Number

Patterning and Algebra

Conceptualizing Addition and Subtraction: Solving Problems 2

Foundational

ACTIVITY 28

GRADE 2

FOCUS: Modelling and solving addition problem types (Whole unknown)

ACTIVITY TIME: 45–50 min

GROUP SIZE: Pairs

PROCESSES/COMPETENCIES: Connecting, Reflecting, Reasoning and Proving, Visualizing, Problem Solving, Communicating

Think Board

MATERIALS

- Student Card 28
- Variety of manipulatives: linking cubes, counters, rekenreks
- Multi-Use Card 1: Ten-Frames
- Multi-Use Card 4: Part-Part-Whole Mat
- Master 73: Think Board A
- Master 74: Story Problems 2
- Master 75: Assessment

Also available: (Below grade) *Canada's Oldest Sport* (On grade) *Array's Bakery*; *Marbles, Alleys, Mibs, and Guli!*; *The Great Dogsled Race*

BIG IDEAS

- Quantities and numbers can be added and subtracted to determine how many or how much.
- Numbers tell us how many and how much.
- Numbers are related in many ways.
- Patterns and relations can be represented with symbols, equations, and expressions.

INSTRUCTIONS

Before

Project Master 73 on the whiteboard. Have students turn to an elbow partner and discuss how they would solve the problem. Under My Picture, invite a volunteer to draw a picture that shows one way to solve the problem. Have students who solved it a different way model their strategies. Together, write a number sentence to represent the problem.

What to Do (15–20 min): Use Student Card 28

Note: Give each pair a story problem (Master 74). Have linking cubes, counters, rekenreks, ten-frames, and part-part-whole mats available.

- Read the story problem. Talk about what is happening in the problem.
- Work together to solve the problem. Use any materials you want to help.
- Show how you solved the problem by drawing a picture on the Think Board. Write a number sentence. Talk about the strategies you used.

How to Differentiate

Accommodations: Choose the problem with smaller numbers. Instead of drawing pictures, have students use counters and ten-frames.

Extension: Students create and solve a problem with different numbers.

Combined Grades Extension: Students create and solve a problem with three-digit numbers or a problem that involves more than two numbers.

CONSOLIDATION

- Have students who worked with a particular problem post their Think Boards. Ask: "What do you notice about the pictures? Did everyone solve the problem the same way? Did everyone write the same number sentence?" Select volunteers to explain and model a variety of strategies that were used to solve the problem. Help students understand that there are many different ways to solve a problem and, when used correctly, all ways will give the right answer.

Highlight for Students

- We can use a Think Board to show others how we solved a problem and to explain our thinking.
- Many different strategies can be used to solve the same story problem.

WHAT TO LOOK FOR

- How do students solve the problem (e.g., counting three times, counting on, using mental math)?
- How do students represent the problem (concretely, pictorially, symbolically)?
- Can students use the information in the problem to write a number sentence?
- Can students represent their thinking on the Think Board or do they struggle to move from concrete to pictorial?

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PROBING QUESTIONS

- How did you solve the problem?
- Did you use addition or subtraction to solve the problem? Why?
- How does your picture show what you did?
- Why did you write that number sentence?

Number

Helping Students to Progress

What You Might See/Hear and Next Steps

Formative Assessment

ACTIVITY 28 | GRADE 2

Conceptual Understanding of Story Problems Behaviours/Strategies

1 Student reads story problem, but is unable to model add-to situations with concrete materials.

"I don't know what to do."

Next Step

Work with student to act out a similar problem with smaller numbers (e.g., 8 ribbons and 3 more) or draw pictures to show the problem. Then work toward modelling the problem with counters. Or use **Intervention Activity 12: Solving Story Problems**.

2 Student models and solves addition problems, but cannot use symbols and equations to represent the problems.

Next Step

Talk about the action in the problem and whether there will be more or fewer objects in the end. Use a part-part-whole mat. Help student see that when both parts are known, addition can be used to find the whole. Together, write the number sentence (e.g., 25 + 11 = ?).

3 Student models and solves addition problems and writes addition sentences, but struggles to represent thinking.

"25 + 11 = ?" or "25 + 11 = 36"
"What do I draw?"

Next Step

Have student draw a picture to show each set of counters. Ask, "How can you show your answer using these pictures?" Student could circle all counters to show that all were counted. Encourage him or her to add numbers to show the strategy used.

4 Student successfully models and solves addition problem types, uses symbols and equations to represent the problems, and represents thinking on the Think Board.

Next Step

Have student create and solve a similar problem with different numbers of objects.

Addition Computational Behaviours/Strategies

1 Student counts three times to add quantities. The answer may not be accurate.

"1, 2, 3, ..., 23, 24, 25" "1, 2, 3, ..., 9, 10, 11"
"1, 2, 3, ..., 34, 35, 36"

Next Step

After student counts the first set, cover the counters with a piece of paper that shows the number of counters hidden. Have student count on from that number.

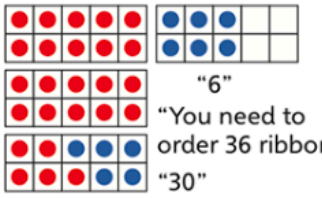
2 Student counts on to add quantities.

"26, 27, 28, ..., 34, 35, 36"

Next Step

Use ten-frames to model filling the third ten-frame to make 30 or subitizing the number of counters left over ("make 10" strategy). This will lead to more efficient counting.

3 Student counts efficiently to add quantities (e.g., makes 10, subitizes).



"6"
"You need to order 36 ribbons."
"30"

Next Step

Encourage mental math. Ask: "How many tens and leftover ones are in 11? What is 10 more than 25? What is 1 more than that?"

4 Student uses mental strategies flexibly and accurately to add quantities.

"25 + 10 = 35, and 35 + 1 = 36"

Next Step

Have student create a new problem with three-digit numbers or a problem that involves more than two numbers.

These student behaviours and strategies illustrate a progression of some of the most common misconceptions, partial concepts, and strategies students may display while learning about modelling and solving addition problem types (Whole unknown), culminating with a deep understanding of the concept(s).

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