“Jars”

K – 4 & Intervention Routine
Developing Flexible Number Sense

What it is:

“Jars” is an individualized and easy to implement number sense routine done weekly with K – 4th grade students in order to build complex and Common Core Aligned number sense in all primary students. This routine was grown out of many common curricular pieces (for example: used in the *Investigations Mathematics* as a 1-2 day lesson in K and 1st grade), but has been expanded to become a regularly implemented routine in schools like Success Academies in New York and other schools nationwide.

There are 3 forms the “Jars” routine takes – see scope and sequence – Counting Jar, Money Jar, and Array Jar. This progress smoothly and concretely allows students to develop their understanding of the base 10 system of numbers, the representation of numbers in groups, and the visual representation of those groups as rectangular arrays that grow area and the patterns in number factor pairs. Each routine matches 15 – 50% of associated grade level’s Common Core standards.

When it’s used:

Jars is used weekly in all K – 3 classrooms and with monthly regularity and as part of an area/perimeter/factor pair unit in 4th. It can additionally be used as an intervention tool at any stage for students who exhibit struggles with number sense or representing abstract quantities with numerals.

How it’s used:

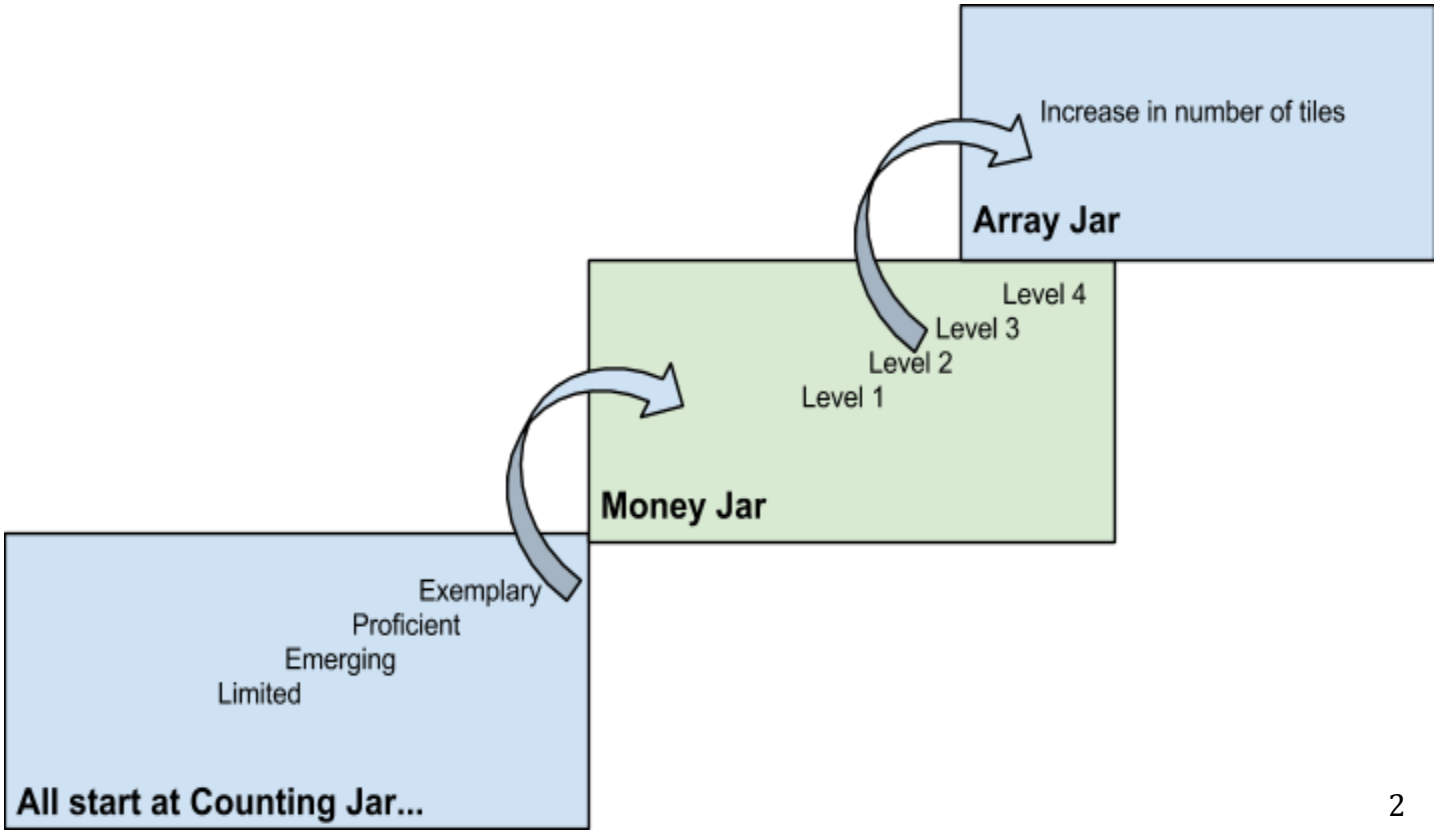
1) Assessment – all students are assessed to find their spot on the trajectory
2) Lesson Plan – regular structure and routine for teachers, including a student-led discourse to explore strategies and overall student noticings. Teachers facilitate conversation to a big student takeaway that builds overtime.
    Prep involves
        A) Placing a certain number or tiles or coins in each students jar (based off of assessment and jar level – see further resources on each jar type).
        B) Printing student recording pages
3) Individualized – Teacher tracks student progress and uses strategic questions to push all students thinking and move them along the trajectory towards each benchmark – see Scope and Sequence page.

“Jars” Scope and Sequence

Ideal Progression: By Grade Level

Jar Type	Counting	Money	Array	Fraction
K				
1				
2				
3				
4				
5				

However, not all students move at the same pace...



Jars Standards Progression K - 2

K Counting Jar	**K: Count to tell the number of objects**. CCSS.MATH.CONTENT.K.CC.B.4Understand the relationship between numbers and quantities; connect counting to cardinality. CCSS.MATH.CONTENT.K.CC.B.4.A When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. CCSS.MATH.CONTENT.K.CC.B.4.B Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. CCSS.MATH.CONTENT.K.CC.B.4.C Understand that each successive number name refers to a quantity that is one larger. CCSS.MATH.CONTENT.K.CC.B.5 Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects
1 Counting Jar	**1st: Extend the counting sequence.** CCSS.MATH.CONTENT.1.NBT.A.1Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. Understand place value. CCSS.MATH.CONTENT.1.NBT.B.2Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: CCSS.MATH.CONTENT.1.NBT.B.2.A10 can be thought of as a bundle of ten ones — called a "ten." CCSS.MATH.CONTENT.1.NBT.B.2.B The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. CCSS.MATH.CONTENT.1.NBT.B.2.C The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
2 Money Jar	**2nd: Solve problems involving money, skip count with 2s, 5s, and 10s** CCSS.MATH.CONTENT.2.MD.C.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have? CCSS.MATH.CONTENT.2.NBT.A.2 Count within 1000; skip-count by 5s, 10s, and 100s.

Counting Jar

Overview: Counting Jar is …

- The beginning of the number sense routine "Jars" (a K – 4 progression).

- A Kindergarten – 1st grade progression that supports students' development of the following concepts:
  - **Writing numbers**
  - **1-to-1 number and quantity correspondence** (when I touch one, and say "one," I have one, etc.)
  - **Cardinality** (the knowledge that the last number I say is the amount I have) –
  - **Organization** strategies for finding the amount in a group
  - **Grouping** of quantities (when I stack or group objects, I can count the amount efficiently in a pattern of units greater than 1 – in 2s, 5s, 10s, 11s, etc. - to quickly and coherently find the total).
  - **Representing quantities in base 10** – creating another version of the number with base 10 blocks.

Counting Jar Lesson Plan

Prep-Work: Teacher:

1. Make 1 jar for each child
   a. Name on lid (with sticker)
   b. Number of tiles in each jar → see tracker
   c. Copies of solving sheet
   d. Recording tracker on clipboard nearby

Launch: (1 - 2min):

1. "How many tiles are in this jar?"
2. *If student makes a guess/estimation*, ask them: "Can you prove it to me? "
3. *If student continues to guess, open their jar and help them pour out the tiles, indicate again "How can you prove how many there are?*
4. *Other possible things to say in the launch:*
   a. *Model Whisper counting*
   b. *Model safely removing tiles (K)*
   c. *Review worksheet*

Work time: (8 – 10 min)

Students work independently (With **whisper voices)**

1. Find out how many tiles (record)
2. Double check (record)
3. Record with drawing/numbers/words how they solved
4. *Eventually: Have them make an equivalent set*

Counting Jar Lesson Plan (continued)

Clean-up routine (1min)

Students put tiles and felt back in jars

Share out:

Teacher has 1 – 2 students share how they solved

1. A student who counts with great organization
2. A student who counts carefully (K)
3. A student who counts with great 1 to 1 care (K)
4. A student who counts in groups (2s, 5s, 10s)
5. A student who builds an array, etc.

Teacher post-group/lesson:

Records students' accuracy and creates new jars for next session

Money Jar

Overview:

Money Jar is …

-The middle of the number sense routine "Jars" (a K – 4 progression).

-A 1st to 2nd grade progression that supports students' development of the following concepts:

- The abstract representation of groups of quantities (5s, 10s, 25s)
- The organized written representation of a large group of items
- The written number sentence that matches a visual image
  (Including the use of repeated addition, multiplication, parentheses, etc.)
- The naming and value of coins
- The base 10 representation of a large amounta
- The solving of word problems when extension is used

Jar Prep:

Level:	Amount:	Coins:	Pennies	Bottom Line: (needs to move on)
1	**Under $1.00**	**P, D, N**	**Over 20, odd number**	**Groups coins and counts**
2	**Over $1.00**	**P, D, N**	**Over 20, odd number**	**Starts with largest or groups (10, 25)**
3	**Around $2.00**	**P, D, N, Q**	**Odd number (more than 13)**	**Counts in groups (25, 50 or 1.00)**
4 ***Ready for Array jar***	**Up to $4.00**	**P, D, N, Q**	**Odd number (more than 13)**	**Counts in groups (1.00)**

Money Jar Lesson Plan

Time: Math Workshop
Frequency: Once a week; five consecutive days till routine is established.

Materials:

1. Counting coin jars prepared for students: Level of coins in each jar (see above).
2. Student recording paper (with chosen exit ticket on back, if preferred).
3. Chart paper for share.

Procedure

Launch (7min)

How much money is in the jar?
Review Worksheet and routine (Day 1)

Work Time (8 – 20min)

Students silently organize, count, represent work

Clean up (3min)

Students clean up – focus on routines and get these solid first, so runs effortlessly

Share (10 – 20min)

Three shares → start with a lower strategy and work up (process mirrors Counting Jar)

Examples of Discourse:

Share 1: *If most class presented at Level 1*	Share 2: *If most class presented at Level 2*	Share 3: *If most class presented at Level 3*
1. Student who grouped and counted (any order but organized and clear → ideal if they have great representation themselves)	1. Student who started with largest and added on all pennies (50, 60, 70, 75, 76, 77, 78, 79, 80, etc.)	1. Student who grouped by 10s
1. Student who started with the largest coin and also grouped coins	2. Student who grouped in logical group, started with largest, and grouped pennies by 10s and ones	2. Student who grouped by 25s and then 10s, if any left
1. Student who started with largest coin and might have grouped (made 10s, 25s)	3. Student who grouped by largest logical amount (100, or 50, or 25)	3. Student who grouped by $1.00 and then smaller chunks
Takeaway: Start with the largest coin	**Takeaway:** Count in groups (10, 25, 50, 1.00)	**Takeaway:** Count in groups (1.00*, 50, 25)

Array Jar

Overview:

Array Jar is …

-The culmination of the number sense routine "Jars" (a K – 4 progression).

-A 3rd – 4th grade progression that supports students' development of the following concepts:
- -The defining attributes of a rectangle
- -Writing a number sentence to match a visual image
  (Including the use of repeated addition, multiplication, parentheses, etc.)
- -Multiplication (the symbol and a visual model of arrays to represent)
- -Area and perimeter
- -Factor pairs – and their relationship to visual images

Lesson Plan:

LT: Varies based on the concepts above (see *Question/LT/tile progression)*

Time (Minutes)	**Teacher Does**	**Students Do**
Before Array Jar	→Ensures all students have a chosen number of tiles in their jar →Prepares recording page (with possible extension on the back) →Chooses LT and posts.	
5 - Launch	→ Break down target/poses questions →Reviews expectations/work time goal (if necessary)	→ Breaks down target/holds on to question
8 – 12 - Grapple	→ Walks the room and collects data on student work → Sequences student work and chooses 1 – 4 students to share their thinking.	→ grapples with question/LT (see progression)
8 – 15 - Discourse	→Writes up student shares (1 – 4) →Asks strategic questions to deepen students conceptual knowledge towards a learning target →Connects back to the learning target	→ Actively engages in math discourse → asks questions to get to LT → shares math arguments and critiques the reasoning of others

Array Jar Progression

***Note**: This progression may not go in order. It will depend on the progression and incoming knowledge of your students. The deciding factor should be determined through listening to your students discourse and using open-ended questions that push for understanding (Ex: How do you know? Why? Can you do it another way? Are you satisfied with you answer? Do we agree or disagree?). There are some components (math vocabulary that will need to be directly taught. You may use this space OR other math time – workshop – to define this math language. However, you do not need to wait for students to come up with the language for the **bolded and underlined** terms in this progression.*

Array Jar Progression

Level	Question Posed	Discourse Goal	# of Tiles in Jars*	Possible LT to connect to:
1A	How many rectangles can you make with the tiles in your jar? **How many rectangular arrays can you make with ALL the tiles in the jar?** While moving about the room: 1. How do you know that is a rectangle? 2. How many do you think you can make? 3. Can you make more? 4. How can you show me the rectangles you've made on paper? (could be day 2) (Can be posed as a challenge with a recording space for students to show how many they found)	What is a rectangle? *Creating visual support with **defining attributes: 4 sides and 4 right angles***** **	8, 12, 16, 24	I can identify the defining attributes of a rectangle. I can show how I solved on paper. *(Notice the connection to scaling (7th grade standard) depending on the size of graph paper you provide. This can be a misconception to watch out for)*
Goal for level 1A (Should take 1-3 lessons) ● *I can articulate the defining attributes of a rectangle. (Rectangular array) (3rd Grade; reviewed in 4th grade)* ● *I can show how I solved on paper (3rd and 4th Grade) (Graph paper)*				
1B	How can you use your rectangular array to figure out how many tiles are in your jar? *While moving about the room:*	Students are using all of their tiles in one or a group of rectangles and showing how they figured out	**8, 12, 16, 24, 36, eventually weirder #s**	I can write an equation/ number model to match a visual model.

	1. How did you use this rectangle to figure out how many tiles are in the jar? 2. **How can you prove that to me?** Push/leading question (if needed) **3. Can you write a number model to match?** <u>Once they are regularly writing number models:</u> 4. How does your number model match your rectangle?	the number of tiles – Students begin to **<u>write number models</u>** to match (**repeated addition** or multiplication.)		

Goals for Level 1B

- I can write a number model (expression or equation) to match my rectangles (rectangular arrays). (3rd and 4th Grade)
- I can prove how many tiles are in my jar. (3rd and 4th Grade)
- I can find all the rectangles that can be made using the tiles in my jar. (3rd and 4th Grade)

<u>Level</u>	<u>Array Jar Question Posed</u>	<u>Discourse Goal</u>	<u># of Tiles in Jars*</u>	<u>Possible LT to connect to:</u>
2	1st: How many rectangular arrays can you make with the tiles in your jar? What are all the factor pairs that make up the number of tiles in your jar? <u>Supporting question:</u> How can you show a rectangle on paper? 2nd: How can you create a complete list of ALL the rectangles that can made given these tiles? *See where students are: could come up with:* ● Draw a picture ● Write an equation/number sentence ● Write factor pairs (might need to directly teach/show this term – if it doesn't come up in the first 2-3 days of this)	1)Students discuss efficient and elegant ways to create a complete list of rectangles. 2) Students begin to use language of **<u>"factor pairs"</u>** and writing equations and move away from drawing random rectangles.	24, 36, 40, 42, 48, 50, etc. all the way to 96.	I can identify all of the factor pairs when given a composite number. I can create a list of all the factor pairs given a composite number.

	Defn: A factor pair is a set of two numbers which, when multiplied, result in a particular number. 2 x 3 = 6 So 2, 3 is a factor pair of 6			
Goal for 2: ● I can create a complete list of all rectangles that can be created from a given amount of tiles. (3rd Grade) → number line add dots ● I can create a list of all the **factor pairs** given a **composite** number. **(prime)** (4th Grade)				

**Remember that the number of tiles can be differentiated as needed, however an instructional choice should be made intentionally. (There are benefits to all students having the same number, and benefits to differentiating. It can affect the discourse for some students).*

***Note a square IS a rectangle (a special one where the sides are all equal. This should not be told, but is a GREAT debate point. You may share the mathematical definition of a rectangle if needed (if students struggle to convince one another. Rectangle: a shape with for four sides and four right angles.) You may also need to define for students what a right angle is – (a 4th grade standard).*