re(Solve) MATHS BY INQUIRY Partitioning

Y1

Summary of learning goals

- To explore the concept of equivalence. The equals sign is presented as a symbol indicating balanced value on both sides of an equation. Students explore equivalence by partitioning numbers into two parts.
- Opportunities to explore the commutative property and compensation also arise throughout the tasks as students work systematically to find all possible combinations.

Australian Curriculum: Mathematics (Year 1)

ACMNA015: Represent and solve simple addition and subtraction problems, using a range of strategies including counting on, partitioning and rearranging parts.

Summary of lessons

Who is this sequence for?

- Students towards the start of Year 1 who have one-to-one correspondence skills in counting and are developing a deeper sense of number.
- Students who are likely to use concrete materials to model the addition of numbers and use count all or count on strategies to find the total in a given collection.
- Students who are familiar with recording equations using symbols, including the use of the equals sign to indicate equivalent values on both sides of an equation.
- Students who would benefit from having some experience in making generalised statements about the structure of number and operations.

Lesson 1: Red Apples, Green Apples

Students explore the different ways that numbers can be partitioned into two parts. Working systematically, students are asked to find the partitions and show that they have all possibilities. This task affords an exploration of early algebraic thinking and scaffolds students towards seeing a pattern and making a generalisation regarding all possible combinations.

Lesson 2: 12 Ways to Get to 11

This task uses the picture book *12 Ways to Get to 11* to investigate how many two-number partitions are possible for any given number. Students apply their learning from Lesson 1: Red Apples, Green Apples to list all the ways that 11 can be made using two numbers. They then look at the number of possible partitions that can be made from some other numbers. Students investigate the fact that for any given number the possible combinations will be always one more than the number itself, and explain why this is the case.

reSolve: Mathematics by Inquiry is funded by the Australian Government and is managed by the Australian Academy of Science.

Australian Academy of Science

Reflection on this sequence

Rationale

Algebraic thinking requires a generalised understanding of the structure of our number system and operations. Understanding arithmetic through generalised algebra means moving from a search for answers to an exploration of relationships in number. One of the central algebraic relationships that students need to understand is that of equivalence and the meaning of the equals sign. This resource focuses on building students' understanding of equivalence through exploring the part–part–whole structure of numbers. Being able to recognise and rename numbers according to the smaller parts they comprise supports efficient addition and subtraction. Examples of this include:

- Near doubles: 8 can be thought of as 7 and 1.
  $8 + 7 = 7 + (7 + 1) = (7 + 7) + 1$
- Bridge to 10: 7 can be made into 5 and 2.
  $8 + 7 = 8 + (2 + 5) = (8 + 2) + 5$

reSolve mathematics is purposeful

- This task uses a context familiar to students to generalise an important algebraic understanding. The concept of equivalence is explored as students show they have found all the ways in which 10 can be partitioned into two smaller parts. They then see that the same method can be applied to all numbers. This develops an understanding of equivalence and part–part–whole that is foundational for students' additive thinking, specifically strategies for computation.
- Problem-solving skills, such as working systematically and looking for patterns, are also developed.

reSolve tasks are inclusive and challenging

- All students are provided with a common experience at the start of the task as they participate in a counter toss to generate some possible combinations. Students can continue to use counters to enable further exploration, or they can move to abstract thinking as they consider other possible values that are yet to be found. The challenge of the sequence lies in students justifying that they have found all possible combinations and then progressing towards a generalisation as to how many possible two-part partitions exist for any number.
- The use of 10 as a total is not central to this task. Access can be provided for some students via a smaller starting total, which still allows students to contribute to the class knowledge of how any number can be partitioned into smaller parts.

reSolve classrooms have a knowledge-building culture

- This sequence works to provide students with an emerging generalised understanding of algebra through the exploration of equivalence and partitioning.
- Classroom discussions provide a central part of this sequence. Through mathematical conversation and explorations, students build on their current understandings and are challenged by the contributions of others.

Acknowledgements

Merriam, E. & Karlin, B. (1996). *12 Ways to Get to 11*. Aladdin Paperbacks: New York.