabilities achieve increasingly higher academic outcomes and leave high school ready for post-secondary options. A well-designed summative assessment alone is insufficient to achieve that goal. Thus, NCSC is developing a full system intended to support educators, which includes formative assessment tools and strategies, professional development on appropriate interim uses of data for progress monitoring, and management systems to ease the burdens of administration and documentation. All partners share a commitment to the research-to-practice focus of the project and the development of a comprehensive model of curriculum, instruction, assessment, and supportive professional development. These supports will improve the alignment of the entire system and strengthen the validity of inferences of the system of assessments.



The contents of this lesson were developed as part of the National Center and State Collaborative by Keri Bethune, Julie Thompson, Alicia Saunders, and Diane Browder at University of North Carolina at Charlotte and verified by Amy Lehew, math content expert, under a grant from the Department of Education (PR/Award #: H373X100002, Project Officer, Susan.Weigert@Ed.gov). However, the contents do not necessarily represent the policy of the U.S. Department of Education and no assumption of endorsement by the Federal government should be made.

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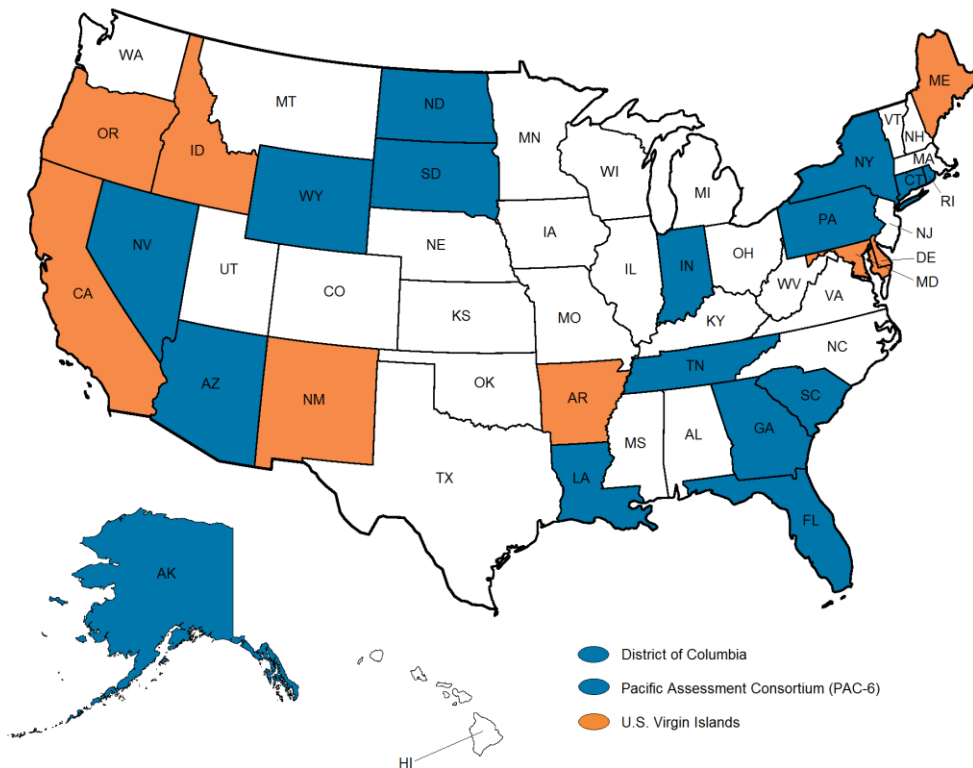


National Center and State Collaborative

NCSC is a collaborative of 18 states and five organizations.

The states include (shown in blue on map): Alaska, Arizona, Connecticut, District of Columbia, Florida, Georgia, Indiana, Louisiana, Nevada, New York, North Dakota, Pacific Assessment Consortium (PAC-6)¹, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, and Wyoming.

Tier II states are partners in curriculum, instruction, and professional development implementation but are not part of the assessment development work. They are (shown in orange on map): Arkansas, California, Delaware, Idaho, Maine, Maryland, New Mexico, Oregon, and U.S. Virgin Islands.



¹ The Pacific Assessment Consortium (including the entities of American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Republic of Palau, and Republic of the Marshall Islands) partner with NCSC as one state, led by the University of Guam Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS).



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The five partner organizations include: The National Center on Educational Outcomes (NCEO) at the University of Minnesota, The National Center for the Improvement of Educational Assessment (Center for Assessment), The University of North Carolina at Charlotte, The University of Kentucky, and edCount, LLC.



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NCSC Math Activities with Scripted Systematic Instruction (MASSI): Elementary Equations

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MASSI: Math Activities with Scripted Systematic Instruction

Activity: Gathering Materials for Art Activity

Grade Band: Grades 3-5

Concept: Equations



Common Core State Standard	Core Content Connectors	MASSI OBJECTIVES
3.OA.8 Solve problems involving the four operations, and identify and explain patterns in arithmetic.	3rd 3.NO.2e1 Solve and check one or two-step word problems requiring addition, subtraction, or multiplication with answers up to 100.	Selecting an expression that matches a word problem
3.OA.1 Represent and solve problems involving multiplication and division.	4th 4.NO.2d8: Match an accurate addition and multiplication equation to a representation	Matching an expression to a representation
6.EE.4 Reason about and solve one-variable equations and inequalities.	5th 5.SE.1b Evaluate whether both sides of an equation are equal.	Indicate whether an equation is true

Be sure to provide specific practice to students on the skills that correspond to their grade level.

Teaching materials: Graphic Organizer (GO): Addition; Graphic Organizer (GO): Subtraction; Addition and Subtraction Templates (cut out and laminated); Symbol Cards (cut out and laminated); Key Word Cards (laminated); Three Teacher Demonstration Cards (e.g., Lukas, Tameka, and Luther word problems and answer choices); Equality Visual; Teacher should create word problems and answer choices for steps #24, 25, 29, 30, and 31; and answer choices for #43, 45.

Other materials: Art supplies to count like markers, erasers, crayons, glue sticks, etc. (or use counting chips if art supplies are too cumbersome or distracting)

Worksheets: There are student worksheets to review each component of the lesson.

Assessments: Progress Monitoring for taking data during the lesson; Skills Test

TEACHING OVERVIEW: The first section of the MASSI provides remedial practice on addition and subtraction of sets. For students with few to no literacy skills, placing objects on the graphic organizers to create the set may be the starting point. Be sure to write equations for each addition/ subtraction problem you introduce. 3rd graders will learn to select the equation for the problem (an expression has no “=” sign, see Curriculum Resource Guide for further explanation). This is a good review for your 4th and 5th graders. The 4th graders will be selecting equations that match an array of objects. This is useful for your 3rd and 5th graders to gain fluency with equations. The 5th graders have to solve each of two sides of an equation. While the 5th graders work on equivalency, you can let the 3rd and 4th graders practice solving one side of the equation to review their addition/ subtraction skills.

SCRIPT FOR LESSON

BUILD ESSENTIAL UNDERSTANDING: CONCEPT AND SYMBOLS: Combining Sets to Add

(Skip this section for students who understand these relationships and can identify these concepts).

INTRODUCE ACTIVITY: Making art can be a lot of fun. When we draw or paint we can make our pictures using different techniques with paint brushes and markers. Let’s watch a video about creative ways to draw [paint]. View a video about water color or markers: Marker ideas: <http://www.youtube.com/watch?v=LGIADrMZgg&list=UUGEA1vUDxgkwsToRTEACsvA&index=104&feature=plcp> Water color ideas: <http://www.youtube.com/watch?v=LMI8s15UdA&list=UUGEA1vUDxgkwsToRTEACsvA&index=102&feature=plcp> (Both videos are under three minutes. If your students have a short attention span, feel free to show them a brief clip pertaining to the art activity you plan to do that day instead of the entire video). **Before we can start an art project we have to make sure we have all the materials we need. First let’s review addition.**

INTRODUCE THE PROBLEM: Write $6 + 2 =$ on board as you say **Today in our art project, we began with 6 markers. Then we added 2 more.**



MODEL THE PROCESS: Show student the GO: Addition $\text{---} + \text{---} = \text{---}$. **Let’s use our graphic organizer to make and add our sets. First, I said we had 6 markers.** Put 6 in first circle. **Then I said we had 2 more.** Put 2 in second circle. **Now I add them together.** Move sets to last circle and count to add. **One. Two. Three. Four. Five. Six. Seven. Eight.** Write answer 8 on the equation $6 + 2 = 8$. **We have 8 markers altogether.**

*Change numbers in equation each day the lesson is taught (sums ≤ 10).



STUDENT PRACTICE: Change numbers in equations above to solve. Use SYSTEM OF LEAST PROMPTS script as needed to help students with each step. Note: If students find using actual art supplies distracting or cumbersome, give them counting chips to complete problems instead.

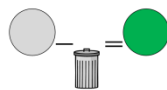
CHECK AND SCORE


Step	Teacher Says/Does	Student Response
1.	Here is a new equation. Put the first number on your set maker.	Student places first number under first circle.
2.	Put second number on your set maker.	Student places second number under second circle.

3.	Count out the number of markers you need to put in the first circle.	Student counts out ___ markers and puts them in first circle.
4.	Count out the number of markers you need to put in the second circle.	Student counts out ___ markers and puts them in second circle.
5.	Show me what to do to find out how many you have altogether.	Student slides markers into 3 rd circle (or indicates where to place markers with eye gaze).
6.	Count the markers.	Student counts the markers.
7.	How many do you have altogether?	Student says/indicates total number of markers.

BUILD ESSENTIAL UNDERSTANDING: CONCEPT AND SYMBOLS: Decomposing Sets to Subtract

INTRODUCE THE PROBLEM: Sometimes we use our art supplies and have to see what's left. Write $5-3$. We had 5 markers, but used up 3 of them.



MODEL THE PROCESS: Hold up the GO: Subtraction handout . **Let's use our graphic organizer to make and subtract our sets We had 5 pens.** Put 5 pens in first circle. **We used up 2.** Put 2 in garbage can on the handout. **Let's see how many are left.** Move the pens to the circle and count. **One. Two.** Write answer $5-3=2$. **There are 2 markers left.** * Change number in equations each day the lesson is taught (total ≤ 10).



STUDENT PRACTICE. Change numbers in equations above to solve. Use SYSTEM OF LEAST PROMPTS script to help student with each step as needed. Note: If students find using actual art supplies distracting or cumbersome, give them counting chips to complete problems instead.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
8.	Let's practice with the Take Away chart (GO: subtraction). Here is a new equation. Put the first number on your Take Away chart.	Student places first number under first circle.
9.	Put the second number on your Take Away chart.	Student places second number under the trash can.
10.	Count out the number of markers you need to put in the first circle.	Student counts out ___ markers and puts them in first circle.
11.	Now take away the number of markers you need to put in the trash can.	Student takes away ___ markers from first circle and puts them in trash can.
12.	Show me what to do to find out how many you have left over.	Student slides markers into green circle (or indicates where to place markers with eye gaze).
13.	Count the markers.	Student counts the markers.
14.	How many do you have left over?	Student says/indicates total number of markers.

BUILD ESSENTIAL UNDERSTANDING: SYMBOL USE: +, -, =

INTRODUCE THE PROBLEM: When we solve and write problems to add and subtract, we use symbols.

MODEL THE PROCESS: Display +. This is plus. Display -. This is minus. Display =. This is equal.



STUDENT PRACTICE: Now it is you turn to show me the symbols. Use the CONSTANT TIME DELAY script to teach students to identify each of the key symbols. When you praise the students after a correct response, define the symbol (Examples: **You got it! Equal means “the same.”/ Plus is the addition sign. It means add together./ Minus is the subtraction sign. It means take away.**). Note: Do not put +, -, or = as a distracter during trials for each of the target symbols. Only use non-targeted symbols (e.g., ?, !, x, or ÷) as distracters for each trial. Make sure to move cards around with each trial.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
15.	Show me equal.	Student points/eye gazes to the equal sign.
16.	Again. Show me equal.	Student points/eye gazes to the equal sign.
17.	Show me plus.	Student points/eye gazes to the plus sign.
18.	Again. Show me plus.	Student points/eye gazes to the plus sign.
19.	Show me minus.	Student points/eye gazes to the minus sign.
20.	Again. Show me minus.	Student points/eye gazes to the minus sign.



This may be a good stopping point. Let students use the art supplies to do an art project. There is a worksheet with this level. You can use this for additional guided practice or to send home as homework.

INDEPENDENT PRACTICE: Equations Skill Test	Teacher Says/Does	Student Response	Error Correction
	Give each student the <i>Equations Skills Test</i> 1. Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.	Once the student has completed the test, review missed problems with the student.
NOW <i>Stop the lesson here and repeat tomorrow if student is not yet getting at least 12 independent correct responses. Score responses 1-20 on the Equation Progress Monitoring Sheet if you did not do so while teaching.</i>		NEXT <i>Remember the goal is for students to be able to match equations to word problems (3rd), match visuals to equations (4th), and indicate whether an equation is true (5th). As soon as possible, move into the remainder of the lesson to hit the target CCCs for this grade band. Be sure to provide some practice for students at their specific grade level concept, even if they have not achieved mastery of previous concepts.</i>	

3rd GRADE BUILD A GRADE ALIGNED COMPONENT: MATCHING EXPRESSIONS TO WORD PROBLEMS
4th and **5th** GRADE BUILD ESSENTIAL UNDERSTANDING: SYMBOL USE

INTRODUCE THE PROBLEM: Our lesson today is about art supplies. Remember yesterday when we practiced adding and subtracting to find the answer to our equation? Write an equation on the board or paper (must have “=” sign, e.g., $3+2=5$). This is an equation. Sometimes we do not know what the equation is and we have to figure it out on our own. Remove the equation you wrote. Let’s read a story about Lukas to learn about finding the equation.

MODEL THE PROCESS ADDITION: Display Teacher Demonstration card #1 with word problem. It says, “Lukas collected the markers. He had 3 markers in the first canister and 2 markers in the second.” Display array of 3 expressions (e.g., $3+2$, 3×2 , $3-2$). Which of these will show us how many Lukas has altogether? Hold up and point to plus symbol card. When a story problem says “in all”, “total”, or “altogether” we use this symbol. Plus tells us to put our sets together. Point to 3 expressions again. Remember our problem, “Lukas has 3 markers in the first canister and 2 markers in the second. Which of these will show us how many Lukas has altogether? Point to “ $3+2$ ”. This tells us to put our sets together. It has a plus.



STUDENT PRACTICE: Now it’s your turn to show me the symbol that tells us to put our sets together. Use the CONSTANT TIME DELAY script to teach students to identify the symbol or equation. Note: Do not put - or = as a distracter during trials for addition. Only use non-targeted symbols ?, !, x, or \div as distracters for each trial. Note: Each time you teach this, vary the order that you display the answer choices so that students do not memorize the answer based on placement.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
21.	A story problem says “in all.” Show me the symbol that tells us to put our sets together.	Student selects +.
22.	A story problem says, “total.” Show me the symbol that tells us to put our sets together.	Student selects +.
23.	A story problem says “altogether.” Show me the symbol that tells us to put our sets together.	Student selects +.
24.	Here is a new word problem. It says, “Elijah passed out the paintbrushes. He had 2 paintbrushes in his left hand and 4 in his right hand. Which of these will show how many paintbrushes Elijah has <u>in all</u> ?” Emphasize “in all.” Listen again: Which of these will show how many paintbrushes Elijah has in all? Read each expression aloud while pointing to it: “ $2 + 4$ ”, “ 2×4 ”, “ $2 \div 4$ ”	Student selects correct expression.

25.	<p>Let's try one more. Listen for the word that tells you which symbol the equation must have. Display new word problem and equation choices. Arlo collected the crayons in pencil cases. He had 6 crayons in one case and 3 crayons in the other. How many crayons did he have <u>total</u>? Emphasize "total." Listen again. Which of these show how many crayons he had total? Read each expression aloud while pointing to it: "6 – 3", "6 + 3", "6 x 3".</p>	Student selects correct expression.
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MODEL THE PROCESS:

SUBTRACTION: Display Teacher Demonstration card #2. **Here is another word problem about our art supplies. It says, "Tameka bought 9 pencils. She gave 4 pencils to her students. Which of these will show how many pencils she has left?"** Display array of 3 expressions (e.g., $9+4$, 9×4 , $9-4$). **Before we can decide which of these equations will show how many pencils Tameka has left, we need to practice finding the symbol that we use to take away.** Hold up and point to subtraction symbol card. **When a story problem says "left" or "remain" we use the symbol that tells us to take away. We can also find the symbol in an expression.** Point to 3 expressions again. **Remember our problem, "Tameka bought 9 pencils. She gave 4 pencils to her students. Which of these will show how many pencils she has left?"** Point to "9-4". **This tells us to take away. It has a minus.**



STUDENT PRACTICE: Now it's your turn to show me the symbol that tells us to take away. Use the CONSTANT TIME DELAY script to teach students to identify the symbol or equation. Note: Do not put + or = as distracters during trials for subtraction. Only use non-targeted symbols ?, !, x, or ÷ as distracters for each trial. Note: Each time you teach this, vary the order that you display the answer choices so that students do not memorize the answer based on placement.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
26.	A story problem says "left." Show me the symbol that tells us to take away.	Student selects -.
27.	A story problem says, "remain." Show me the symbol that tells us to take away.	Student selects -.
28.	A story problem says, "difference." Show me the symbol that tells us to take away.	Student selects -.
29.	Here is a new word problem. It says, "Zatrel had 10 markers. He passed out 4. How many markers did he have <u>left</u> ?" Emphasize "left." Listen again: Which of these will show how many markers Zatrel has left? Read each expression aloud while pointing to it: " 10 – 4 ", " 10 + 4 ", " 10 X 4 "	Student selects correct expression.

30.	Nehemiah collected 6 crayons. He threw 2 broken ones away. How many crayons <u>remain</u>? Emphasize “remain.” Listen again: Which of these shows how many crayons remain? Read each expression aloud while pointing to it: “ $6 \div 2$ ”, “ 6×2 ”, “ $6 - 2$ ”	Student selects correct expression.
31.	Hannah has 8 apples. Karen has 4. What is the <u>difference</u> between the number of apples Hannah has and the number Karen has? Emphasize “difference.” Listen again: Which of these will show the difference between the number of apples Hannah has and the number of apples Karen has? Read each expression aloud while pointing to it: “ $8+4$,” “ 8×4 ,” “ $8-4$.”	Student selects correct expression.

MODEL THE PROCESS:

VARYING NUMBERS IN EXPRESSION: You have done a great job listening for the symbol. Now listen very carefully. We are going to practice choosing the correct expression for our problems by listening for the symbol **AND** the numbers. **Watch me first.** Display Teacher Demonstration Card #3 and answer choices. “Luther had 5 markers. He found 3 more. How many did he have in all?” Point to the numbers in the word problem as you say, **First I will find the numbers. They are 5 and 3.** Point to answer choices “ $5 + 3$ ” and “ 5×3 ”. **Look, there are two answer choices with 5 and 3. I can remove the choice that does not have 5 and 3** (remove answer choice so two choices are left). **Now, watch very carefully! I have to make sure I choose the one with the right symbol.** Point to highlighted “in all” in word problem. **I have to find the words that tell me which symbol to use. This says “in all.” Remember, “in all” tells me to put the sets together with the plus sign. Now, I have to find the answer choice with a plus symbol.** Point to the “x” symbol between “ 5×3 ”. **This does not have a plus.** Point to correct choice “ $5 + 3$ ”. **Does this have a plus symbol? Pause 2 seconds then say, Yes, this says plus. The answer is 5 plus 3.**



STUDENT PRACTICE: Now it’s your turn to listen for the symbol **AND** the numbers. Use the CONSTANT TIME DELAY script to teach students to identify the symbol or equation.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
32.	This says, “Cora has 4 crayons. She gave 2 to Mike. How many does she have left?” Read each answer choice aloud. “ $4 - 2$ ”, “ $3 + 7$ ”, “ 4×2 ”. Point to an answer choice that has the same numbers.	Student points to an answer choice with numbers 4 and 2 (doesn’t have to be correct answer yet).
33.	Now, point to the word that tells you what symbol to use.	Student points to “left.”
34.	Point to the answer choice student selected. Now look here. Is this the symbol that tells us how many are left?	Student indicates yes or no.
35.	*If yes: Good job. You found the expression 4 minus 2. Mark this step correct on assessment. *If no: Read each answer choice aloud. Try again. “ $4 - 2$ ”, “ $3 + 7$ ”, “ 4×2 ”. Which one tells us how many she has left?	Student selects “ $4 - 2$ ”.

BUILD ESSENTIAL UNDERSTANDING: CONCEPT: EQUALITY (“=”)

INTRODUCE THE PROBLEM: Sometime we need equal supplies, like making sure we have equal paper and pencils for each student. Let’s see if I have equal supplies before we do more.

MODEL THE PROCESS: Point to equal sign. **Remember, this is the equal sign.** Display equality visual with equal sign present. **The equal sign means the total amount is same on both sides.** Show the students a number (e.g., 9) and the equal sign (e.g., $9 = \underline{\quad}$). **If the number 9 is on this side, then we put the number 9 on this side too, to make it the same. When both sides are equal it means that the equation is true.**



STUDENT PRACTICE: Display equality sign erased and place markers on each side. **Now you practice making the equations true.** Use SYSTEM OF LEAST PROMPTS script as needed to help students with each step. Note: Each time you complete this section change the number of markers (≤ 10 each side) and vary whether the amounts are equal.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
34.	Write a number and = sign (e.g., $5 = \underline{\quad}$). Read ‘ five equals $\underline{\quad}$. ’ Which number goes on this side? Point to right side.	Student says or selects the same number (e.g., 5).
35.	Write a different number and = sign (e.g., $3 = \underline{\quad}$). Read ‘ three equals $\underline{\quad}$. ’ Which number goes on this side? Point to right side.	Student says or selects the same number (e.g., 3).
36.	Write a different number and = sign (e.g., $8 = \underline{\quad}$). Read ‘ eight equals $\underline{\quad}$. ’ Which number goes on this side? Point to right side.	Student says or selects the same number (e.g., 8).

MODEL THE PROCESS: Display Equality Visual with “=” written between the two ovals. **Here’s a rule for using “=” in equations.** Point to the left side of equals and say, **We must end with the same number on this side and** (point to right side) **the other side of the equal sign.** Place equal amounts of markers on each side of the Equality Visual. **Let’s see if we have equal amounts of markers on both sides of the equals sign.** Point to left side. **Count the markers with me on this side as I touch them.** Count aloud pointing to each marker as you count. **There are $\underline{\quad}$ markers on this side, so we must have $\underline{\quad}$ on the other side.** Point to right side. **Count the markers with me on this side as I touch them.** Count aloud pointing to each marker as you count. **We ended with $\underline{\quad}$ markers on both sides, so the sides are equal.**

Let’s try another problem. Display Equality Visual with equal sign erased. **Remember the equal rule. We must have the same number on this side** (point to one side) **and the other side** (point to other side). Place unequal amounts of markers on each side of the Equality Visual. **Let’s see if we have the same number of markers on both sides.** Point to left side and say, **Count the markers with me on this side as I touch them.** Count aloud pointing to each marker as you count. Write number below after counting. **There are $\underline{\quad}$ markers on this side, so there must be $\underline{\quad}$ markers on the other side.** Point to right side. **Count the markers with me on this side as I touch them.** Count aloud pointing to each marker as you count. Write number below after counting. **There are $\underline{\quad}$ markers on this side. The numbers are not the same, so the sides are not equal. I do NOT write an equal sign.**



STUDENT PRACTICE: Display Equality Visual with no “=” sign and place markers on each side. You can vary items used each day to build generalization. **Now you practice.** Use SYSTEM OF LEAST PROMPTS script as needed to help students with each step. Note: Each time you complete this section change the number of markers (≤ 10 each side) and vary whether the amounts are equal or not equal.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
37.	Point to left side. How many on this side?	Student counts items.
38.	Point to right side. How many on this side?	Student counts items.
39.	Are the numbers on each side the same? If they are, write the equal sign.	Student indicates yes or no and writes the equal sign between two amounts if amounts are the same (students who cannot write may eye gaze to or Velcro the equal sign).



This may be a good stopping point. Let students use the art supplies to do an art project. There is a worksheet with this level. You can use this for additional guided practice or to send home as homework.

	Teacher Says/Does	Student Response	Error Correction
INDEPENDENT PRACTICE: Equations Skill Test	Give each student the <i>Equations Skills Test</i> 2. Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.	Once the student has completed the test, review missed problems with the student.
NOW <i>Stop the lesson here and repeat tomorrow if student is not yet getting at least 9 independent correct responses. Score responses 21-36 on the Equation Progress Monitoring Sheet if you did not do so while teaching.</i>		NEXT <i>Remember the goal is for students to be able to match equations to word problems (3rd), match visuals to equations (4th), and indicate whether an equation is true (5th). As soon as possible, move into the remainder of the lesson to hit the target CCCs for this grade band. Be sure to provide some practice for students at their specific grade level concept, even if they have not achieved mastery of previous concepts.</i>	



BUILD A GRADE ALIGNED COMPONENT: MATCHING EQUATIONS TO REPRESENTATIONS

INTRODUCE ACTIVITY AND PROBLEM: Use actual classroom supplies (e.g., paperclips, erasers, etc.) or create pictures with arrays of classroom items. **We have been working with equations to help us organize our art supplies. Today, let's see if we can match an equation to the supplies (or pictures). We can line things up into rows with the same amount in each row to help us keep things organized and make them easier to count.**

MODEL THE PROBLEM: Watch me line up some paper clips so that every row has an equal amount of paperclips. Create 3 or 4 rows of objects, with the same number of objects in each row (see Worksheet 3 for an example). **I can write this as an equation. First, let's count how many paperclips are in each row.** Count aloud pointing to each paperclip in the row as you count. **There are ___ in each row. Now, let's count how many rows there are.** Count aloud pointing to each row as you count. **There are ___ rows. The number of rows tells us how many times we need to add the amount in each row.** Write and say the equation. For example: $3+3+3+3=12$. "There are 3 in each row and there are 4 rows, so we add 3 four times: $\underline{3} + \underline{3} + \underline{3} + \underline{3} = 12$."



STUDENT PRACTICE: Let's try some more examples. I'll line up the supplies, and then you help me write the equation. If students cannot write, provide answer choices. Do 3-4 examples. If students do not get correct response, use MODEL-LEAD-TEST script for error correction. Note: If student finds use of paper clips distracting use chips or draw dots on paper. Change the number of rows and items per row each time you teach this section.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
40.	Show me the rows.	Student runs fingers (or eye gazes) across each row.
41.	How many in each row?	Student counts each item in row.
42.	Count the rows.	Student counts the rows.
43.	Find the equation that matches.	Student selects correct addition equation.

MODEL THE PROBLEM: There is another way we can think about this equation to check our work. **We can count the total number in all. Count the paperclips with me. One, two, three...** Point to the equations. **Can you find an equation that equals (total)?** Pause three seconds to see if student(s) can locate equation independently, then point to correct equation. **This equation equals (total), so this is the correct answer.**



STUDENT PRACTICE: Display new array of paper clips (or erasers). **Now it's your turn.** If students cannot write, give them options on a paper to select. Do 3-4 examples. If students do not get correct response, use MODEL-LEAD-TEST script for error correction. Note: If student finds use of paper clips distracting use chips or draw dots on paper. Change the number of rows and items per row each time you teach this step.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
44.	How many paper clips are there in all?	Student counts the paperclips.
45.	Point to the equation that equals ___.	Student selects correct equation.



This may be a good stopping point. Let students use the art supplies to do an art project. There is a worksheet with this level. You can use this for additional guided practice or to send home as homework.

INDEPENDENT PRACTICE: Equations Skill Test	Teacher Says/Does	Student Response	Error Correction
<p>NOW Stop the lesson here and repeat tomorrow if student is not yet getting at least 4 independent correct responses. Score responses 37-42 on the Equation Progress Monitoring Sheet if you did not do so while teaching.</p>		<p>NEXT Remember the goal is for students to be able to match equations to word problems (3rd), match visuals to equations (4th), and indicate whether an equation is true (5th). As soon as possible, move into the remainder of the lesson to hit the target CCCs for this grade band. Be sure to provide some practice for students at their specific grade level concept even if they have not achieved mastery of previous concepts.</p>	

5th BUILD A GRADE ALIGNED COMPONENT: INDICATE WHETHER AN EQUATION IS TRUE

INTRODUCE ACTIVITY AND PROBLEM: We have been using equations to help us organize and think about our art supplies. Today we want to decide if we have the same number of supplies left after some activities. Here is our problem. Write the problem, $3 + 2 \square 9 - 4$, as you say: **We had 3 red pens and got 2 new ones. We had 9 papers, but used 4. Do we have the same number of pens as paper? We have to decide if these are equal. Find the equal sign.** If students are unclear on equal sign, use the time delay script to find the equal sign.

MODEL THE PROBLEM: Get out GO: Addition and GO: Subtraction. **One side of our equation says to add. The other says to subtract. Show me which of these we use to add.** If student is incorrect, point out the + sign. **Now I add 3+2.** Demonstrate on GO: Addition using chips that $3+2=5$. **Next I subtract 9-4.** Demonstrate with GO: subtraction that $9-4=5$. **Look, these are both 5. The same. They are equal.** Put = sign between the two. **We can say this equation is true because the values on both sides of the equals sign are the same.** Note: On alternate days, demonstrate equations that are NOT equal, and thus, not true.



STUDENT PRACTICE: Write equations that are/are not true on paper using an expression on both sides of the equal sign (e.g., $4+2=5+1$). Let students solve expressions on each side of equation and decide if should use the = sign. Use SYSTEM OF LEAST PROMPTS script as needed to help students with each step. Write different equations each day. Note: If student has difficulty solving the equation review steps 1-14 in lesson.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
46.	Show me which chart you will use to solve this side.	Student indicates correct chart.
47.	Show me which chart you will use to solve the other side.	Student indicates correct chart.
48.	You are going to tell me if this equation is true. An equation is true if the expressions on both sides of the equation are equal. Here is an equation. Before you decide if it is true you have to solve each side. Point to left side. Solve this side and write your answer below.	Student solves left side of equation and writes/indicates answer.
49.	Point to right side of equation. Now solve this side and write your answer below.	Student solves right side of equation and writes/indicates answer.
50.	Are both sides equal?	Student answers yes (or no).
51.	Is the equation true?	Student answers yes (or no).



This is the end of the lesson. Let students use the art supplies to do an art project. There is a worksheet with this level. You can use this for additional guided practice or to send home as homework.

	Teacher Says/Does	Student Response	Error Correction
INDEPENDENT PRACTICE: Equations Skills Test	Give each student the <i>Equations Skills Test</i> 4. Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.	Once the student has completed the test, review missed problems with the student.

Troubleshooting and Data-based Decision making for Equations Skills Test

If student is unable to complete any items on the equations test independently and correctly go back and teach one problem step-by-step.

MASSI CULMINATING ACTIVITY: Have students complete an art activity related to the season, an upcoming holiday, or a science or social studies theme. Be sure to include a variety of art materials and have student practice creating sets, matching equations to sets, and determining if they have equal amount of supplies using skills they learned during MASSI lesson.

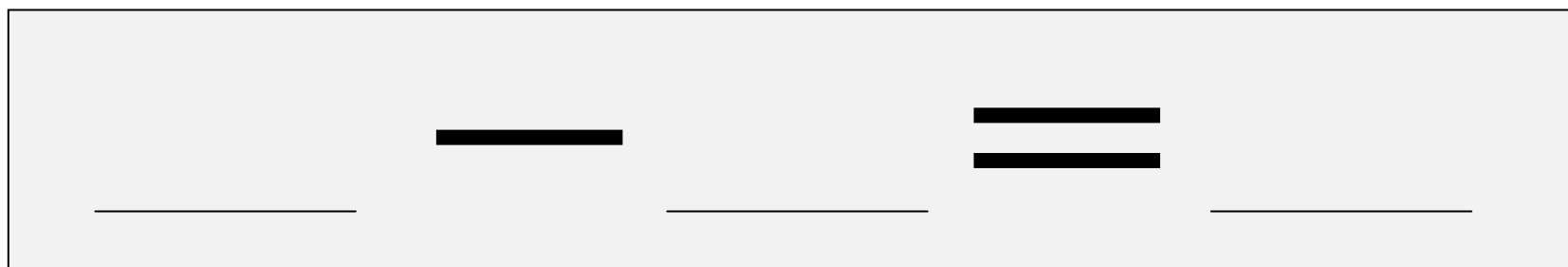
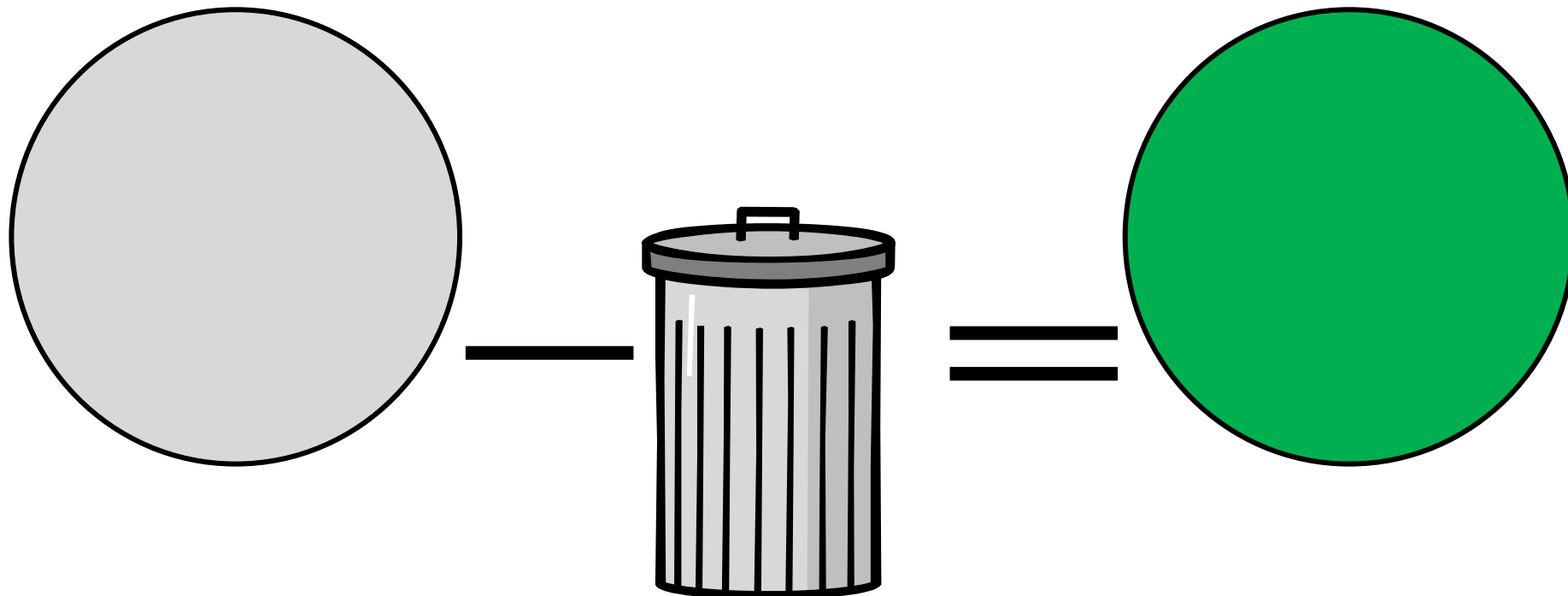
BUILD TOWARDS FULL GRADE LEVEL COMPETENCE

Here are ideas to build competence towards the full grade level competence using this same activity. See the unit plan and talk with the general education teacher for more ideas.

Component	Activity	What Student Does	Generalization/ Fluency
Matching multiplication equation to representation. Students should build an understanding of the relationship between repeated addition and multiplication.	Student is presented with a set of art materials.	Write equation demonstrating number of rows times number in each row.	Vary amounts and items daily.
Solving multiplication and division problems.	For multiplication: Student is given number of students and supplies needed for each student and asked to find the total using repeated addition and multiplication. For division: Student is given large amount of art items and is asked to determine how many each student can have.	Multiplies number of people by supplies per person to get total amount. Divides total number of art items by number of students in class.	Vary amounts and items daily.

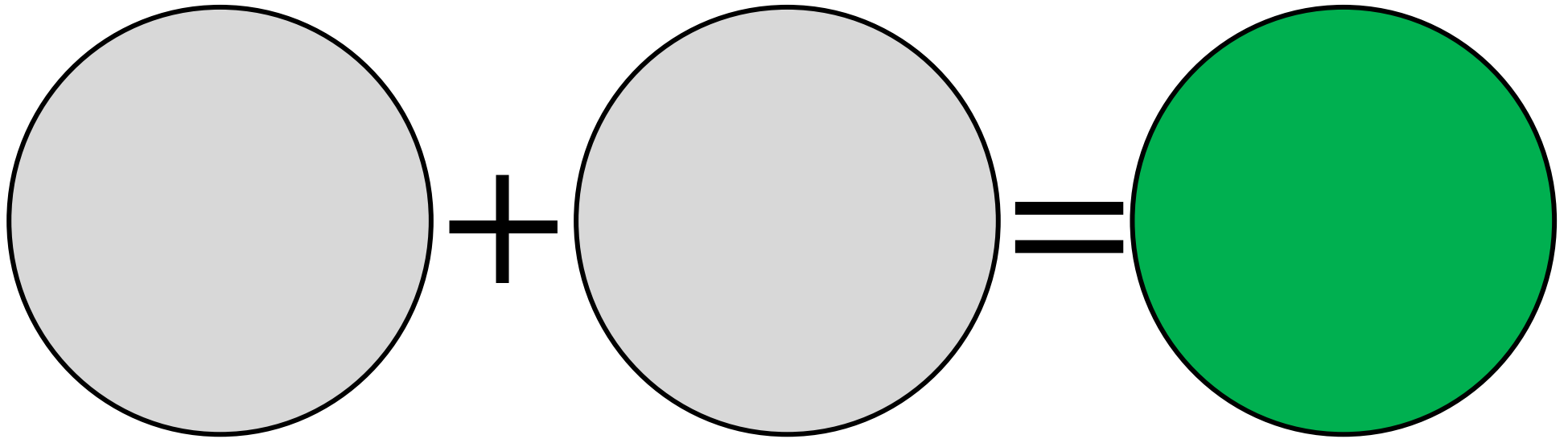
Graphic Organizer: Subtraction

1 for teacher and 1 for each student (Laminate) – May want to print as 12 x 15 if using real art supplies



Graphic Organizer: Addition

1 for teacher and 1 for each student (Laminate) – May want to print as 12 x 15 if using real art supplies



A horizontal rectangular box with a light gray background and a black border. Inside the box, there are three horizontal lines for writing numbers. Between the first and second lines is a plus sign (+). Between the second and third lines is an equals sign (=). The layout is: _____ + _____ = _____

Subtraction Equation Template: 1 for teacher (Cut out and laminate)



A horizontal rectangular template for a subtraction equation. It features three horizontal lines for numbers, a minus sign, and an equals sign.

$$\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

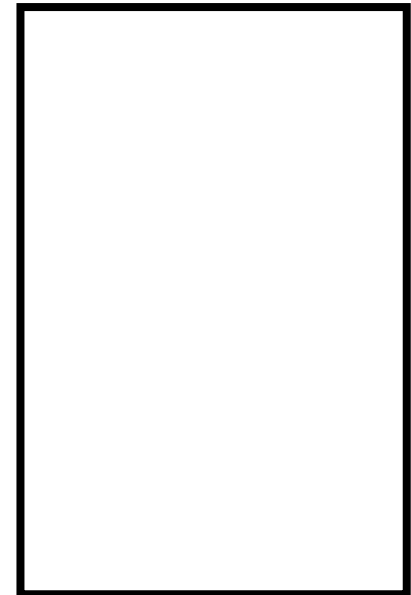
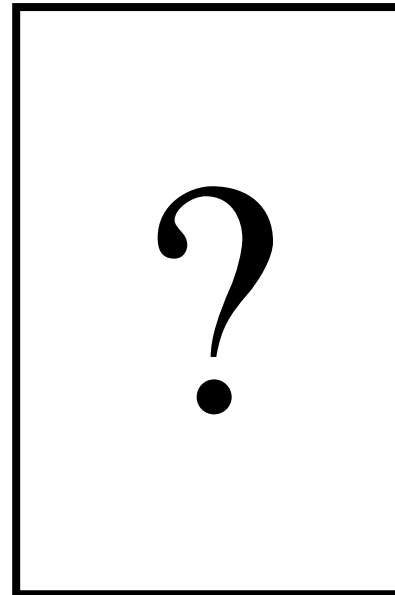
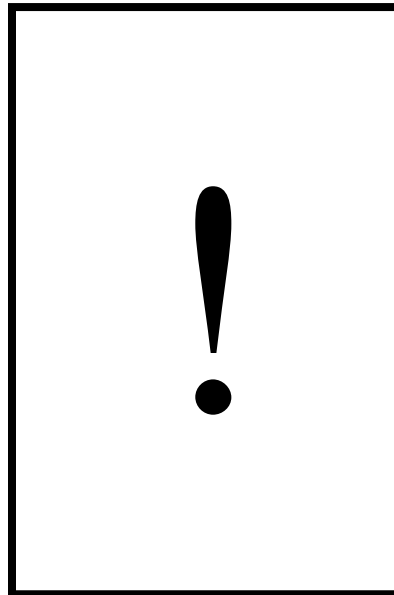
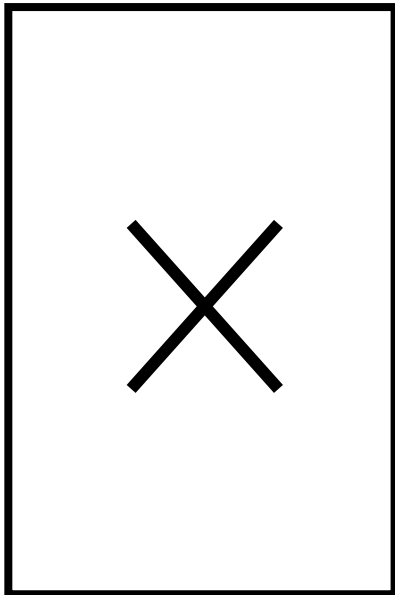
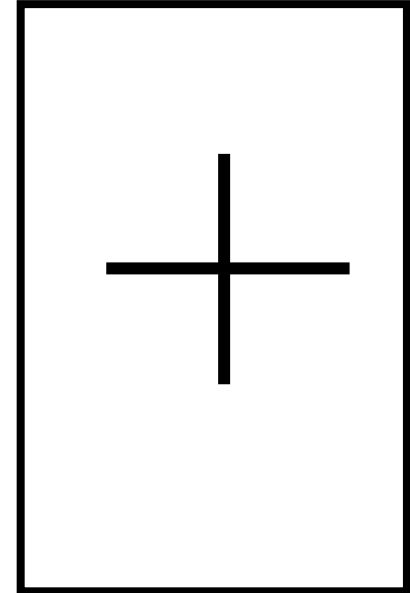
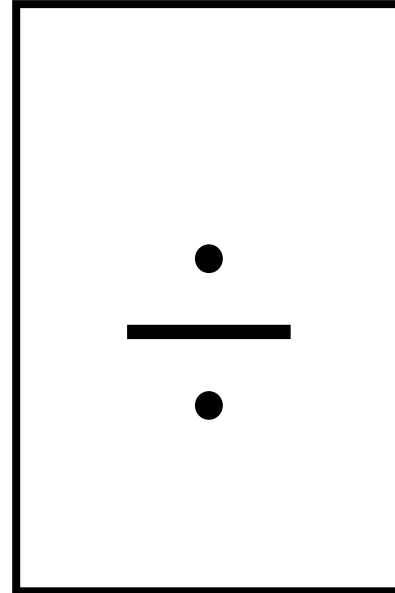
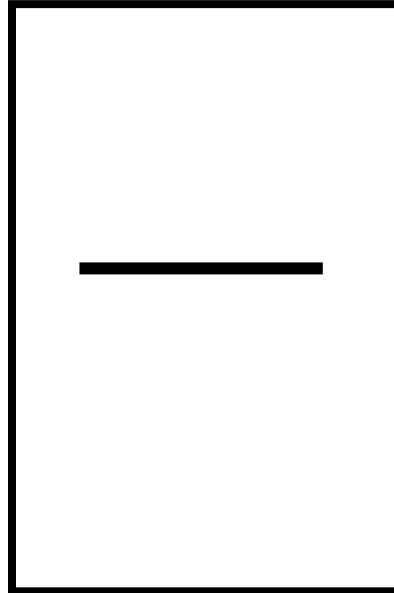
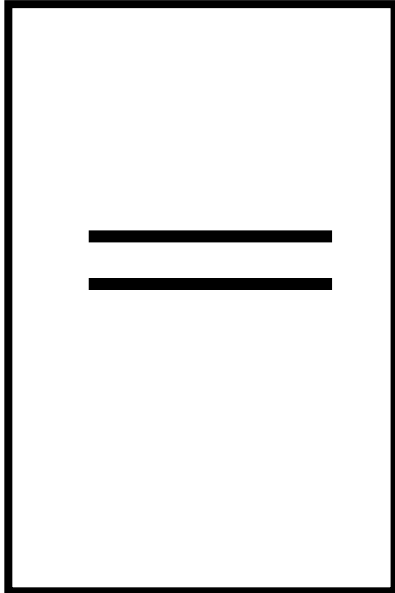
Addition Equation Template: 1 for teacher (Cut out and laminate)



A horizontal rectangular template for an addition equation. It features three horizontal lines for numbers, a plus sign, and an equals sign.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Symbol Cards 1 set for teacher (Cut out and laminate)



Addition Key Words: 1 set for teacher (lamine)

altogether

in all

total

Subtraction Key Words: 1 set for teacher (lamine)

left

remain

difference

Teacher DEMONSTRATION card #1 (laminare)

*Velcro answer choices on back to keep organized

Lukas collected the markers. He had 3 markers in the first canister and 2 markers in the second. Which of these will show how many markers Lukas has altogether?

Cut out answer choices and laminate

$$3 + 2$$

$$3 \times 2$$

$$3 - 2$$

Teacher DEMONSTRATION card #2 (laminare)

*Velcro answer choices on back to keep organized

Tameka bought **9** pencils. She gave **4** pencils to her students. Which of these will show many pencils she has **left**?

Cut out answer choices and laminate

$$9 + 4$$

$$9 \times 4$$

$$9 - 4$$

Teacher DEMONSTRATION card #3 (lamine)

*Velcro answer choices on back to keep organized

Luther had **5** markers. He found **3** more.
How many did he have **in all**?

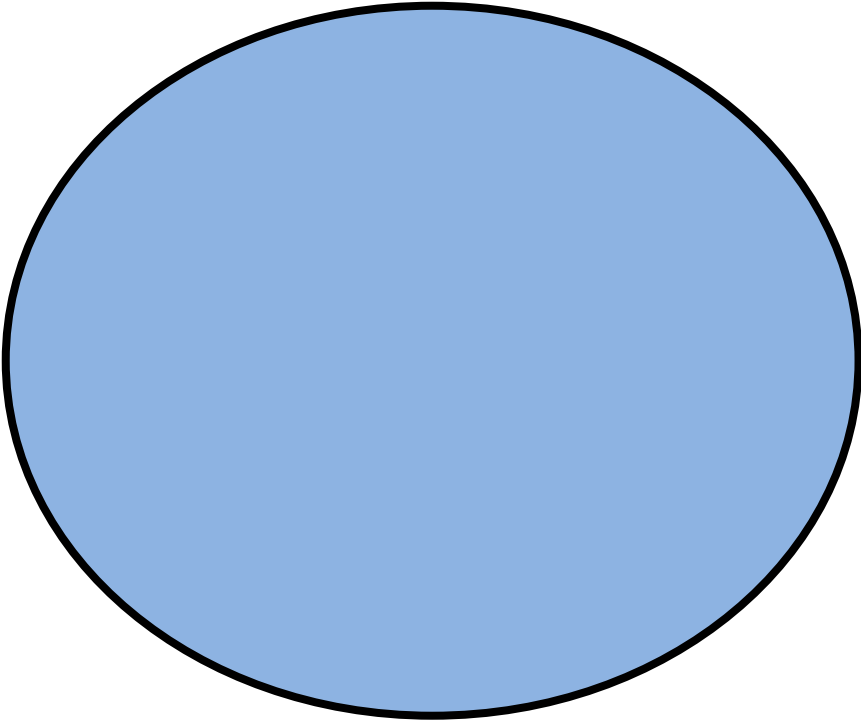
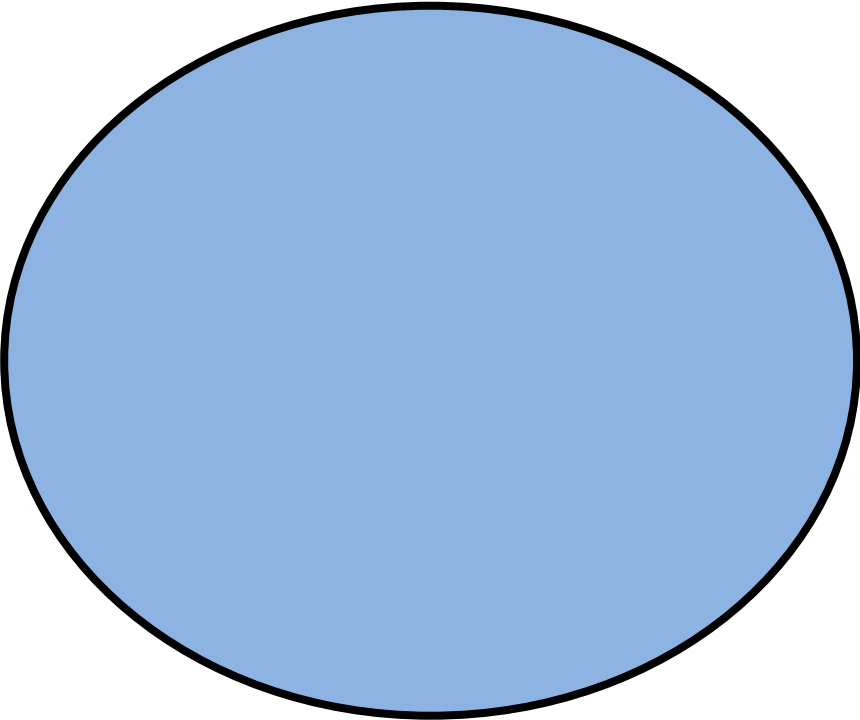
Cut out answer choices and laminate

$$5 + 3$$

$$5 \times 3$$

$$9 - 4$$

Equality Visual (Laminate)



Level 1 Worksheet: Building the Foundation using graphic organizer to complete simple addition and subtraction; identifying symbols

Name: _____

Use your setmaker and chips to find out how many all together in this equation.

$$3 + 2 = \underline{\quad}$$

Use your take away chart and chips to find out how many all together in this equation.

$$5 - 1 = \underline{\quad}$$

Circle minus.

? X -

Circle equal.

= ÷ !

Circle plus.

! + ?

Level 3 Worksheet: Matches equation to representation

Name: _____

___ Point to symbol for story problem that says, "in all."

\times $?$ $+$

___ Point to symbol for story problem that says, "total."

$+$ \times \div

___ Point to symbol for story problem that says, "altogether."

$+$ $!$ $?$

___ Troy had 2 crayons. He bought 4 more. Which of these will show how many Troy has altogether?

$$2 - 4$$

$$2 + 4$$

$$2 \times 4$$

___ Point to symbol for story problem that says, "left."

$=$ $-$ $?$

___ Point to symbol for story problem that says, "remain."

? ÷ −

___ Jackie had 3 markers. 1 was dry so she threw it away. How many markers remain?

$$3 - 1$$

$$3 + 1$$

$$3 \times 1$$

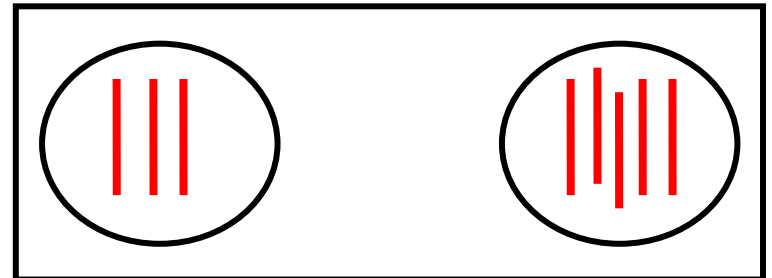
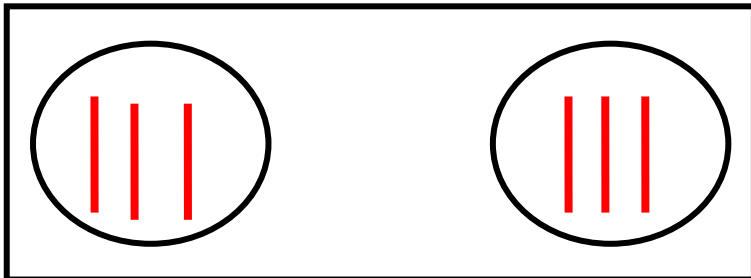
___ Daniel collected 4 crayons. He found 2 more. How many crayons does Daniel have in all?

$$8 - 6$$

$$4 + 2$$

$$4 \times 2$$

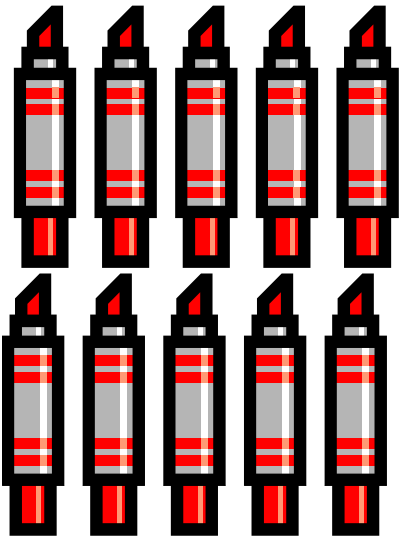
___ Are the sets on each side the same? If they are, write the equal sign.



Level 4 Worksheet: Indicating whether an equation is true

Name: _____

___ Which equation shows what you see in this picture?



$$2 + 2 + 2 = 6$$

$$5 + 5 = 10$$

$$2 + 5 = 7$$

___ Which equation shows what you see in this picture?



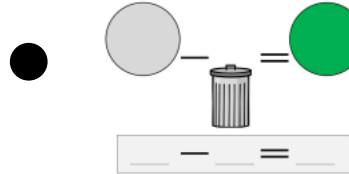
$$3 + 4 = 7$$

$$3 + 3 + 3 = 9$$

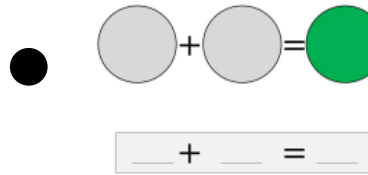
$$4 + 4 + 4 = 12$$

___ Match the equations to the chart you can use to solve it.

$7 + 2 \bullet$



$4 - 1 \bullet$



___ Solve the each side of the equation and write your answer below.

$$3 + 2 = 6 - 1$$
$$\underline{\quad} = \underline{\quad}$$

___ Are both sides equal?

Yes No

___ Is the equation true?

Yes No