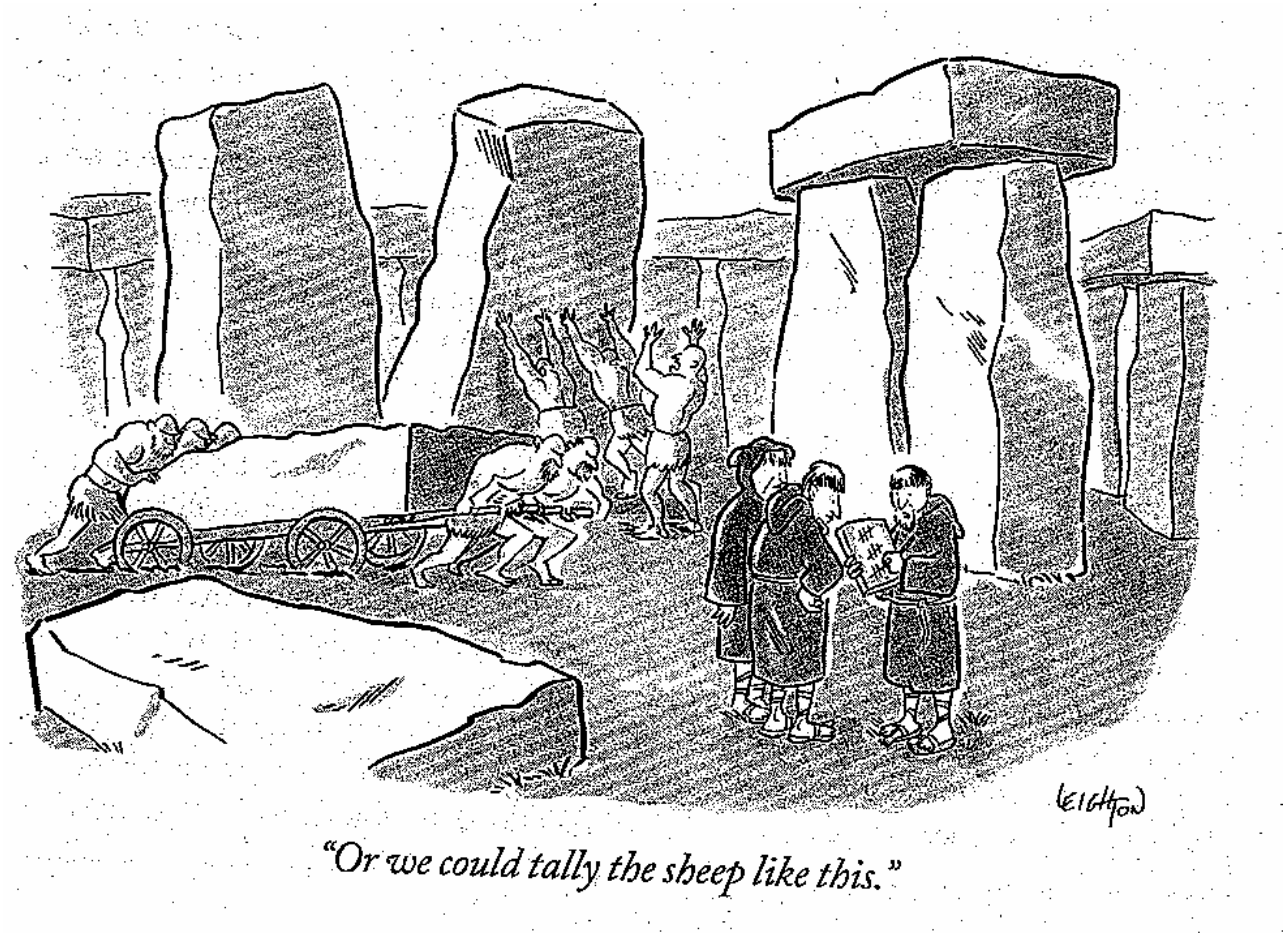
Thank you for coming today!



"Or we could tally the sheep like this."

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Make that Number!

Let’s Learn Together!
Setting Norms for our Cohort

honor start & end times

share the floor

confidentiality

have a focus (follow agenda)

reach closure (next steps...)

be fully engaged

respect varying perspectives

participate equally

maintain momentum

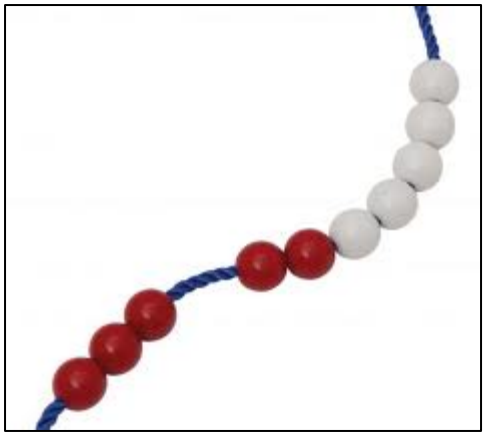
other ideas?

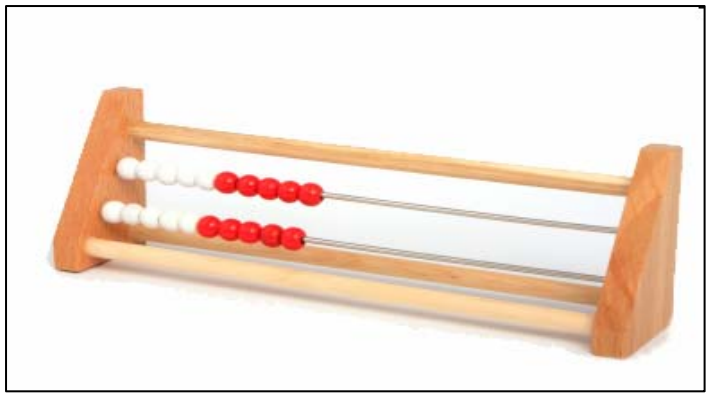
Focus for Today

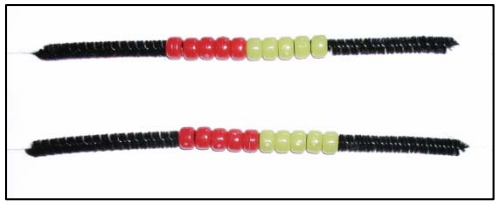
- Content: ***Counting, Cardinality & Number Sense***

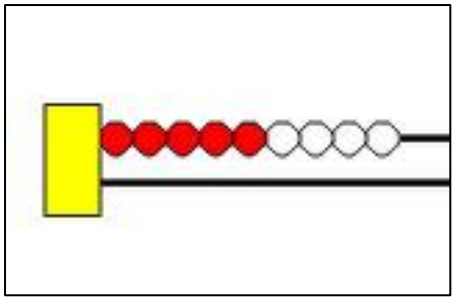
- Strategy: ***Learners rephrase other learners' thinking***

Developing Visual Number Sense Through Models









Counting Frames (Rekenrek)

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Counting in Context

- Each table group will get a large quantity of red and white beads.
- How many 20-bead (10 red, 10 white) counting racks could be made with these beads? How many of each color are left over?
- How many 10-bead (5 red, 5 white) counting racks could be made with these beads? How many of each color are left over?
- You will make a poster will showing your answers and the process you used to figure it out.

Gallery Walk of Posters

- You now have a few minutes to look at the posters made by other table groups.
- Examine ***at least one*** poster carefully & consider what questions or comments you have about the math you see. *(If time permits, move on to another poster.)*
- Use your sticky notes to leave comments or questions on the poster(s) you examine.
- Put at least one sticky note on each poster you examine.

New Understandings

- What have we learned about counting and cardinality in general?
- What have we discovered about doing math?

How do children develop understanding of counting, cardinality & number sense?

What are the ***Big Ideas***?

Number is Complex!

Counting is Complex, too!

A ***Big Idea***

There are principles (rules)
for counting.

One-to-One Principle

Each item in a set
is counted
once and only once.

1-to-1 Correspondence Principle: What learning looks like (skills)

One number is named
for each object pointed at.

When objects are
counted in groups,
appropriate skip counting is used.

Stable Order Principle

Number names must be said in a stable, repeatable order.

Stable Order Principle: What learning looks like (skills)

- Mastery of the number name sequence used by culture
- Can count up from given number
- Can count down from given number

Cardinality Principle

The final number used
when counting
represents the quantity
of the set counted.

Cardinality Principle: What learning looks like (skills)

- When asked, “How many altogether?” names the last number (without re-counting).
- Can count out to create a set of a given quantity.
- When given a story problem, can model the count, using manipulatives, drawings & words.

Order Irrelevance Principle

No matter what order
the items in a set are counted,
the result is the same.

Order Irrelevance Principle: What learning looks like (skill)

Can re-arrange items in a set
in order to count them
most efficiently.

Abstraction Principle

Counting can be applied
to any set,
including groups (like dozens) or
non-physical entities (like ideas).

Abstraction Principle: What learning looks like (skill)

- Can name the unit that has been counted (3 *rocks* or 3 *steps*).
- Can make new units to count: collect items into same-size groups and then count the groups.

Why do we Count?
A ***Big Idea***

Quantity is an attribute
of a set & we use numbers
to name specific quantities.

Video Analysis

Young Mathematicians at Work: "Taking Inventory"

- Turn to a partner & talk about what evidence of children's mathematical thinking & understanding you observed.
- Share ideas with the whole group.

A *Big Idea*

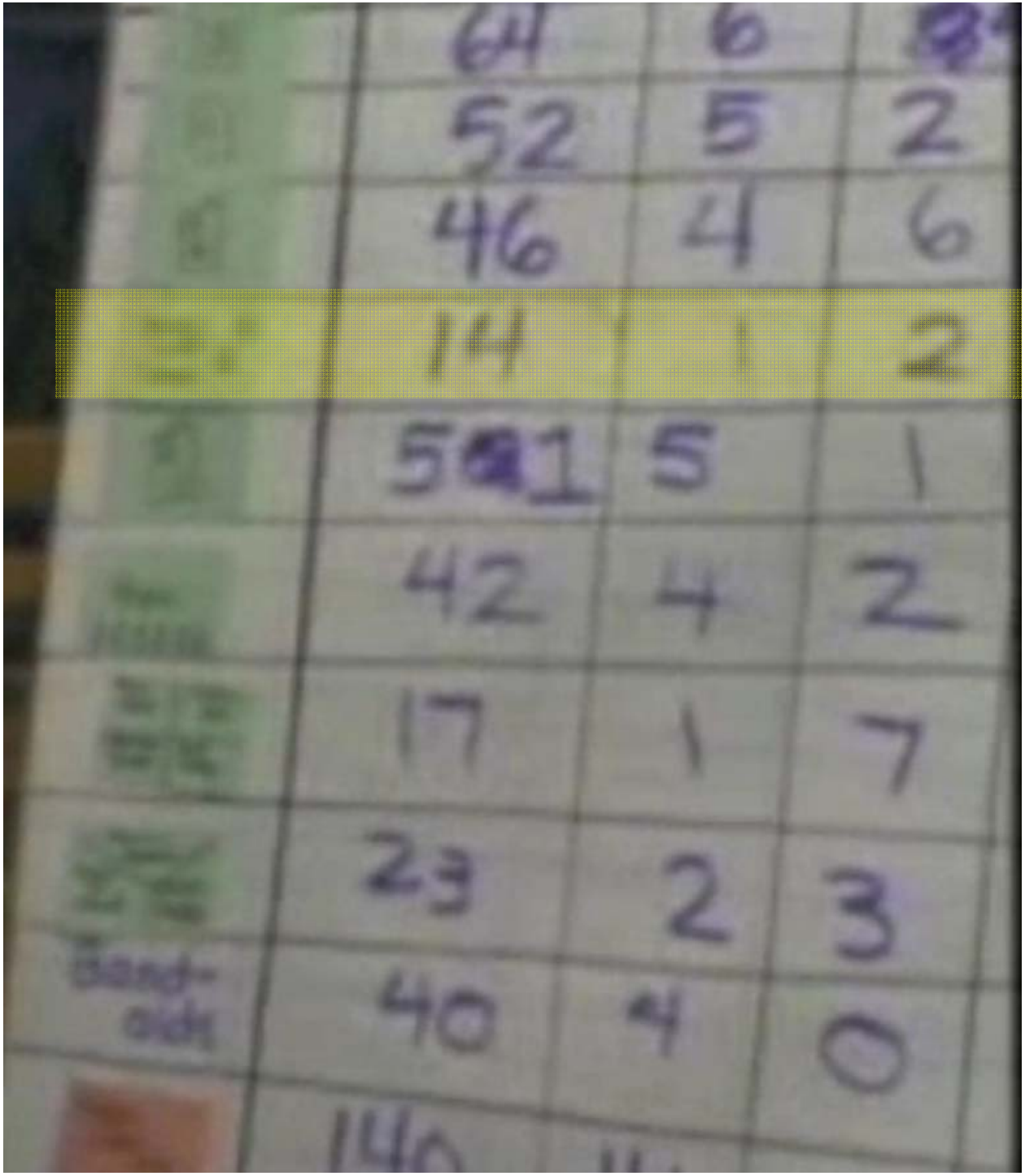
- As numbers grow larger, we group by tens to create new units.
  - Because we group by tens, we can represent all numbers using ten digits (0 to 9), and there are patterns to how numbers are represented.

Video Analysis

Young Mathematicians at Work: "Taking Inventory"

- Turn to a partner & talk about what evidence of children's mathematical thinking & understanding you observed.
- Share ideas with the whole group.

How do you think students explain the highlighted result (which is added to the chart several moments after the clip we just watched)?



How are the **Big Ideas**

& related **skills**

we've been discussing

reflected in

the *Common Core Standards*?

What happens in an effective mathematics classroom?

- Students & teachers believe & experience that math is a sense-making activity to help us understand our world.
- Students & teachers model math in multiple ways.
- Students & teachers talk about math.
- Students & teachers ***do*** math.

How were these **principles** illustrated in the classroom we saw in the video?

How did the **teacher's choices** influence the **children's construction** of mathematical understanding?

High-Impact Strategies to Promote Mathematical Thinking & Action

- What did we do during this learning lab?
- How did our choices and practices affect your learning?

Focus Strategy:
Learners rephrase other learners' thinking

- Why is it effective?
- How does it develop children's thinking, problem solving & communication?
- How can you make it work for mathematics in your classroom?

Using good books to help students explore numerosity & number sense

- Where's the math in the book?
  - What are the Big Ideas?
- How can you bring the math out of the book?
  - What kind of activities could you use to develop children's thinking about the math of the book?