Using Math Work Stations to Help Students Master the CCSSM

DENISE RAWDING

drawding@nps.k12.nj.us

"My kids [illegible] this. I'll put it into a cen[illegible]tudents can practice [illegible]

Based on my knowledge of each student's cognitive level, I will differentiate the materials that I put into each math work station, so each student will be working in their zone of proximal development.

Why is this Important?

- All students will be college and career ready.
- Student need to make sense of the mathematics in which they are involved.
- All students are capable of learning math with effective instruction and differentiated supports.
- On-going formative assessment is critical in order to know how our students are thinking and understanding.

Kindergarten

Counting and Cardinality
- **Know number names and the count sequence.**
- **Count to tell the number of objects.**
- **Compare numbers.**

Operations and Algebraic Thinking
- **Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.**

Number and Operations in Base Ten
- **Work with numbers 11-19 to gain foundations for place value.**

First Grade

Operations and Algebraic Thinking
- **Represent and solve problems involving addition and subtraction.**
- **Understand and apply properties of operations and the relationship between addition and subtraction.**
- **Add and subtract within 20.**
- **Work with addition and subtraction equations.**

Number and Operations in Base Ten
- **Extending the counting sequence.**
- **Understand place value.**
- **Use place value understanding and properties of operations to add and subtract.**

Measurement and Data
- **Measure lengths indirectly and by iterating length units.**

Second Grade

Operations and Algebraic Thinking
- **Represent and solve problems involving addition and subtraction.**
- **Add and subtract within 20.**
- **Work with equal groups of objects to gain foundations for multiplication.**

Number and Operations in Base Ten
- **Understand place value.**
- **Use place value understanding and properties of operations to add and subtract.**

Measurement and Data
- **Measure and estimate lengths in standard units.**
- **Relate addition and subtraction to length.**

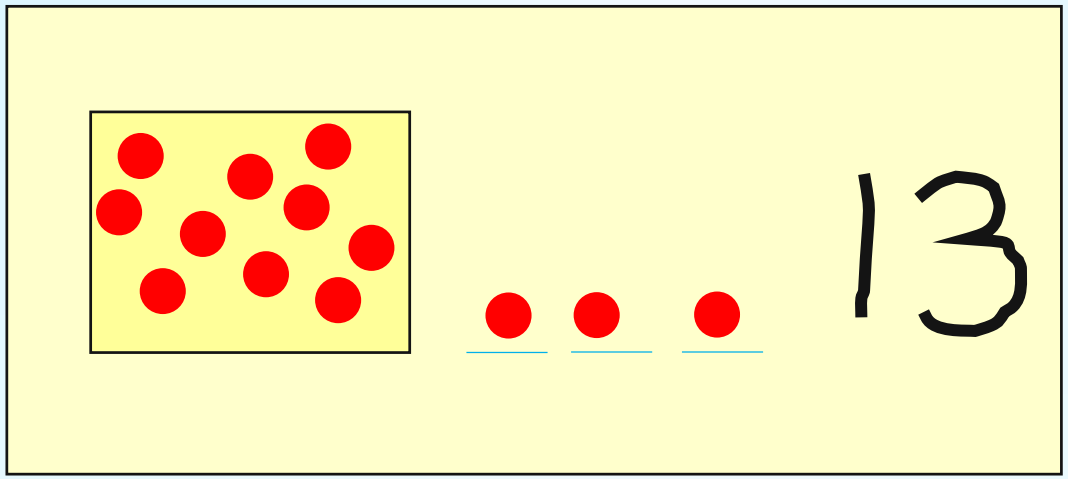
Source: http://achievethecore.org/content/upload/Focus_in_Math_06.12.2013.pdf

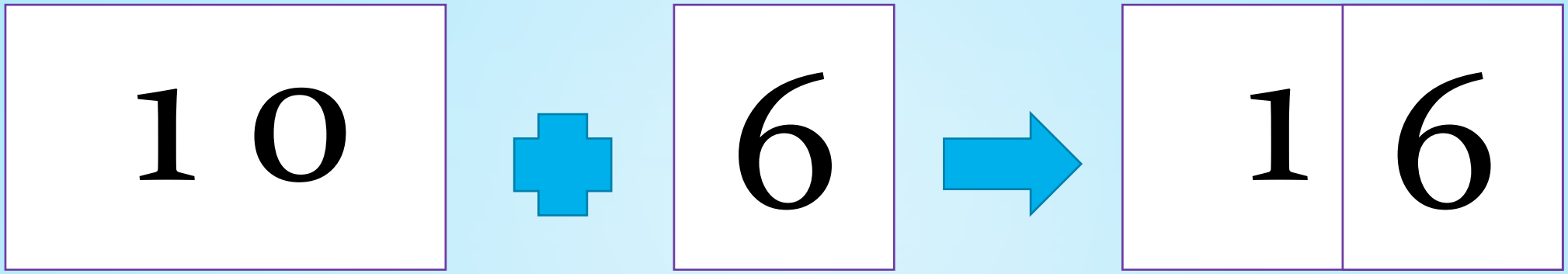
Understanding the Number System – Counting by Ones

- Rote counting sequence
- Counting objects by physically moving them
- Counting objects by touching them
- Connecting counting and cardinality

Understanding the Number System – Teen Numbers

- Teen numbers as a group of ten ones and some more ones




10
6
16

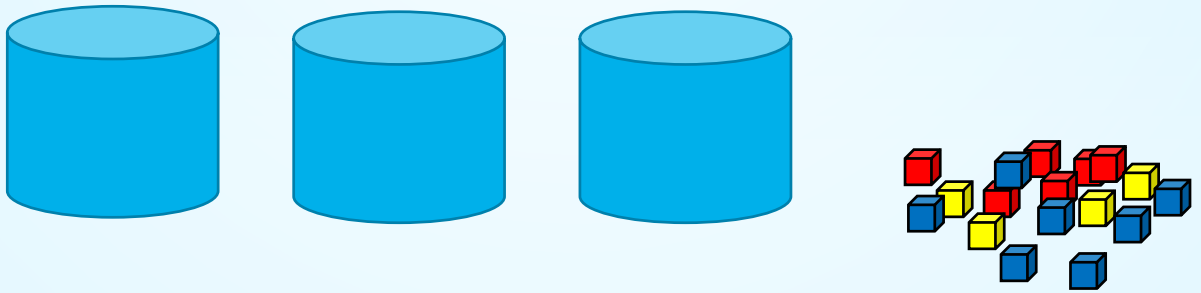

4


2

Understanding the Number System – Counting Groups of Ten

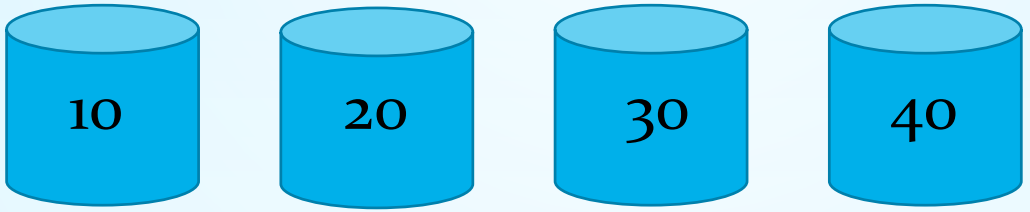
- Unitizing
- Use connecting cubes to allow students to physically make groups of ten.
- Start with containers and a decade number of cubes.

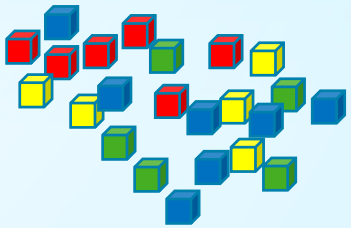
How many groups of ten can you make?



Understanding the Number System – Skip Counting by Ten

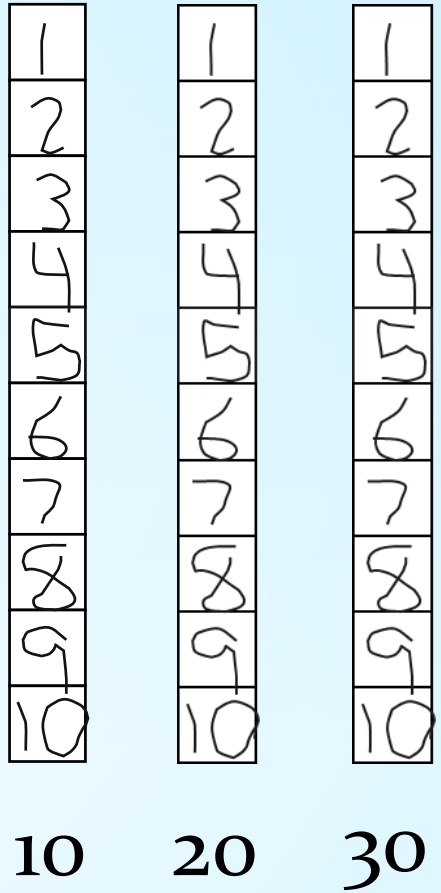
- Use containers and a decade number of cubes
  - Students group objects into tens, skip count the groups by ten, and count by ones to verify.
- Want students to notice and understand the pattern: 4 tens = 40





Understanding the Number System – Skip Counting by Tens (Transitioning to Base-Ten Blocks)

- Move to using ten strips
- Students begin by putting the numbers 1 – 10 on the strip.
- Once students recognize that each strip is ten and can count by tens, move to using ten rods.



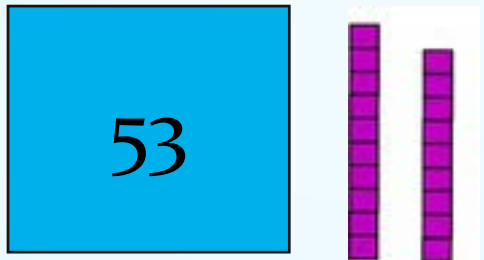
Understanding the Number System – Problems with Groups of Ten

- Jon has 3 packs of gum. There are 10 sticks in each pack. How many sticks of gum does Jon have altogether?

(Battista, p. 56)

Understanding the Number System – Counting by Tens and Ones in Mid-Decade

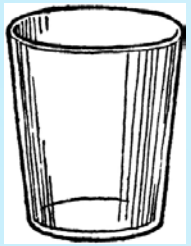
- Use the same process as with tens but using mid-decade numbers.
- Can use hundred chart (No arrows!)
- Begin with adding a two-digit number that is not a multiple of ten to a multiple of ten (e.g., 53 + 20).
- Next, 2 two digit-numbers that do not cross decades (or regrouping).
- Finally, Add 2 two-numbers that requires regrouping.

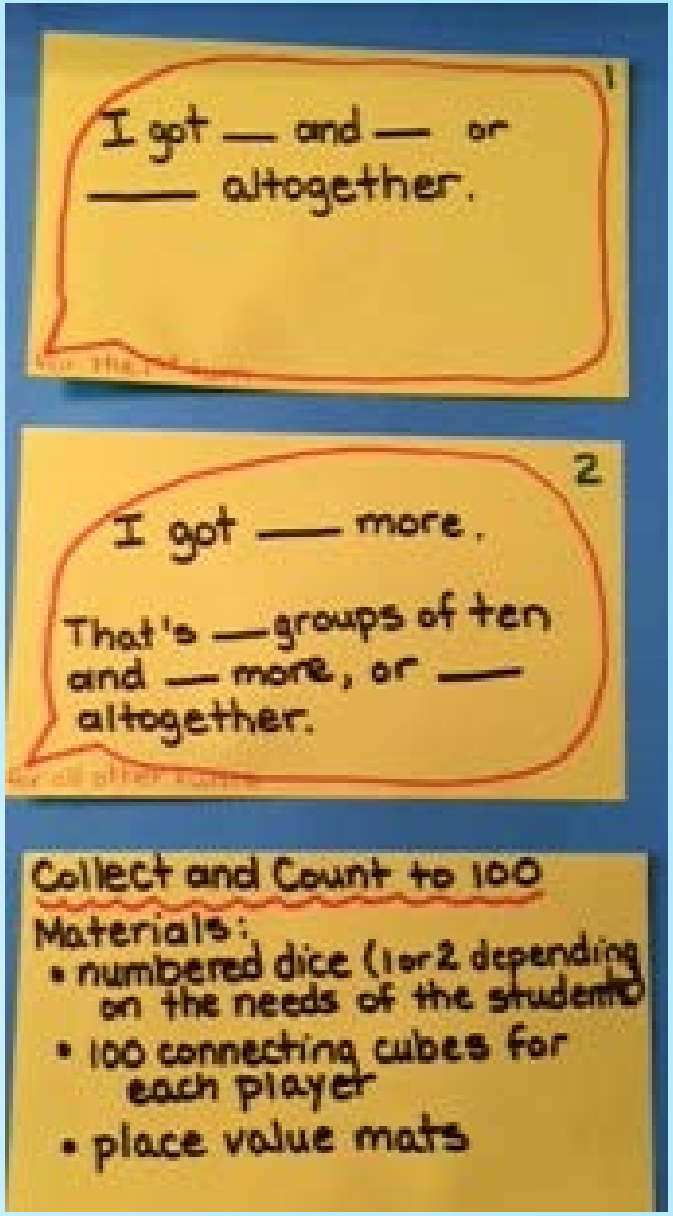


Collect and Count to 100

tens	ones

or

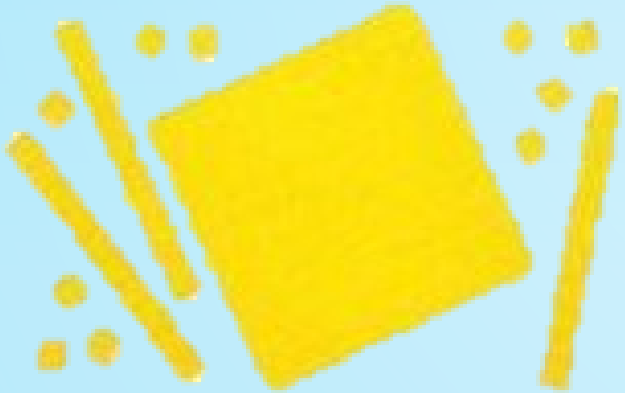


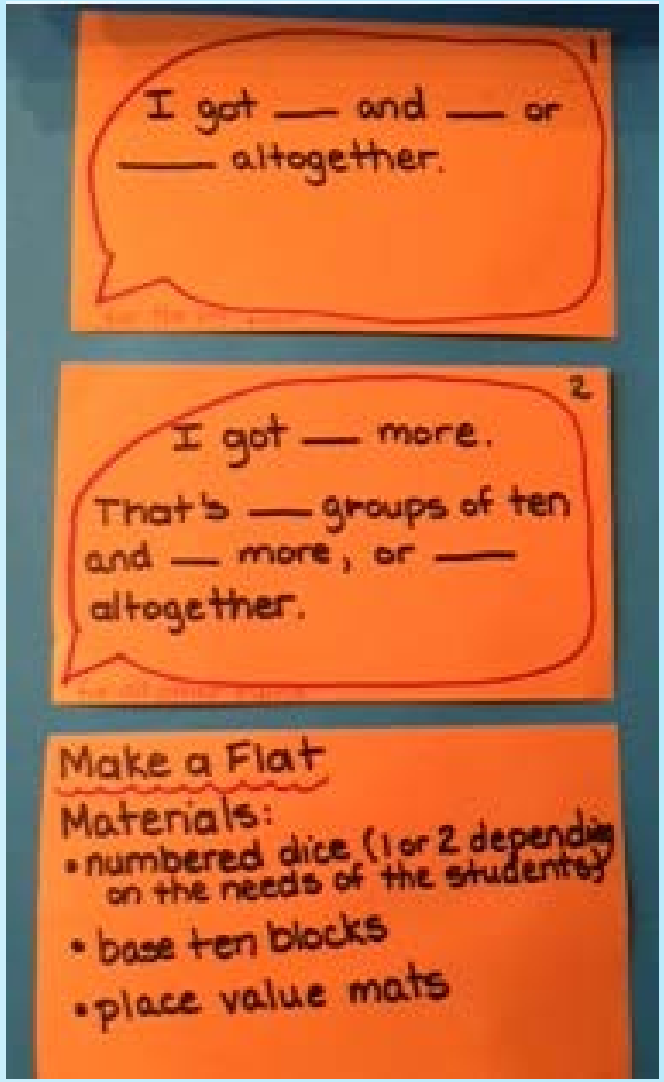


Source: Debbie Diller, *Math Work Stations*

Make a Hundred

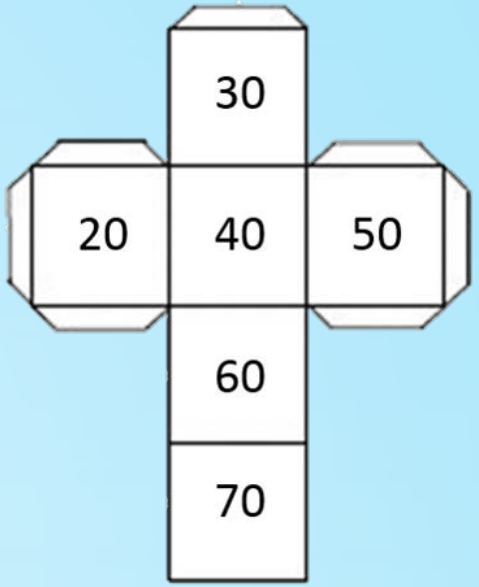
tens	ones

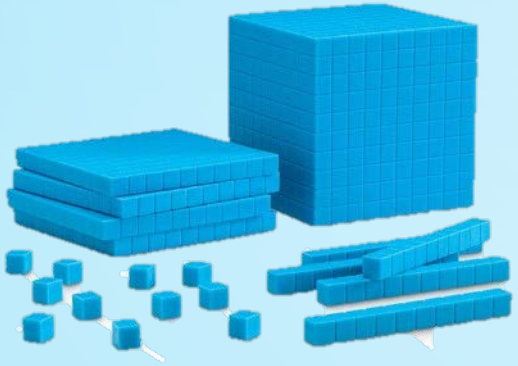


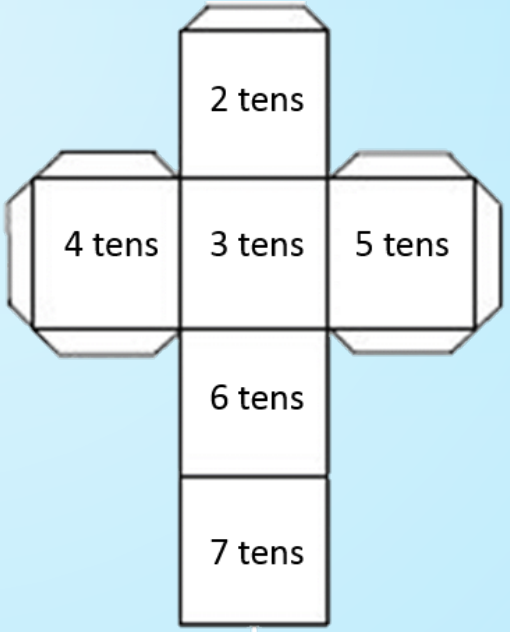


Make a Thousand

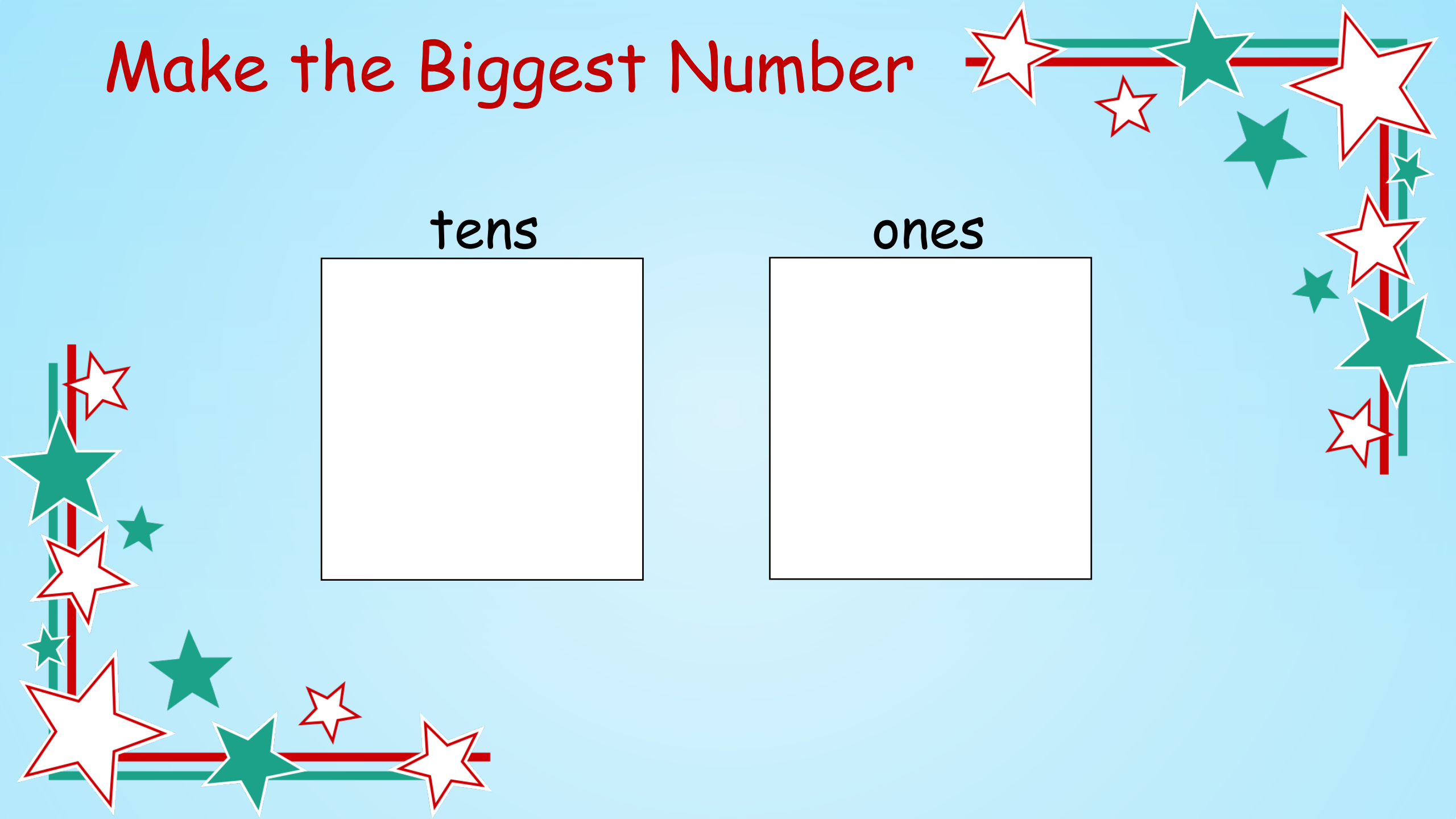
thousands	hundreds	tens	ones







Make the Biggest Number



Combining and Separating Place-Value Parts (No Skip-Counting)

- Mental Math 
- Begin with adding two multiples of ten (20 + 50)
- Next, the first number has tens and ones, and the second number has only tens
  - 26 + 50
- Both numbers have tens and ones but no regrouping
  - 26 + 53
- Both numbers have tens and ones
  - 26 + 58

$$37 + 46$$

Two-Digit Mental Math

Level 1

Peter used 30 blocks to build his tower, and Pam used 20 blocks to build her tower. How many blocks did they use in all?

Level 2

Susan has 41 stickers in her book. Mary has 50 stickers in hers. How many stickers are in the girls' books in all?

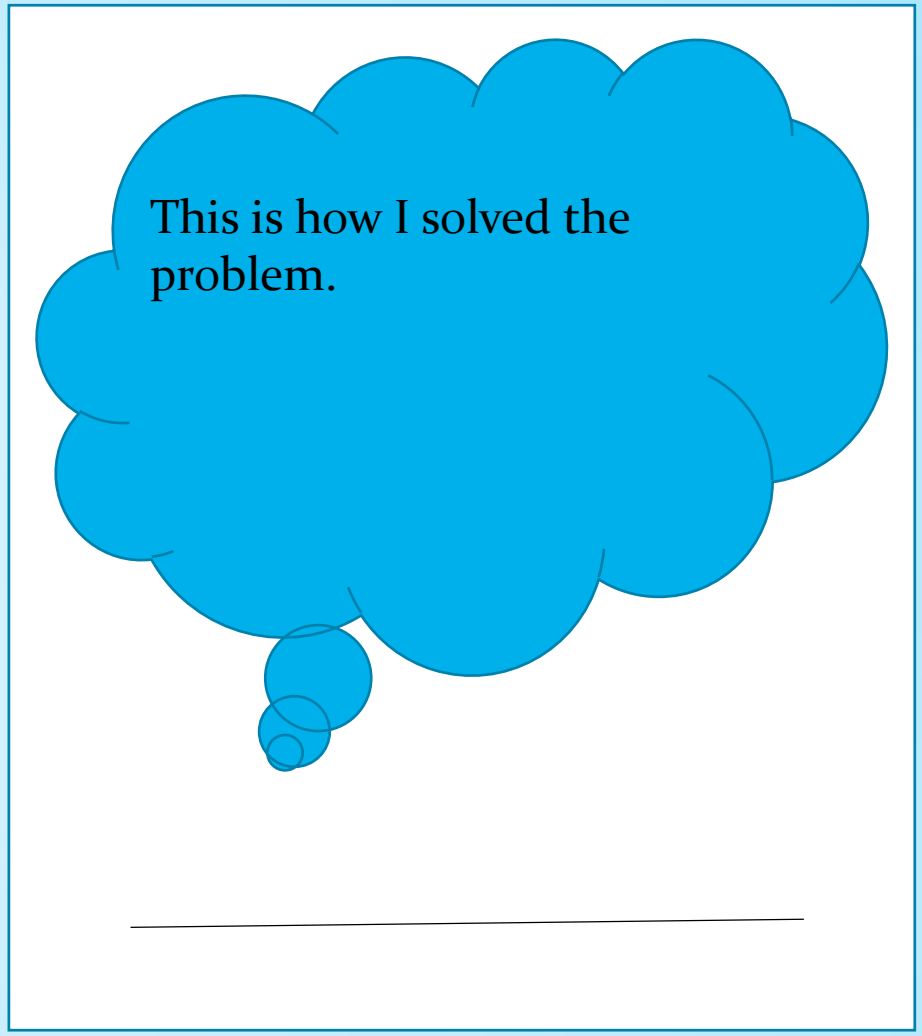
Level 3

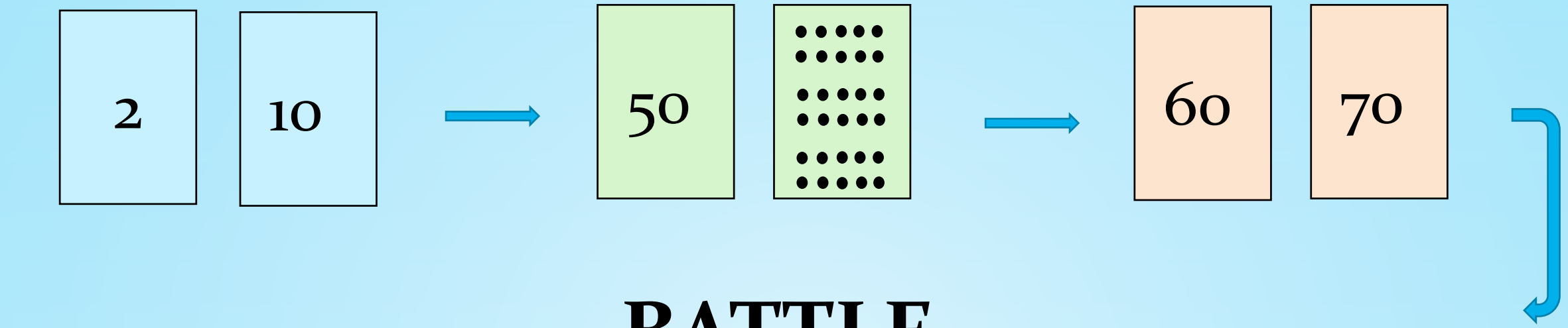
Tommy read to page 56 in his book. There are 13 pages left in the book. How many pages are in the book?

Level 4

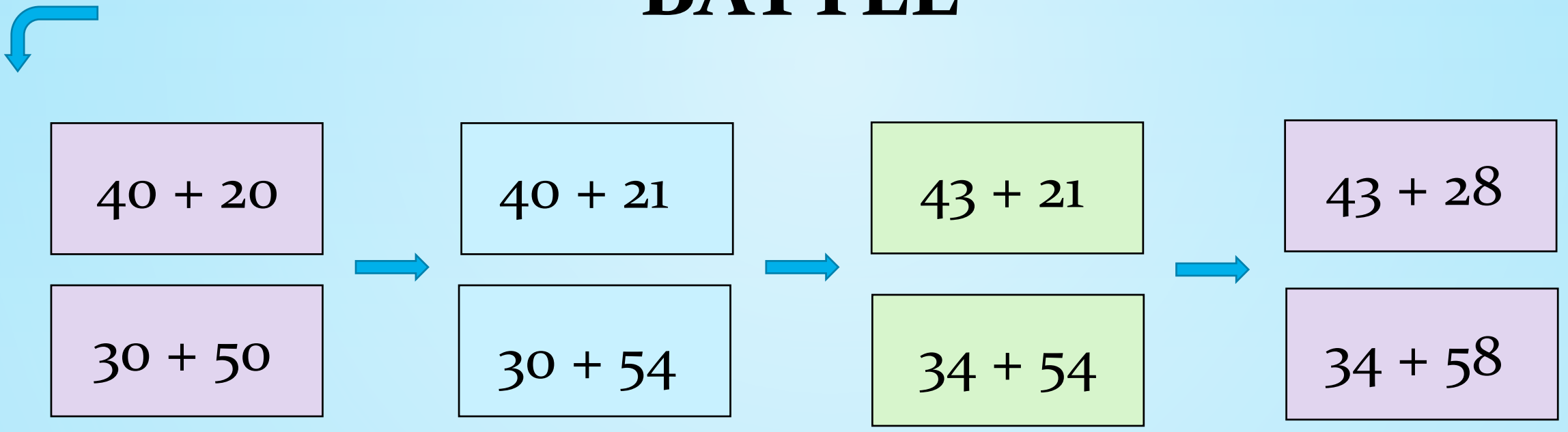
Sam spent 46 dollars at the food store on Monday and 26 dollars at the food store on Tuesday. How much did he spend in all?

Think Sheet





BATTLE



Using Multiples-of-Ten Language

- “Twenty plus thirty equals fifty”
- “As students operate on composites of ten, they maintain the connection between the tens and the ones within the tens.”
- “Numbers expressed in tens language (4 tens) are translated to multiples-of-ten language (forty) before operating on them.” (p. 24)

(2 tens + 4 ones) + (3 tens + 5 ones)

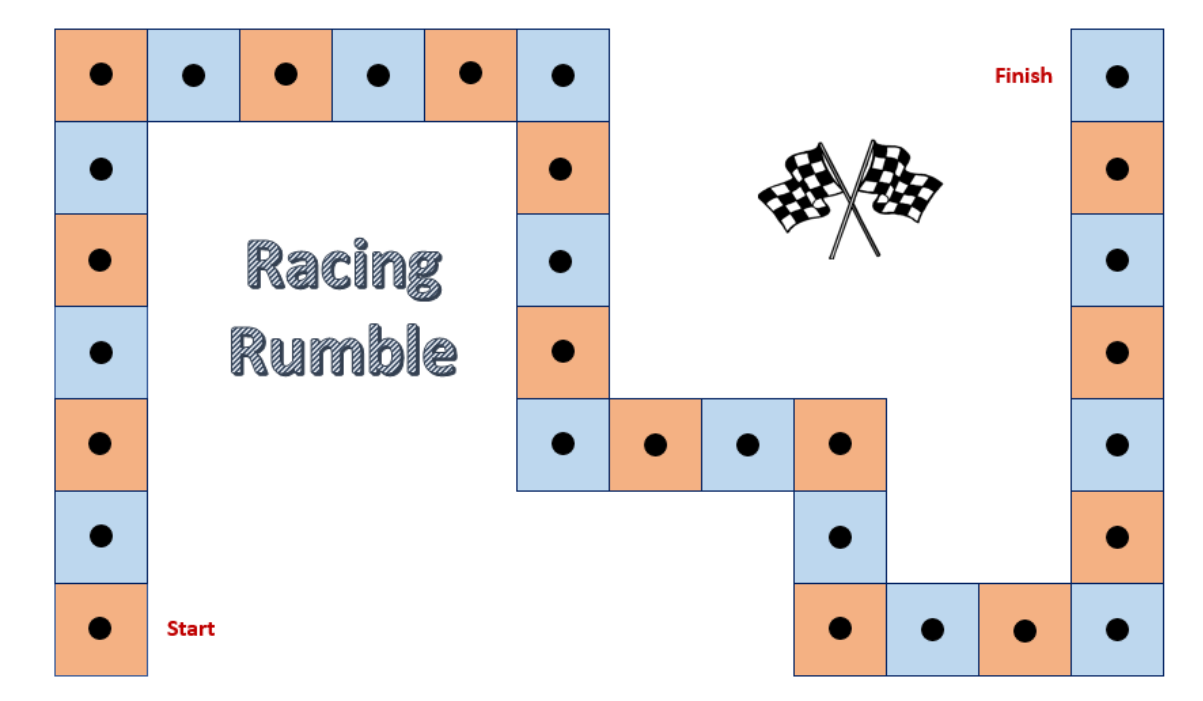
Using Tens Language

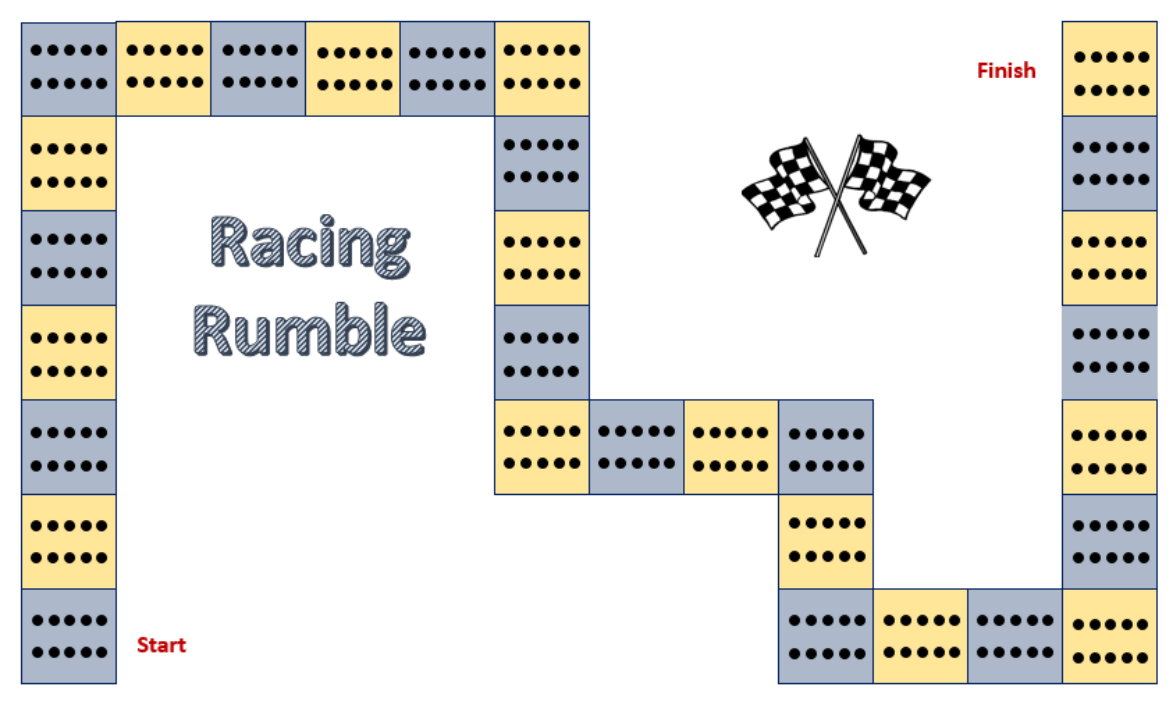
- “2 tens plus 3 tens equals 5 tens”
- Language will progress from “2 groups of one hundred, 5 groups of ten, 4 ones” to “2 hundreds, 5 tens, 4 ones”
- Students at this level know the basic relationships between place values, but they justify these relationships by counting (e.g., “1 hundred equals 10 tens because if you count ten 10 times, you get 100; 10, 20,…, 90, 100”) p. 26

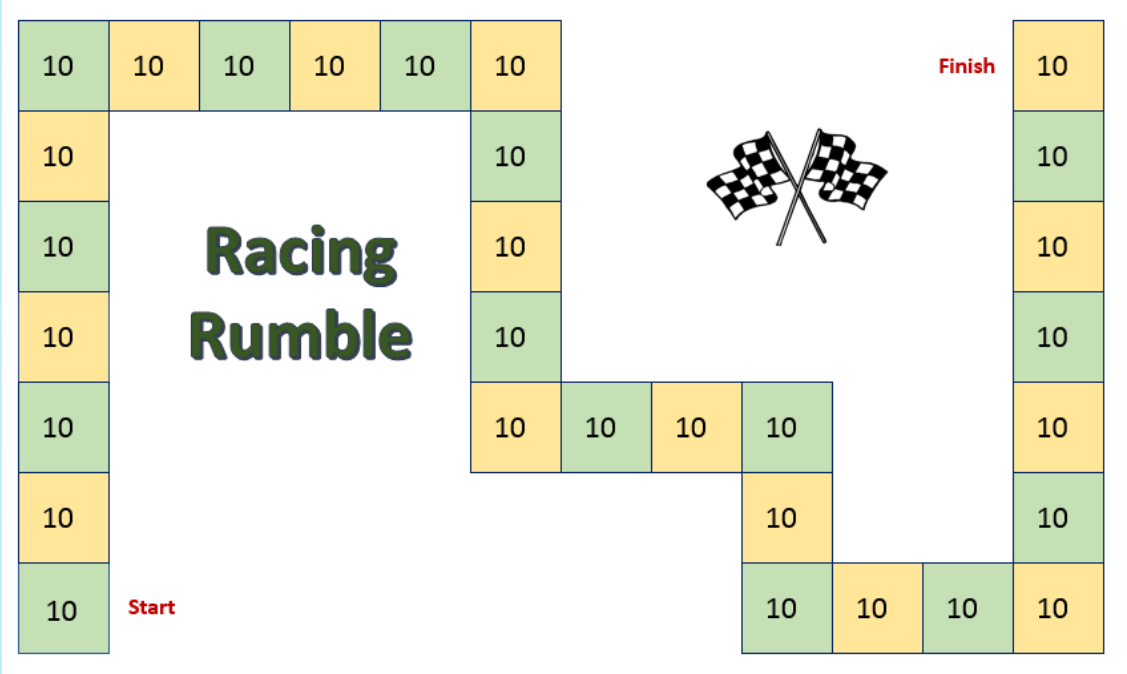
Uses Integrated Language and Strategy Use

- Flexibility between language and strategies
- Can answer the question, “Why do all of these strategies give correct answers?”
- For hundreds, tens, and ones, students understand the relationship between adjacent place values.

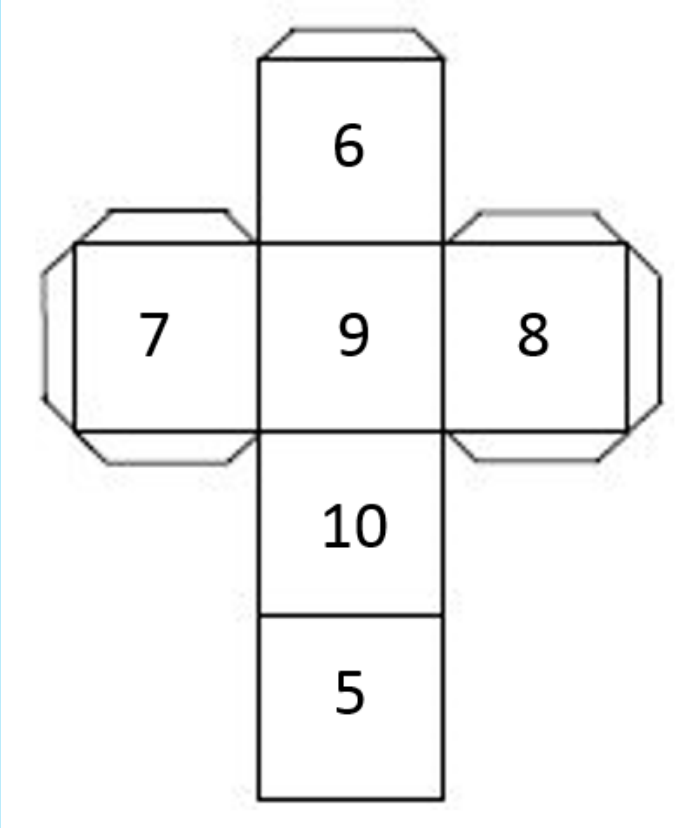
Differentiated Game Boards

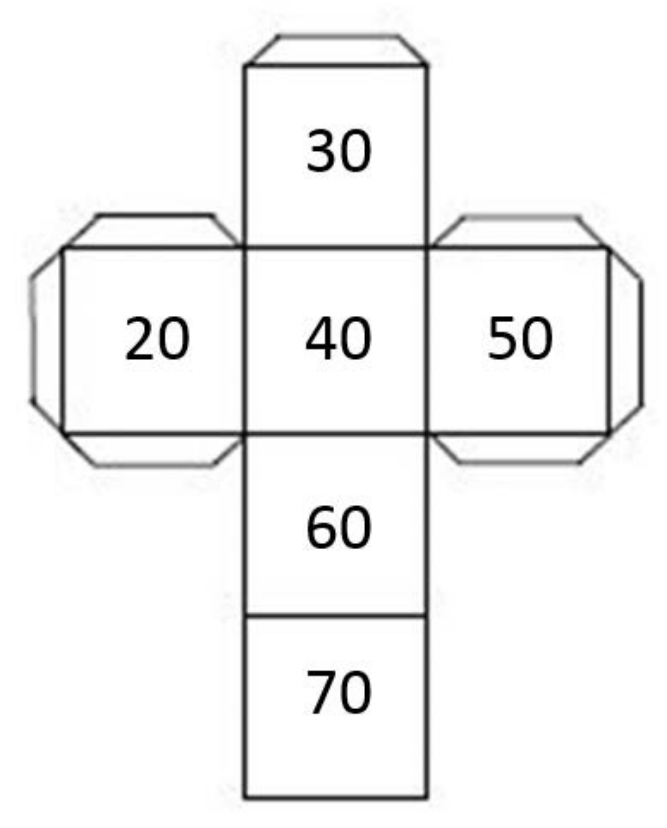


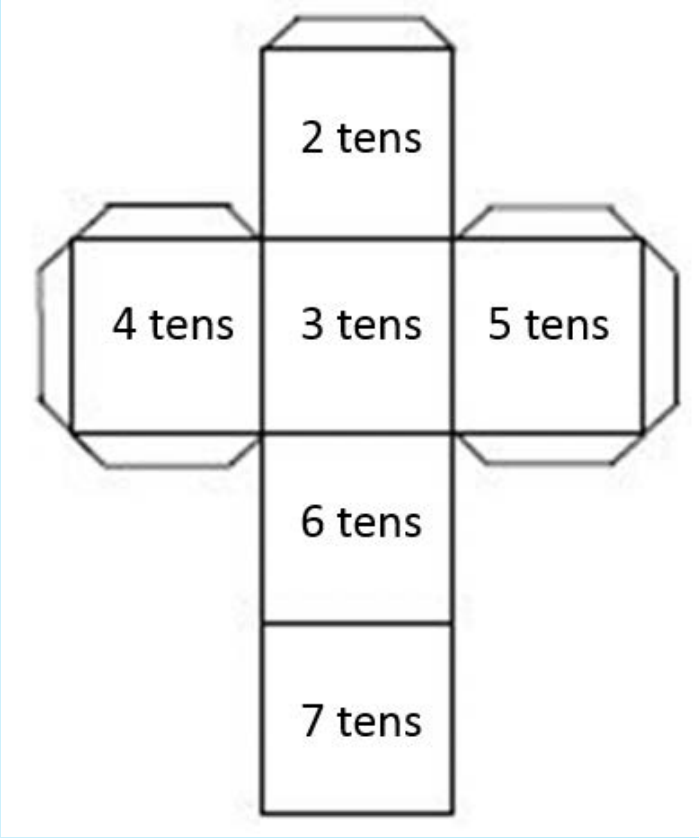




Differentiated Dice







Understands Place Value in Expanded Algorithms

- Numbers are treated in their place-value "expanded" form (35 is "thirty plus five")
- Intermediate operations are shown in their entirety
- "The place-value parts are retained both in words and in symbols." (p. 29)

$$\begin{array}{r} 100 + 30 + 5 \\ +\ 200 + 40 + 1 \\ \hline \end{array}$$

Understands Place Value in Traditional Algorithms

- Students understand numbers as combinations of their place-value parts.
- Students understand and can move flexibly between place-value parts. (e.g., “The 2 in 243 can be thought of as 200 ones, 2 hundreds, or 20 tens.”) p. 34
- Students use language that shows they are decomposing numbers into their place-value parts.
- Students can demonstrate how traditional algorithms correspond step-by-step to expanded algorithms.

"A written algorithm is meant to SHOW how you think, not to TEACH you how to think."

References

- Battista, M. T. (2012). *Cognition-Based Assessment and Teaching of Place Value: Building on Students' Reasoning*. Portsmouth, NH: Heinemann.

- Battista, M. T. (2012). *Cognition-Based Assessment and Teaching of Addition and Subtraction: Building on Students' Reasoning*. Portsmouth, NH: Heinemann.

- National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: National Council of Teachers of Mathematics.