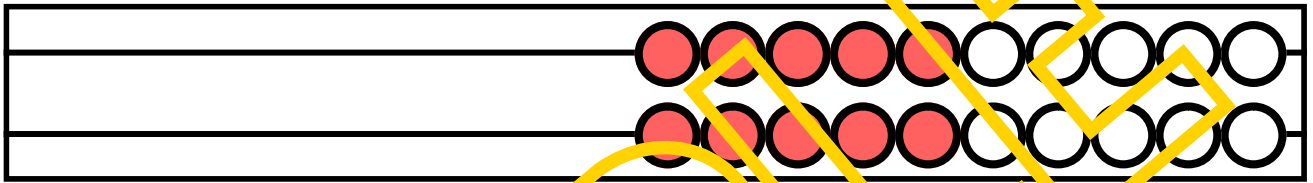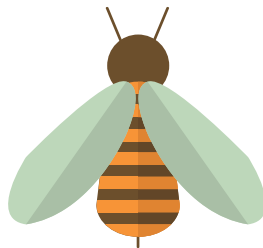# Using the Rekenrek

Cognitive Guided Instruction

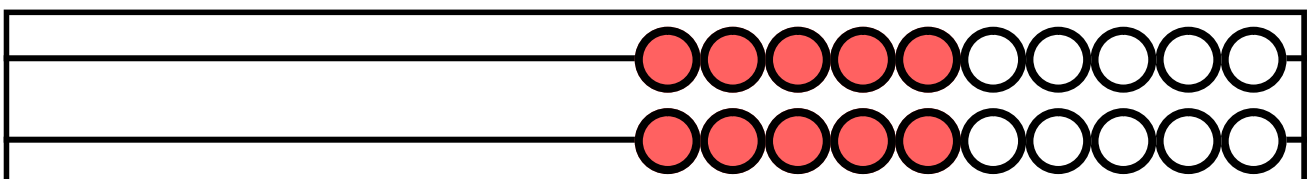# Same questions, different thinking.

Cognitive Guided Instruction allows teachers to understand how fundamental mathematical concepts develop in learners and allows opportunities to build and develop upon their natural understanding of number sense and intuitive ability to solve problems.

It requires careful listening to children, asking intelligent questions and engaging with their thinking to strengthen and deepen understanding.

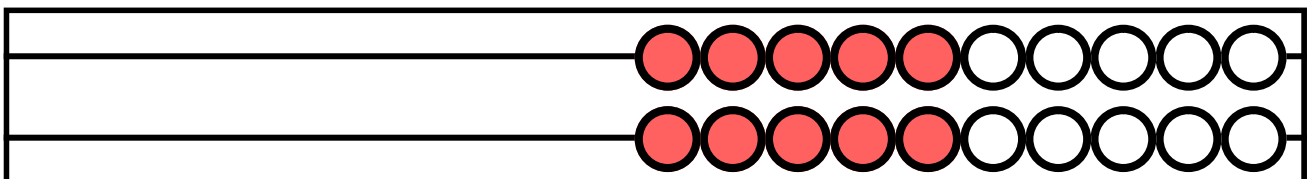**One principle of cognitive guided practice is the idea that there are multiple ways to express any given number relationship. Each requires a different way of thinking. For example:**

Carl has 6 apples. Lynsey gave him 3 more. How many apples does Carl have now?

Initially, this can seem straight forward. Most would show 6 + 3 = 9, 3 + 6 = 9, 9 = 6 + 3 or 9 = 3 + 6. Here the <u>sum</u> is unknown.

Cognitive guided practice takes what seems like a simple idea and applied a different way of thinking to deepen and strengthen mathematical understanding.

- **Carl had some apples. Lynsey gave him 3 more. He now has 9 apples. How many did he have at the beginning?**   The augend is unknown

- **Carl had 6 apples. Lynsey gave him more. Now he has 9 apples. How many did Lynsey give him?**   The addend is unknown

- **Together, Carl and Lynsey have 9 apples. Lynsey has 3 more apples than Carl. How many apples do Carl and Lynsey have each?**   Comparison

Question types

Join Problems
• Join, where the sum is unknown
• Join, where the augend is unknown
• Join, where the comparison is unknown

Separate Problems
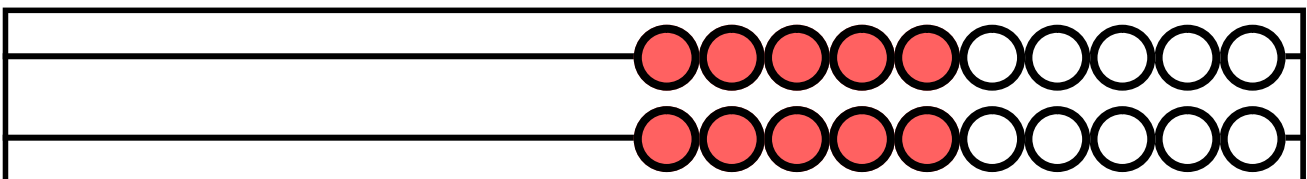• Separate, where the sum is unknown
• Separate, where the augend is unknown
• Separate, where the comparison is unknown

Part-Part-Whole Problems
• Part-Part-Whole, where the whole is unknown
• Part-Part-Whole, where the part is unknown

Compare Problems
• Compare, where the sum is unknown
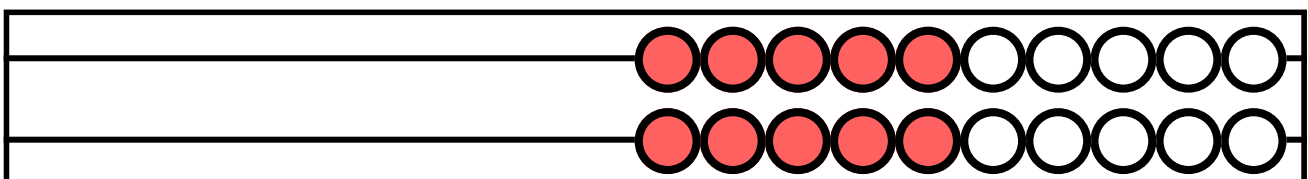• Compare, where the quantity is unknown

Same questions, different thinking.

Each question may be asked in different ways. This document will support teachers and educators in thinking about how questions are designed and asked to develop mathematical thinking.

For example:

? John had 2 marbles. Natalie gave him 1 more. How many marbles does John have?

? John had some marbles. Natalie gave him 1 more marble. He now has 3 marbles all together. How many marbles did John have to begin with?

? John had 2 marbles. How many more does he need to have 3 marbles?

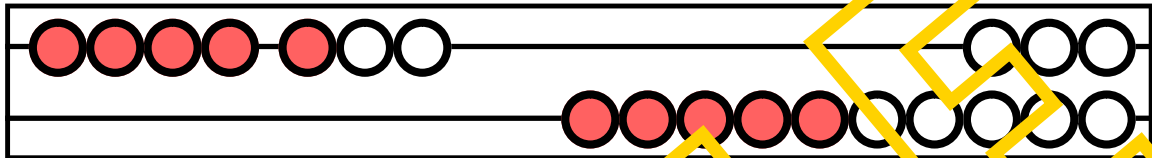Each question may be represented differently using a Rekenrek.

Join problems

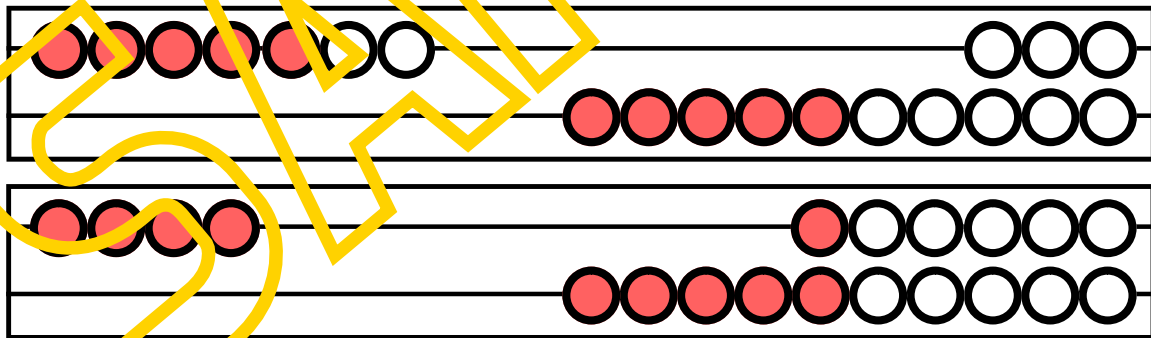**?** John had 4 marbles. Natalie gave him 3 more. How many marbles does John have?

💬 "John had 4 marbles. 1 push 4"
"Natalie gave him 3 more. Add three"
"How many marbles all together?"

? John had some marbles. Natalie gave him 3 more marbles. He now has 7 marbles all together. How many marbles did John have to begin with?
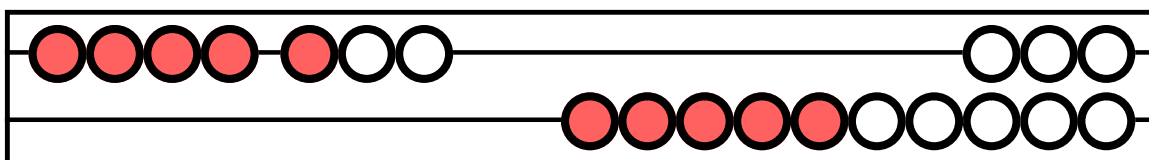
💬 "There are 7 marbles all together. 1 push 7"
"Natalie gave him 3 marbles. Subtract 3 from your 7"
"How many marbles did John have to begin with?"

? John had 4 marbles. How many more does he need to have 7 marbles?

💬 "John has 4 marbles. One push 4"
"How many more does he need to have 7 marbles?"

Join problems
Same question, different thinking

? John had 2 marbles. Natalie gave him 1 more. How many marbles does John have?

? John had some marbles. Natalie gave him 1 more marble. He now has 3 marbles all together. How many marbles did John have to begin with?

? John had 2 marbles. How many more does he need to have 3 marbles?

? John had 3 marbles. Natalie gave him 2 more. How many marbles does John have?

? John had some marbles. Natalie gave him 2 more marbles. He now has 5 marbles all together. How many marbles did John have to begin with?

? John had 3 marbles. How many more does he need to have 5 marbles?

? John had 4 marbles. Natalie gave him 3 more. How many marbles does John have?

? John had some marbles. Natalie gave him 3 more marbles. He now has 7 marbles all together. How many marbles did John have to begin with?

? John had 4 marbles. How many more does he need to have 7 marbles?
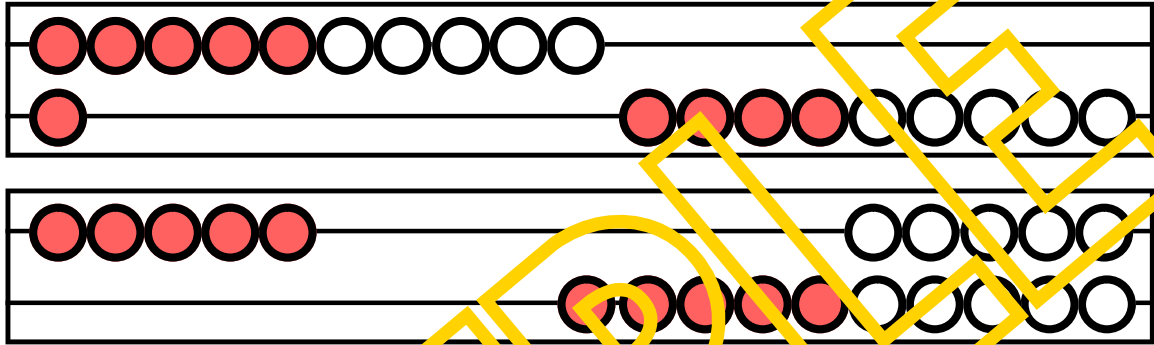
Separating problems

? Susan brought 11 spoons to a picnic. She gave 6 to her teacher. How many does she have left?

... "11 is made from 10 and 1. Show me 1 push 10 on the top row and 1 push 1 on the bottom row"
"Subtract 6 spoons. Take one away from the bottom row and 5 from the top row"

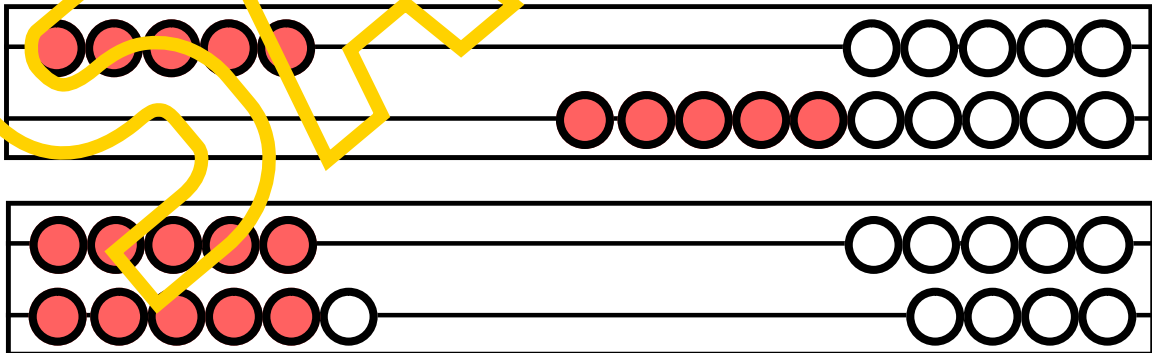**?** Susan had some spoons. She gave 6 to her teacher. She has 5 left. How many spoons did she have to begin with?

... "We know Susan has 5 spoons. 1 push 5"
"We must put the 6 spoons back that the teacher has. On the bottom row, show 1 push 6"

Separating problems

Same question, different thinking

? Susan brought 10 spoons to a picnic. She gave 6 to her teacher. How many does she have left?

? Susan had some spoons. She gave 6 to her teacher. She has 4 left. How many spoons did she have to begin with?

? Susan had 10 spoons. She gave some to her teacher. Now she has 4 left. How many spoons did Susan give to her teacher?

? Susan brought 12 spoons to a picnic. She gave 7 to her teacher. How many does she have left?

? Susan had some spoons. She gave 7 to her teacher. She has 5 left. How many spoons did she have to begin with?

? Susan had 12 spoons. She gave some to her teacher. Now she has 5 left. How many spoons did Susan give to her teacher?

? Susan brought 14 spoons to a picnic. She gave 8 to her teacher. How many does she have left?

? Susan had some spoons. She gave 8 to her teacher. She has 7 left. How many spoons did she have to begin with?

? Susan had 14 spoons. She gave some to her teacher. Now she has 7 left. How many spoons did Susan give to her teacher?

Part-whole problems

? Jenni scored 7 goals. Her friend Lynsey scored 6 goals. How many goals did they score together?

⋯ "Show Jenni's goals on the top row. One push 7.
"Show me Lynsey's goals on the bottom row. One push 6"
"How could you add the totals together?"
- Accept double 6 + 1, 5 + 5 + 3, 10 + 3 or any reasoned strategies.

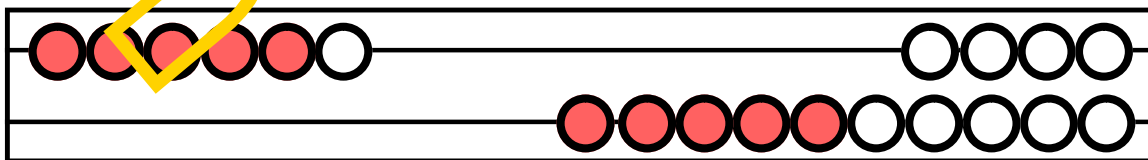**?** Together, Jenni and Lynsey scored 13 goals. Jenni scored 7 of the goals. How many did Lynsey score?

⋯ "Together they scored 13 goals. Show me 13"
"Jenni scored 7 of the goals. Take 7 of the goals away"
"How might you show this using the Rekenrek?"

Part-whole problems

Same question, different thinking

? Jenni scored 3 goals. Her friend Lynsey scored 2 goals. How many goals did they score together?

? Together, Jenni and Lynsey scored 5 goals. Jenni scored 3 of the goals. How many did Lynsey score?

? Jenni scored 4 goals. Her friend Lynsey scored 3 goals. How many goals did they score together?

? Together, Jenni and Lynsey scored 7 goals. Jenni scored 4 of the goals. How many did Lynsey score?

? Jenni scored 5 goals. Her friend Lynsey scored 4 goals. How many goals did they score together?

? Together, Jenni and Lynsey scored 9 goals. Jenni scored 5 of the goals. How many did Lynsey score?

? Jenni scored 6 goals. Her friend Lynsey scored 5 goals. How many goals did they score together?

? Together, Jenni and Lynsey scored 11 goals. Jenni scored 6 of the goals. How many did Lynsey score?
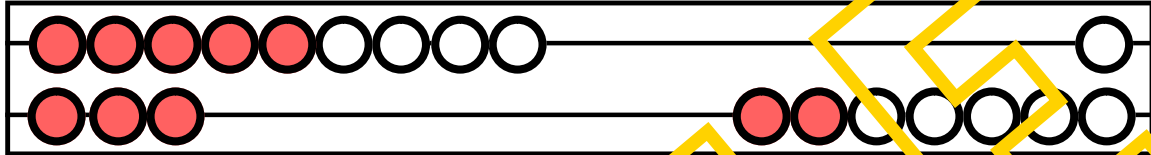
Comparison problems

? Carl has 9 books from the library. John checked out 3 books. How many more books does Carl have than John?
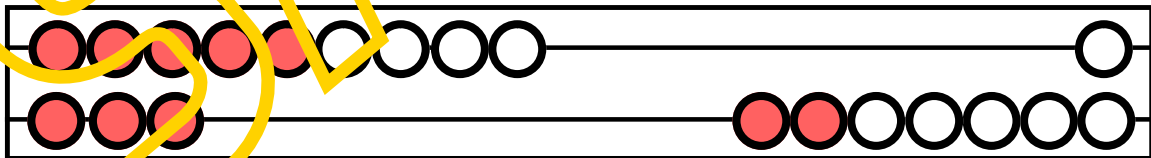
💬 "Carl has 9 books. Show me 9 books on the top row. One push 9"
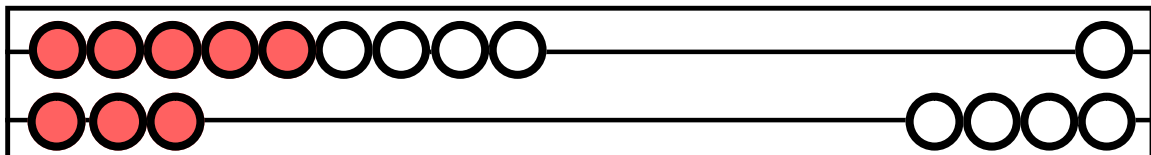"John has 3 books. Show me 3 books on the bottom row. One push 3"

? Carl checked out 9 books from the library. He checked out 6 more books than John. How many books did John check out?

💬 "Show me Carl's books on the top row. One push 9"
"We know Carl has 6 more books than John. On the bottom row, show me the 6 fewer books John has than Carl"

💬 *Or...*
"Show me Carl's 9 books on the top row"
"Show me 6 fewer on the bottom row. This represents John's books"
"How many books did John check out?"

Comparison problems

Same question, different thinking

? Carl has 3 books from the library. John checked out 2 books. How many more books does Carl have than John?

? Carl checked out 3 books from the library. He checked out 1 more book than John. How many books did John check out?

? Carl has 4 books from the library. John checked out 3 books. How many more books does Carl have than John?

? Carl checked out 4 books from the library. He checked out 1 more book than John. How many books did John check out?

? Carl has 5 books from the library. John checked out 3 books. How many more books does Carl have than John?
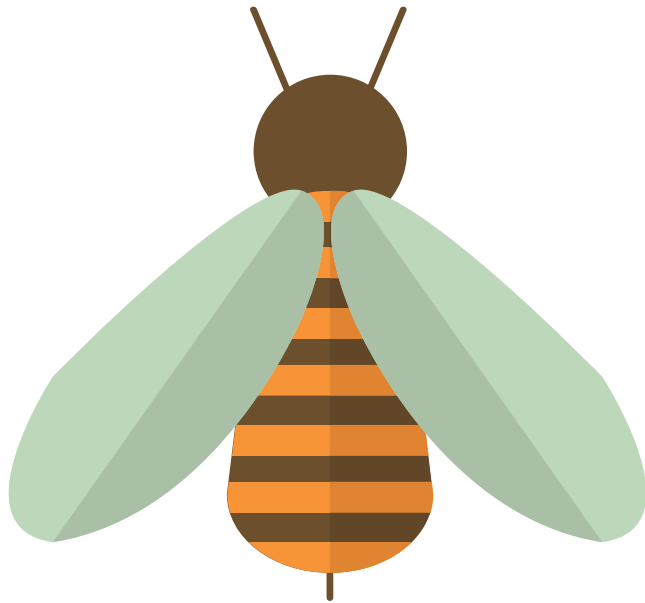
? Carl checked out 5 books from the library. He checked out 2 more book than John. How many books did John check out?

? Carl has 6 books from the library. John checked out 3 books. How many more books does Carl have than John?

? Carl checked out 6 books from the library. He checked out 3 more book than John. How many books did John check out?

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