Welcome!

This webinar was pre-recorded on Thursday, October 22. A copy of the FAQs generated during the live presentation may be downloaded at this site.

Please submit any additional questions or comments to mc2@nmsu.edu.

Understanding Tens and Ones

A Conceptual Approach to Number and Operations in Base Ten

Narrator: Megan Kidwell
Developers: MC^2 K-3 Team

Learning Targets

- Compare conceptual place value instruction and conventional place value instruction

- Understand conceptual benchmarks for tens and ones knowledge

- Understand how to assess and develop a student's understanding of tens and ones

Place Value Instruction:
Conceptual   vs.   Conventional

- Quantities are presented and discussed in their full value: 20 as twenty or 2 tens; 21 as twenty-one, or twenty and one.

- Solving tasks essentially involves inquiry or problem-solving.

- Answering tasks might involve using knowledge of the number sequence.

- Numbers may be explicitly presented or discussed in terms of digits: 20 has two in the tens column; 21 has one in the ones column.

- Solving tasks might require following a convention or rehearsing a given procedure.

- Answers are unlikely to relate tasks to the number sequence.

Conceptual Place Value: Phases of Instruction

1st Grade

- **Phase 1: Developing Foundational Knowledge**

- Phase 2: Consolidating Early Strategies

- Phase 3: Refining Strategies and Extending Tasks

2nd Grade

Conceptual Place Value:
Phases of Instruction

1st Grade

- **Phase 1: Developing Foundational Knowledge**

- Phase 2:

- P

2nd Grade

Many students go well beyond first grade without ever developing conceptual understanding of place value

Stages of Tens and Ones Knowledge: Emergent Understanding

- Student does not see a concrete unit of ten (e.g., bundle of sticks) as a significant unit.

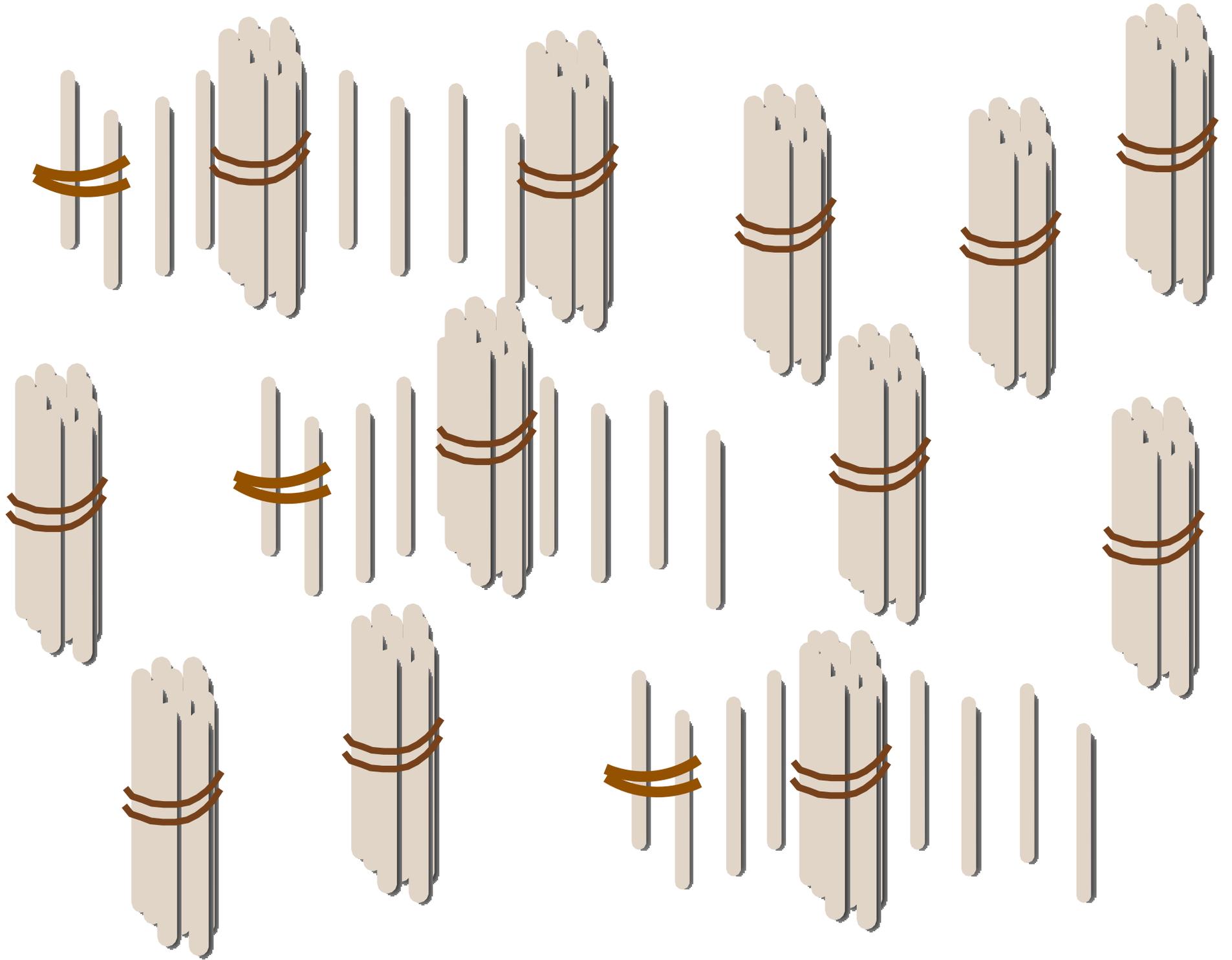- What does this look like?
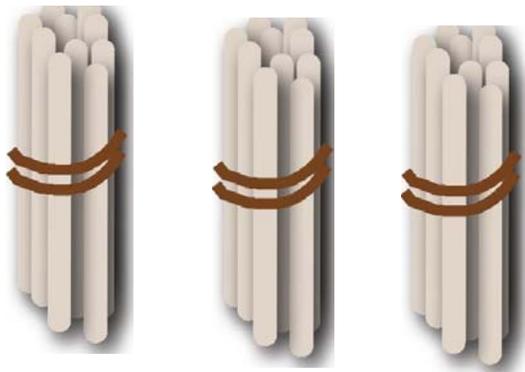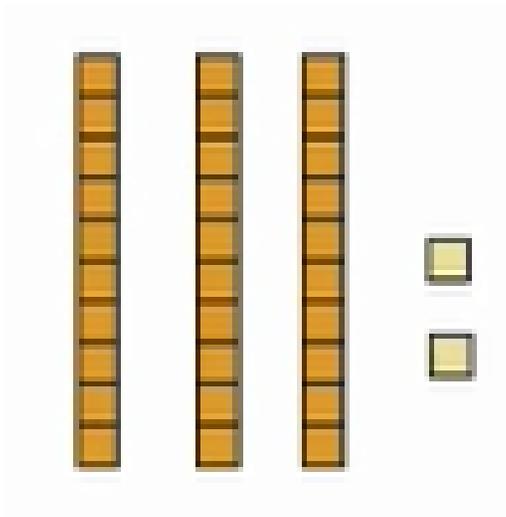
Video

"Get Me 40 Sticks"

Instruction: Developing Foundational Knowledge

When a student does not see a concrete unit of ten (e.g., bundle of sticks) as a significant unit…

> …Construct groups of ten

> …Count groups of ten

Incrementing by tens: counting up by tens

Decrementing by tens: counting down by tens

Stages of Tens and Ones Knowledge: Tens <u>Or</u> Ones Understanding

- Student understands how to count up and back using concrete units of ten (like bundled sticks), but has trouble counting with tens *and* ones when single sticks are introduced

- What does this look like?

Video

10 and 4 → 14 and 10 → 15

Instruction:
Introducing Tens *and* Ones

When a student understands how to work with concrete units of ten (like bundled sticks), but has trouble working with tens *and* ones…

...increment by ten (10,20)

...add a single stick (21)

...help students sort out how many sticks there are

count units of tens **and** single sticks

Instruction:
Developing Tens *and* Ones

When a student understands how to work with tens *and* ones, using visible concrete materials…

…increment and decrement by tens and ones, screening the materials

…students begin to develop habits of reflecting on their strategies

flexibly count concealed tens and ones,
reflect on strategies

flexibly count concealed tens and ones,
reflect on strategies

Instructional Activities to Deepen Conceptual Place Value Understanding

Deepen student understanding by providing many opportunities to work with tens and ones materials, and help students attach numeral meaning to quantity:

Read It, Build It, Check It

Arrow Card Draw Game

Arrow Cards

1 0

2 0

3 0

7 0

4 0

8 0

5 0

9 0

6 0

0 0

1

5

2

6

3

7

4

8

9

0

Arrow Cards

1 0
2 0
3 0
4 0
5 0
6 0

8 0
9 0
0 0

7 4

1
2
3

5
6
7
8
9
0

IA5.3 Read It, Build It, Check It

Intended Learning: To learn the value of each place, to connect quantities and numerals, to read numerals

Instructional Mode: longer, inquiry mode, 1:1 or groups

Materials: One set of arrow cards for each student, up to 10 two-digit number cards, base 10 materials

Description:

Present the student with the numeral 74. *Read this number, please*. Have the student build the number using arrow cards. Have the student compare the numeral card with the numeral formed with the arrow cards. *Are they the same number?* If not, have the student try again with the arrow cards until the numbers are the same. Have the student expand the arrow cards to read each place in order from the largest to the smallest. Point to each arrow card as the child reads the numeral on the card. Prompt the child to read the number cards more quickly until the child becomes aware of the two-digit number name. Have the child build the number using base-ten materials. *Where is the 70? Where is the four?*

Change the arrow card number and the materials so that the new number is 10 more than what we have now. What part changed? Change the arrow cards and materials so the new number is 20 fewer.

Continue bridging the century and beyond through both adding and subtracting collections of tens.

Notes:
• Designed to facilitate conceptual understanding of each place in the numeral
• Helpful in addressing reversals
• Use arrow cards, base ten materials, and the empty number line to show each change, thereby building connections between the different settings

IA5.4 Arrow Card Draw Game

Intended Learning: To learn the value of each place, to connect quantities and numerals, to read numerals

Instructional Mode: Shorter, rehearsal mode for partners

Materials: One set of arrow cards for each group

Description:
Place all tens and ones arrow cards face down on the table. Each student draws one arrow card of each color. Students build the number with the arrow cards. Each student reads his or her number and builds the number with base-ten materials. The student with the largest number gets all the arrow cards from both numbers. The winner is the student with the most arrow cards at the end of the game.

Notes:
- Designed to facilitate conceptual understanding of each place in the numeral
- Designed to link the quantitative and symbolic aspects of number
- Extend the activity by including hundreds arrow cards
- Extend the activity by including thousands arrow cards
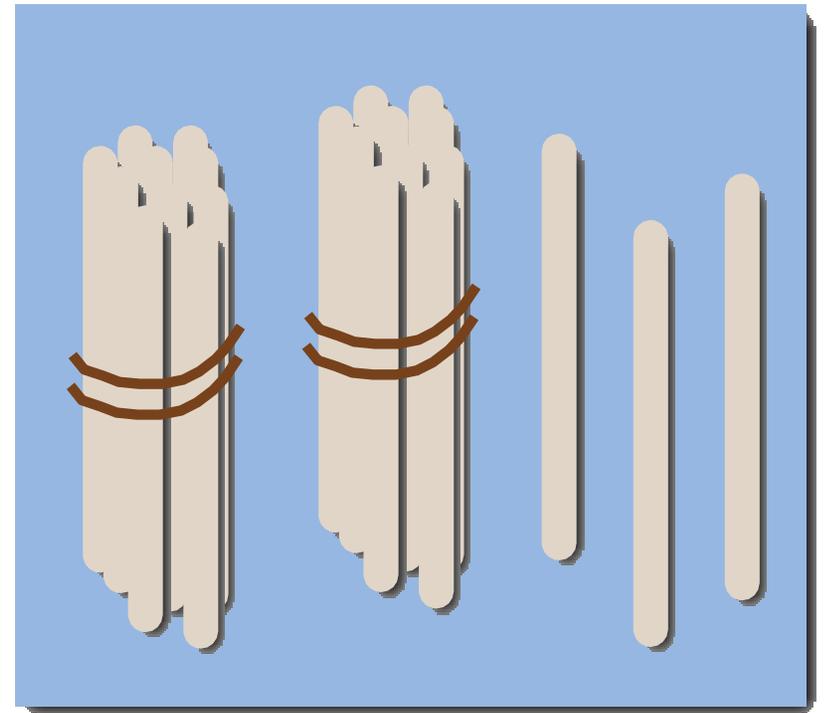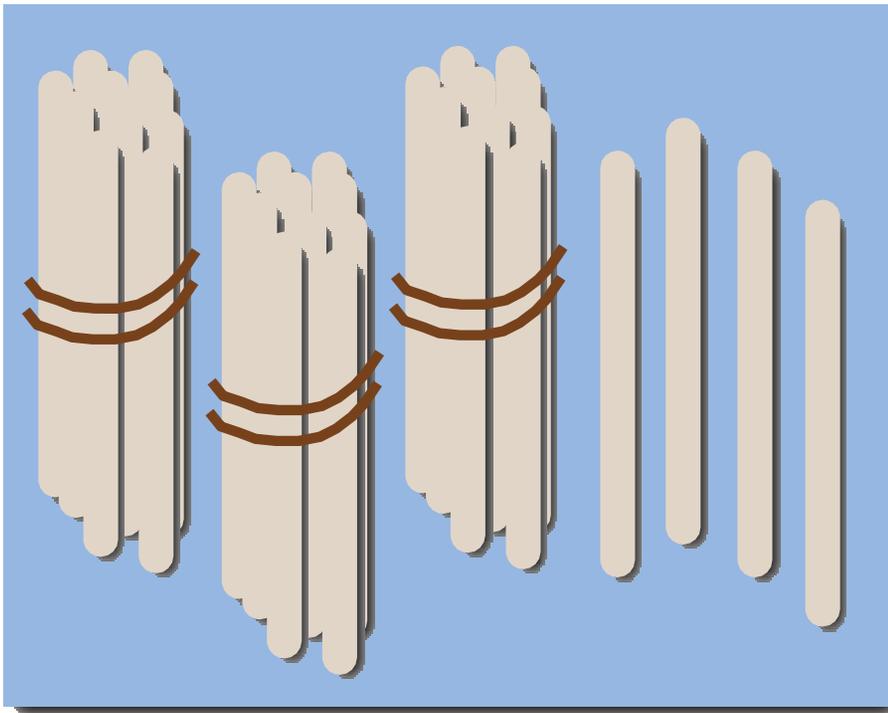
Instructional Activities
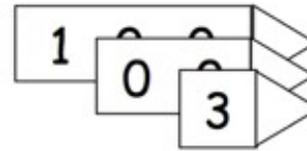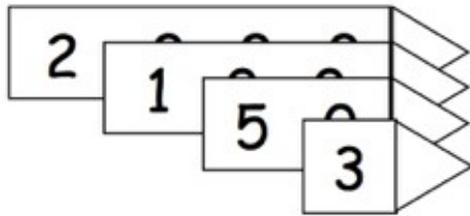
Rules for the Arrow Cards:
1. Arrows all point in the same direction
2. Arrows must stack on top of each other
3. Each digit must be a different color
4. Each card says its name (40 says _forty_, 100 says _one hundred_),
5. Except zero- 0 makes a lip-zip motion instead of saying its name

Number Talks

Tens and Ones:
A Conceptual Approach

How many sticks are there?

1st Grade: Number and Operations in Base Ten   (1.NBT)

2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:
   a) 10 can be thought of as a bundle of ten ones — called a "ten."
   b) The numbers from 11 to 19 are composed of a ten and one, two,three, four, five, six, seven, eight, or nine ones.
   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).

3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.

4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/ or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

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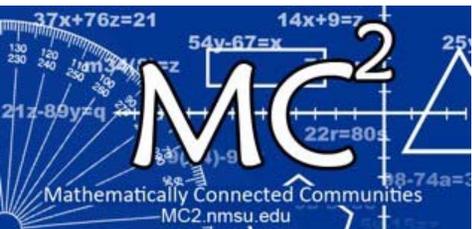# Foundation for
Number and Operations in Base Ten

Emergent:
concept of ten is not yet evident

Developing:
can work with tens, but not tens _and_ ones

Robust:
can flexibly increment and decrement using tens and ones

Coming in December

Early Fluency in Structuring Number
(Grades K-2)

The webinar recording and handouts will be available at the MC² and New Mexico K-3 Plus websites on Wednesday, December 16, 2015.