Sense of Number (Exemplars)

- Basic Counting
- Understanding Size
- Number Relationships
- Patterns
- Operations
- Place Value
Subitizing

• See article on Subitizing
• Read and discuss with your table.
• What are some new ideas you gained from this article?
Subitizing

• Math Dictionary
• Subitizing is instantly recognizing a number when a group is presented
This exercise lets you know if the student has a concept of numbers and what they represent.

If they have to “peek” to see how many fingers they are holding up, they don’t understand numeracy.

What strategies can you use to help them grasp this concept?
Hands for Counting--

- If ten frames are difficult- relate back to Hands for counting
Ten Frames

- Establish recognition of numbers of objects -
- Counting, grouping objects and leading to identifying groups without counting
- Focus on multiples of 10
- Leads to number bonds or groups of numbers that equal 10- and
- Do your students have these?
- Where do you need to start?
Ten Frames - Game

• Do your students need practice at this level?

• Do they all have this concept or do you need to go back to the Ten Frames originated with - "Hands"
Number Bracelets is another subitizing format

• This is another way to orient students to grouping numbers with “rekenrek” or “arithmetic rack”

• Number lines made of beads are color coded to help students group numbers and increase “mental math” skills
Number Bracelets with Rekenrek Pattern
NUMBER BRACELETS

You will need the following:

- 10 chenille stems (pipe cleaners), all one color
- 55 beads, 40 red and 15 white
- Choose one color of pipe cleaner and add red beads for first 5 beads on each bracelet
- Numbers 6-10 will be white
- Make a number bracelet for each number 1-10
Rekenrek Rods

- Another way to stress Focus on Base 10
- An Arithmetic Rack
To make a Rekenrek Rod

• One tongue blade
• 6 inch elastic string
• 5 red beads (right) - 5 white beads (left)

• Put string through hole at one end of tongue blade
• Add beads and add other end of string through hole at opposite end of tongue blade
Peas on Craft Sticks
Make Peas on Craft Sticks

- 9 craft sticks, peas and glue gun,
- You will need a **ziplock bag** for peas once they are glued on sticks,
- You will need an **8 x 11 piece of construction paper, a ruler and markers** to make the place value mat.
- Draw a line down the center of the page. Paste the “**tens**” on the left and “**ones**” on the right.
Peas on Sticks Practice

• Begin putting peas on mat to show a number, putting ones in ones column and tens in tens column.
• Progress to addition
• Then addition with regrouping
• Try Subtracting without regrouping
• Then progress to subtracting with regrouping
Peas on Sticks Activity

• Make the number 22.
• Make the number 325.
• Add 2 + 7.
• Add 7 + 8.
• Add 22 + 36.
• Add 38 + 42
• Subtract 9-6.
• Subtract 18-9.
• Subtract 45-17.
CPA

- Concrete - 10 single peas and on each stick
- Pictorial - numbers written to represent the number of peas on the mat
- Abstract - are numbers identified and said from peas arranged on the mat
Place Value Mats

• Are expanded to 100s place with Place Value Mats and Place value Disks

• Disks are arranged on a mat to show the value of the location of a number
100’s - Place Value Mats & Place Value Disks
Make/Take
Place Value Mats

• One sheet of construction paper (12 x 18)
• One - 1” x 18” strip placed across top – down 2 inches
• Two - 1” strip placed vertically to separate sheet into thirds
• Numbers - 100, 10, 1 placed across top between strip and top edge
• Use these with place value disks
Working with Place Value Chips

- Make the number 22.
- Make the number 325.
- Add 2 + 7.
- Add 7 + 8.
- Add 22 + 36.
- Add 38 + 42
- Subtract 9-6.
- Subtract 18-9.
- Subtract 45-17.
Place Value Mats and Disks

• Use your place value mat and disks to show the number on the card.

• Explain as a strategic pattern:
  • C Concrete – arrangement of disks
  • P Picture – number sentence
  • A Abstract – read the number sentence with disks paired to show both representations
Multiplication and Division

- Multiply 12 x 4.
- Multiply 15 x 4
- Multiply 26 x 3
- Show 6 ÷ 2.
- Show 16 ÷ 4.
- Show 34 ÷ 6.
“In an increasingly complex world, sometimes old questions require new answers.”
PROBLEM SOLVING
WITH MODEL DRAWING

• The model drawing approach takes students from the concrete to the pictorial to the abstract stage.
• Students create bars and break them down into "units."
• The units create a bridge to the concept of an "unknown" quantity that must be found.
• Students can learn to use this strategy in the primary grades and continue with it through the middle grades.
• There are two types of model drawings: discrete and continuous
Discrete Model

- "crete" like concrete blocks
- Used with smaller numbers
- One-to-one correspondence
- Use with fraction problems
- Use with percentage problems
Concrete: Unifix cubes

Jan has 5 yellow cubes. Bill has 4 red cubes. How many cubes altogether?

Jan's cubes

Bill's cubes

5

4

9
Concrete to pictorial

Jan has 5 dogs. Bill has 4 dogs.
How many dogs altogether?
Pictures to Dots

Jan has 5 dogs. Bill has 4 dogs. How many dogs altogether?

Jan’s dogs

Bill’s dogs

\[ \{ \text{Jan’s dogs} + \text{Bill’s dogs} \} = 9 \]
Jan has 5 dogs. Bill has 4 dogs. How many dogs altogether?

You may want to use large grid paper at first.
Numbers on the outside

Jan has 5 dogs. Bill has 4 dogs. How many dogs altogether?

First Grade

Jan’s dogs

Bill’s dogs

\[
\begin{align*}
\text{Jan’s dogs} & \quad 5 \\
\text{Bill’s dogs} & \quad 4 \\
\{ & \quad 9
\end{align*}
\]
8 Steps of Model Drawing

1. **Read** the entire problem.
   Jan has 5 yellow cubes. Bill has 4 red cubes. How many cubes altogether?

2. **Decide** who is involved in the problem.
   Jan
   Bill
Jan has 5 yellow cubes. Bill has 4 red cubes. How many cubes altogether?

3. Decide what is involved in the problem.

Jan's cubes
Bill's cubes
Jan has 5 yellow cubes. Bill has 4 red cubes. How many cubes altogether?

4. **Draw** units of equal length.

Jan’s cubes \[\square\]

Bill’s cubes \[\square\]
Jan has 5 yellow cubes. Bill has 4 red cubes. How many cubes altogether?

5. Reread the problem, one sentence at a time, saying the word stop at each comma or period and draw the information on the unit bars.

Jan’s cubes: [ ] [ ] [ ] [ ] [ ] 5

Bill’s cubes: [ ] [ ] [ ] [ ] 4
Jan has 5 yellow cubes. Bill has 4 red cubes. **How many cubes altogether?**

6. Determine the question and place the question mark in the appropriate place in the drawing.

Jan’s cubes

Bill’s cubes

5

4
Jan has 5 yellow cubes. Bill has 4 red cubes. **How many cubes altogether?**

7. Work all the computation to the side or underneath the drawing.

Jan’s cubes

Bill’s cubes

\[5 + 4 = 9\]
Jan has 5 yellow cubes. Bill has 4 red cubes. How many cubes altogether?

8. Answer the question in a complete sentence.

Jan’s cubes: 1 1 1 1 1 1 5
Bill’s cubes: 1 1 1 1 1 4

Jan and Bill have 9 cubes altogether.
Model Drawing Problems

• Jan has 2 more kittens than Sally. Sally has 6 kittens. How many kittens are there in all?
Sam, Max, Ted, and Curt shot baskets. Sam shot 4, Max shot 3, Ted shot 6 and Curt shot 5. How many shots were made?
Continuous Model

- Use with larger numbers
- Talk about what part-part-whole means
- Talk about what whole -part-part means
Practice with a Partner
Model Drawing Rubric

1. Read the problem
2. Identify the variables - the “who” and “what”. (2 points)
3. Draw a unit bar to model each variable.
4. Chunk the problem and adjust your unit bars to match your information. Fill in your question mark. (4 points)
5. Work your computation. (2 points)
6. Write a complete sentence to answer the question. (2 points)
Part/Whole

• Has been stressed with
  - Number Bonds
  - Fact Families
  - Visuals given with model drawing
  - So concept of fractions will follow naturally
Fractions

• Are a natural part of every child’s environment
• Start with common objects and divide them equally
Fractions

• Introduced with concrete objects:
  • Apples, Oranges, Cookies, Pizza
  • All can easily be divided into equal parts for visual demonstrations
Whole and half (k-level)
Fractions

- Pictures can be paired with circles with words writing on them.
Foldable Fractions

- Pink strips Label WHOLE
- Fold yellow strips in half Label $\frac{1}{2}$ on each size
- Fold green strips in fourths Label $\frac{1}{4}$ on each piece
- Fold blue strips in thirds Label $\frac{1}{3}$ on each section
- Fold purple strips in sixths Label $\frac{1}{6}$ on each section
- Fold orange strips in eighths Label $\frac{1}{8}$ on each section

What happens to size of section as the number increases?

Compare this concept to whole numbers—what happens to size or number of pieces as number increases?
Foldable Fractions for each student
Fold squares diagonally
Fold Corner up to center

- What fraction would you “estimate”
- The small corner triangle to be?
Fold small corner triangle to center
Fold in half - what is the new shape?
What are the differences in these shapes?

How many equal triangles are in each of these shapes?
What are the differences in these shapes?

How many equal triangles are in each of these shapes?
Bridges and Barriers

Bridges

• Talk at your table and list ideas you have learned about today that you can use to help bridge learning gaps in math.

Barriers

• Talk at your table and list ideas you didn’t quite grasp today that may be barriers to math learning.
Enjoy using manipulates to establish Number Sense & Subitizing with Singapore Math Concepts