

# Session 5: Developing Powerful Thinking Around Place Value

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## Goals:

**I can describe how multiplication and measurement division problems support the development of place value ideas.**

**I can develop number talks focused on groups of tens with my partner.**

**I can describe different ranges of strategies that children use to solve addition/subtraction problems.**

**I can use a variety of representations of multi-digit numbers.**

**I can use open number lines and numbers sentences to record and represent children's strategies.**

**K.1.1.2** Read, write, and represent whole numbers from 0 to at least 31. Representations may include numerals, pictures, real objects and picture graphs, spoken words, and manipulatives such as connecting cubes.

**1.1.1.1** Use place value to describe whole numbers between 10 and 100 in terms of tens and ones.

**1.1.1.2** Read, write and represent whole numbers up to 120. Representations may include numerals, addition and subtraction, pictures, tally marks, number lines and manipulatives, such as bundles of sticks and base 10 blocks.

**1.1.1.4** Find a number that is 10 more or 10 less than a given number.

**1.1.2.1** Use words, pictures, objects, length-based models (connecting cubes), numerals and number lines to model and solve addition and subtraction problems in part-part-total, adding to, taking away from and comparing situations.

**1.1.2.2** Compose and decompose numbers up to 12 with an emphasis on making ten.

**1.1.2.3** Recognize the relationship between counting and addition and subtraction. Skip count by 2s, 5s, and 10s.

**2.1.2.3** Estimate sums and differences up to 100.

**2.1.2.4** Use mental strategies and algorithms based on knowledge of place value and equality to add and subtract two-digit numbers. Strategies may include decomposition, expanded notation, and partial sums and differences.

**2.1.2.5** Solve real-world and mathematical addition and subtraction problems involving whole numbers with up to 2 digits.

How do you want your kids to solve each problem?

<https://www.mathreasoninginventory.com/Pdfs/InterviewScreensWholeNumbers.pdf>

1. $1000 - 998$	2. $99 + 17$
3. $100 - 18$	4. $15 + \square = 200$
5. $20 \times 15 = 300$ $21 \times 15 = \square$	6. $60 \times 4$
7. $15 \times 12$	8. $7000 \div 70$
9. Determine the best estimate. $18 \times 21 =$  100   400   700   1000	10. There are 294 students. Each school bus holds 25 students. How many buses are needed to fit all of the students? Figure it out in your head or use paper and pencil.

Candace's Problem (2<sup>nd</sup> Grade)

**Joshua wants 205 cars. He has 36. How many more does he need?**

Predict and show at least three different ways that second grade students might use an open number line to find the answer.

## Using Word Problems to Promote Place Value

**Using Multiplication** (1<sup>st</sup>-grade class, <http://smarturl.it/CM5.1>, 11 minutes, 30 seconds\*)

Gardener Juliet has 6 bean pods. Each pod has 10 bean seeds inside. She also has 2 extra seeds. How many seeds does she have?

**What to look for.** (Counting by ones, counting by tens, direct place value)

**Write your own**

## Using Measurement Division

- C.B.T. <http://smarturl.it/CM6.4>
- D.P.V. <http://smarturl.it/CM6.5>

Ms. Green has 85 markers. If 10 markers fit in a box, how many boxes can Ms. Green fill?

What to look for. (Counting by ones, counting by tens, direct place value)

Write your own

# Developing Number Talks to Move Children to Direct Place Value

## Writing Word Problems

Write word problem then show different ways that children might solve them. Rank the strategies you come up with from least sophisticated to most sophisticated.

**A. Join (result unknown)  $28 + 35 = ?$**

**B. Separate (result unknown)  $75 - 26 = ?$**

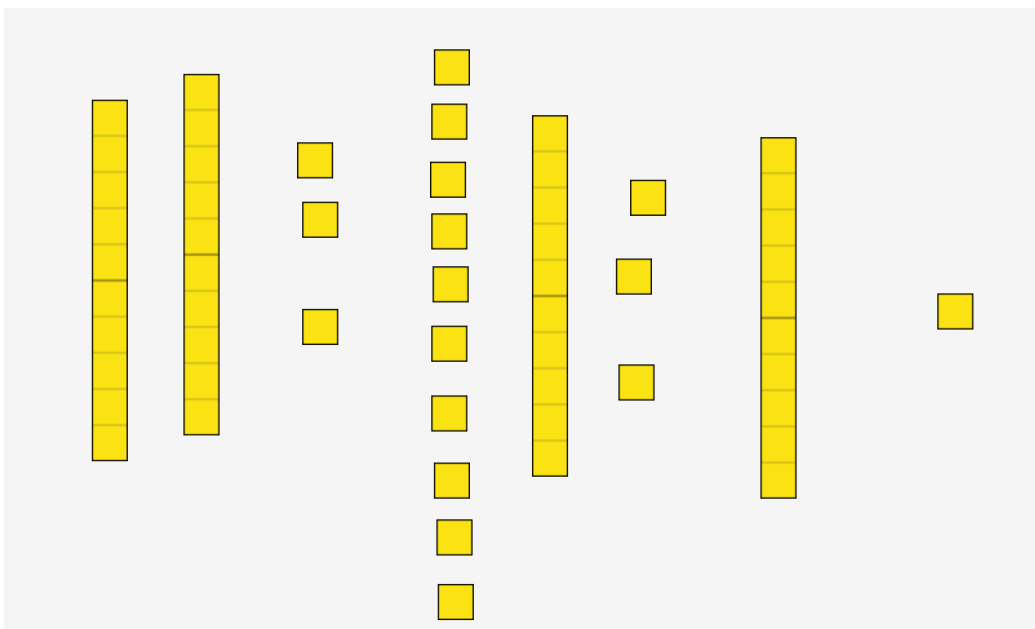


C. Join (change unknown)  $47 + ? = 75$

**D. Compare (change unknown)  $47 + ? = 75$**

## Developing Number Talks around Tens

What do you see? How do you see it? How could you see it differently?



Recording thinking with symbols

Naming multidigit numbers in a variety of ways

**47**

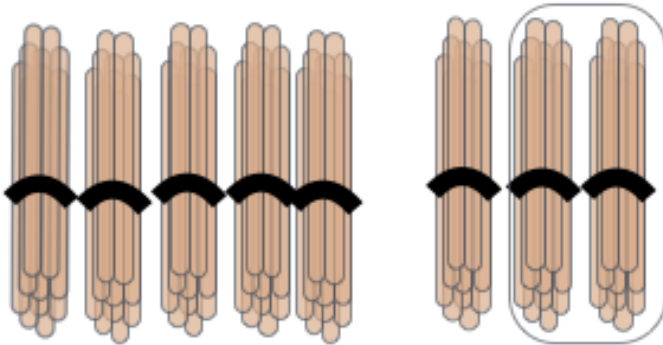
**120**

**734**

## Bundles of Sticks – We are going to use Unifix cubes

How many bundles of ten sticks do you see? How many sticks altogether?

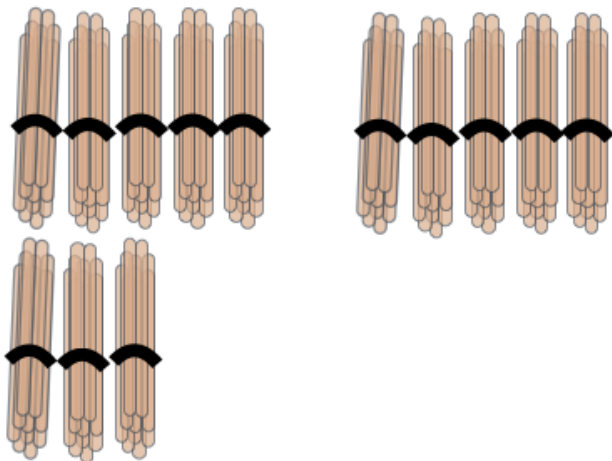
### Math Talk 1a



Begin by showing 1, 2 or 3 bundles. Ask, “How many sticks? How do you see it?” (If students do not mention the number of bundles, ask, “How many bundles of ten sticks do you see?”)

Continue to place down bundles 1 or more at a time until reaching 120, pausing to ask, “How many sticks? How do you see it?”

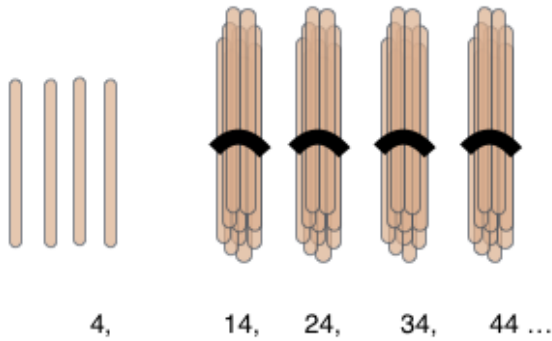
### Math Talk 1b



Remove bundles 1 or more at a time. Each time ask, “How many sticks? How do you see it?” (If students do not mention the number of bundles, ask, “How many bundles of ten sticks do you see?”)

Continue removing bundles 1 or more at a time until reaching 0, pausing to ask, “How many sticks? How do you see it?”

## Math Talk 2a

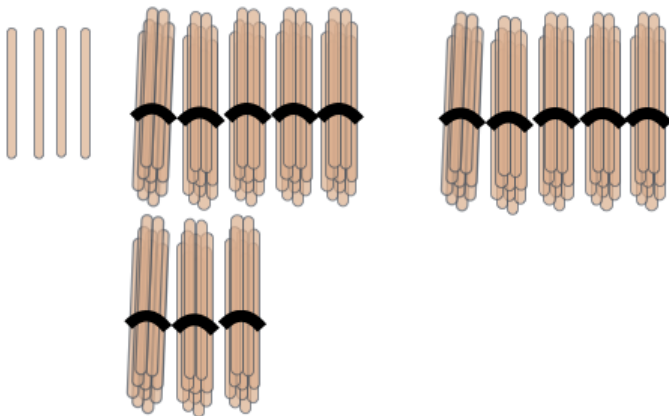


Begin by showing 4 single sticks. After the class identifies the number of sticks, place bundles of 1 or more.

Ask, "How many sticks? How do you see it?" (If students do not mention the number of bundles, ask, "How many bundles of ten sticks do you see?")

Continue to place down bundles 1 or more at a time until crossing 120, pausing to ask, "How many sticks? How do you see it?"

## Math Talk 2b

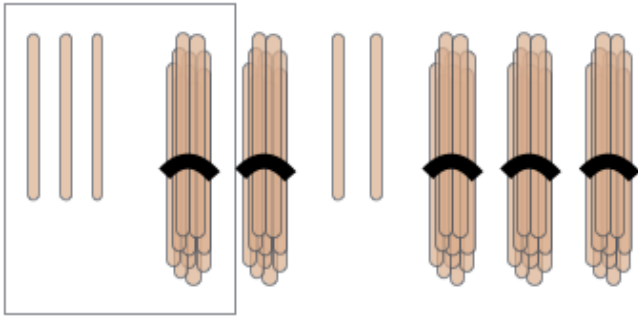


Begin by showing a 4 single sticks and 12 bundles. After the class identifies the number of sticks, remove bundles of 1 or more.

Ask, "How many sticks? How do you see it?" (If students do not mention the number of bundles, ask, "How many bundles of ten sticks do you see?")

Continue to remove bundles 1 or more at a time until reaching 4, pausing to ask, "How many sticks? How do you see it?"

### Math Talk 3a

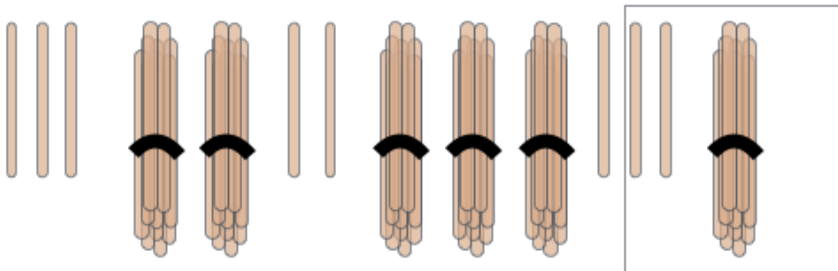


Begin by showing a 3 single sticks and 1 bundle. After the class identifies the number of sticks, place down 1 bundle. Ask, “How many sticks? How do you see it?” Follow by placing down 2 sticks and 1 bundle. Ask, “How many sticks? How do you see it?”

Continue to place down bundles and sticks until crossing over 100, pausing each time to ask, “How many sticks? How do you see it?”

### Math Talk 3b

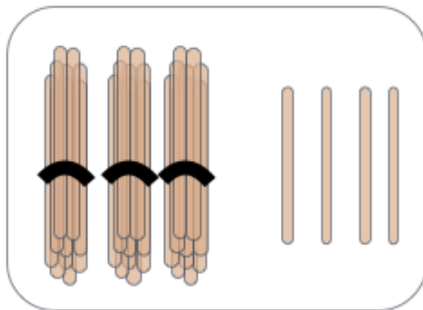
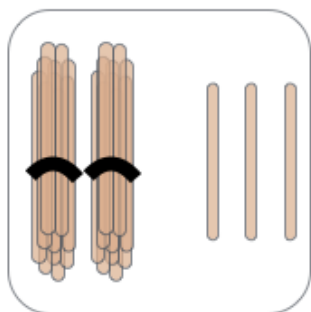
Keep the final display from math Talk 3a



Remove 1 bundle and 2 sticks. Ask, “How many sticks? How do you see it?” Follow by removing 1 stick and 2 bundles. Ask, “How many sticks? How do you see it?”

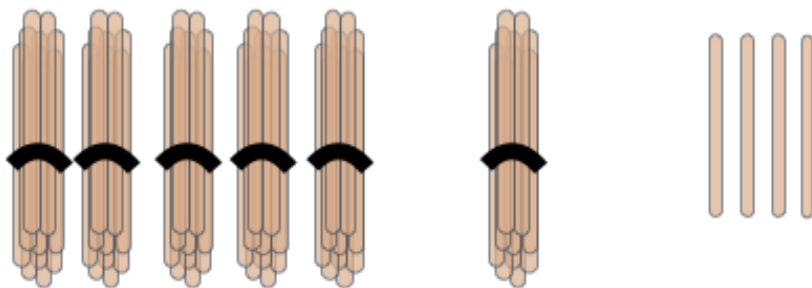
Continue to remove bundles and sticks until reaching 0, pausing each time to ask, “How many sticks? How do you see it?”

## Math Talk 4a



Place down 2 bundles and 3 sticks. Ask, “How many sticks? How do you see it?” Place down 3 bundles and 4 sticks. Ask, “How many sticks? How do you see it?”

## Math Talk 4b



Show 6 bundles and 4 sticks. Ask, “How many sticks? How do you see it?” I want to take away 14 sticks. How can I do it? How many are left?

# Using Base-Ten Blocks



# Number Strings