



Math at the Primary Level

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Issues

- Using manipulatives effectively
- Building number sense (including mental math)
- Better consolidation of lessons



Manipulatives of Value

- Counters
- Linking cubes/ with pan balance
- Ten Frames
- Square tiles



Manipulatives of Value

- Base ten blocks
- Coins
- Cuisenaire rods
- Fraction pieces



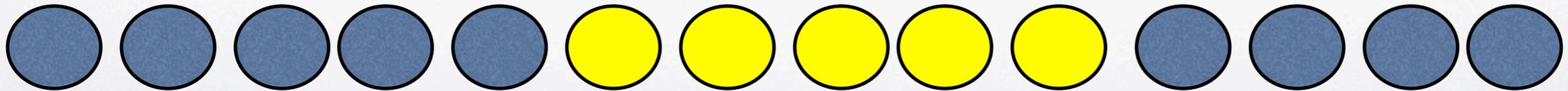
Counters

- Certainly to count and represent numbers
- If you alternate colours with every 5 counters and line them up, you can replace a rekenrek



Counters

- For example, show 14 as





Counters

- Compose and decompose
- For example, show that 15 can be decomposed into two next-to-each other numbers



Counters

- What numbers can you decompose into a number and twice as much?
- What numbers can you decompose into three next to each other numbers?



Counters

- Estimating total in a pile (or jar)
- For example, put 45 counters in a container and let kids see what 5 look like. They estimate the number in the container.



Counters

- Addition and subtraction
- Multiplication and division



Division

- Be sure to show, e.g. $18 \div 3$ both as how many groups of 3 in 18 AND sharing 18 into three groups.



Counters

- Building patterns visually
- How might you show how the pattern 3, 7, 11, 15, ... continues with counters?



Linking cubes

- Great for skip counting, e.g. skip counting by 2s— start with individual cubes and then pile in 2s



Linking cubes

- Commutativity of addition
- E.g. show $4 + 3$ using two different colours.
- Turn it around in your hand.



Linking cubes

- Associativity of addition
- E.g. use 3 colours to show $4 + 3 + 5$
- Change the middle 3 to the first colour
- Change the middle 3 to the second colour



Linking cubes

- Constant difference
- Show a link of 12 and a link of 8 and see how much longer 12 is than 8
- Now add 2 to the matching ends of 12 and 8.
- How do I know $14 - 10 = 12 - 8$?



Linking cubes

- Non-standard measurement unit
- Building patterns
- Building concrete graphs
- Probability



Pan balance

- Determining sums
- What do I need to put on the other side to balance $4 + 3$?
- What do I need to balance 4 and 9?



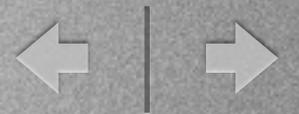
Pan balance

- **Associativity of addition**
- **Put $3 + 5$ on one side and 2 on the other side.**
- **What do I need to add to the 2 ?**



Pan balance

- Relationships between sums, e.g.
- How much more is $8 + 3$ than $6 + 2$?



Ten frames

- To decompose 10
- Representing numbers in terms of 5s, 10s, 15s, 20s, etc.
- Making 10s to add and subtract, e.g. $9 + 3$ or $12 - 4$



Cuisenaire rods

- Representing numbers
- Commutativity of addition
- Associativity of addition
- Subtraction as inverse addition



Cuisenaire rods

- Non-standard length units
- Proportional reasoning with length units
- Building shapes and determining perimeter



Square tiles

- Creating arrays
- Work with fractions, e.g. make a rectangle that is half red or one fourth green



Base ten blocks

- Representing numbers/decomposing numbers
- Show a number with more ten rods than unit blocks
- Show 54 four different ways



Base ten blocks

- What numbers can you show with exactly 13 blocks?



Base ten blocks

- Addition and subtraction
- Let's look at $42 + 19$ and $41 - 18$



Coins

- Estimate value of a collection
- Skip counting by 5s, 10s, 25s
- To decompose into 10s , 5s and 25s
- Add and subtract



Fraction rectangles

- Comparing sizes of halves, quarters, etc



Visuals that Matter

- **Hundred chart**
- **Number Line**



Hundred chart

- **Locate numbers**
- **Adding and subtracting using mental math strategies**

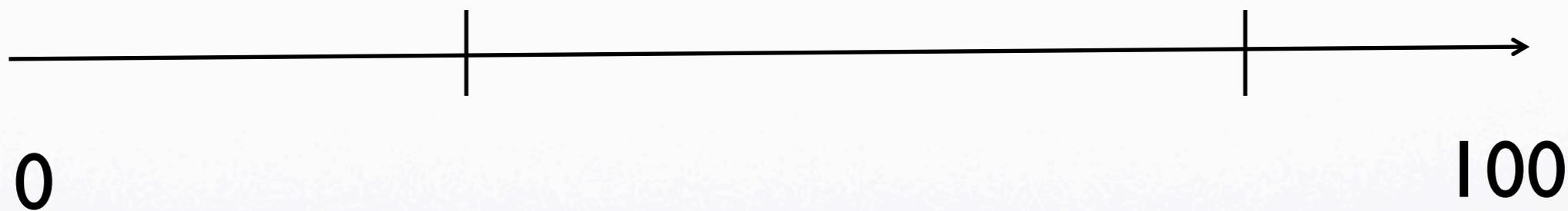


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Number Line

- Locating numbers, e.g.
- A number line is marked in 5s and you ask students to place numbers not ending in 5.
OR
- You just mark two dots with only 0 and 100 marked and students estimate what they might be.





Number Line

- Comparing numbers
- Rounding to nearest ten



Number Line

- Addition and subtraction (two ways for subtraction)
- $35 - 12$ could be start at 35 and go back 12
OR start at 12 and go up to 35



Mental math

- Need the small facts (+, x)
- Can always relate – to + and ÷ to x
- Use strategies for larger facts



For example

- $9 + 7$
- $18 + 8$
- $24 + 37$



For example

- $17 - 9$
- $22 - 8$
- $41 - 18$



For example

- 7×4
- 8×6
- 7×8



Number talks

- These are discussions like we just had.
- If you teach the way I propose, you may not need stand-alone number talks.
- However, you might still choose to use them to focus on personal strategies.



Consolidation

- You are teaching about subtracting 3-digit numbers using manipulatives.
- What might a lesson focus be (if it's not just doing it)?
- What would the consolidation be?



Possible focus

- Sometimes it's quicker to add up from the lower amount to the upper one to figure out a difference and sometimes not.



My consolidation

- Includes questions like:
- How would you solve $300 - 2$?
- How would you solve $418 - 302$?
- Why might you solve them differently?
- What other ones would you solve like each one?



Or

- You are working on skip counting backwards.



My focus might be

- Why it's quicker to skip count by 5s than 2s or by 10s than 2s or 5s.



I would include in consolidation

- You skip count back from 50 to 10.
- Suppose you didn't say many numbers.
- What were you skip counting by? How do you know?
- Would it still be true if you it was 100 to 10?



But my focus might be

- Noticing the pattern of digits that are said when you count back by various amounts.



So my consolidation might include

- I counted back from 85.
- The numbers I said all ended in the same digit.
- What did I count back by? How do you know?
- Would that always happen? Why?



Work together

- Think about a topic you are teaching.
- What idea might you focus on?
- What would your consolidation sound like?



Your questions

- What are some of your questions to me?



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