re(Solve) MATHS BY INQUIRY How Many Birds?

Y1

Summary of learning goals

- To build students' ability to unitise a group using skip counting strategies. For example, when skip counting by 5s, students shift from seeing five individual ones to seeing one group of five.

Australian Curriculum: Mathematics (Year 1)

ACMNA012: Develop confidence with number sequences to and from 100 by ones, from any starting point. Skip count by 2s, 5s and 10s, starting from zero.

Summary of lessons

Who is this sequence for?

- Students should be beginning to apply skip counting sequences when counting a collection of objects. They should have well-developed counting skills with one-to-one correspondence.
- Students should be able to count large collections (greater than 50) by 1s with accuracy and be familiar with reciting skip counting sequences, including 2s and 5s.
- Students should also have an understanding of sharing fairly, and creating and recognising equal groups.

Lesson 1: How Many Birds?

Students are presented with a picture of a large number of birds sitting on telegraph wires. They use their own strategies to work out how many birds are in the picture. Students are then encouraged to consider efficient counting strategies and to re-count the collection by grouping birds and using skip counting strategies.

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

Reflection on this sequence

Rationale

Multiplicative thinking is the ability to think about, compare and work flexibly with multiplicative relationships. Due to its complexity, multiplicative thinking is developed through mathematical reasoning over an extended period. One important understanding on the path to multiplicative thinking is that of *unitising*. Unitising describes the cognitive process of recognising a group as a unit. For example, students recognise that five ones can be seen as a group; that is, one group of five. When students are able to view a large collection in terms of unitised chunks, the counting process is simplified. Although skip counting is an additive process of repeatedly adding equal-sized groups together, it introduces the idea that a group can be used as a unit.

The value of unitising extends beyond just counting. Understanding a unitised group is essential for students to fully understand place value, where 10 ones are regrouped as one group of 10, 10 tens are regrouped as 1 hundred and so on. Unitising is essential for working fluently with multiplication when students learn that the unitised group can be multiplied by the number of groups to give the total in a collection.

reSolve mathematics is purposeful

- This task focuses on the substantial mathematical idea of unitising to skip count a large collection.
- Skip counting is a skill used beyond the mathematics classroom; it is regularly used in everyday life.

reSolve tasks are inclusive and challenging

- This task activates students' prior knowledge of equal groups and counting sequences, extending this to skip counting a collection.
- Students are challenged to look beyond just skip counting by a familiar number, to exploring the picture and deciding the skip count group based on the arrangement of the objects in the picture.

reSolve classrooms have a knowledge-building culture

- It is anticipated that students will initially count in ones, which will make it difficult to keep track of the count and create a high chance of error. Seeing the variation of answers across the class motivates students to re-count and come to consensus.

LESSON 1

reSolve MATHS BY INQUIRY How Many Birds?

How Many Birds?

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About this lesson

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Mathematical purpose

- To build students' ability to unitise a group, using skip counting strategies.

Learning intention

- To think about the best way to count a large group of things.

Time

A lesson of approximately 1 hour.

Vocabulary

- efficient
- skip counting

Resources

- reSolve PDF *1a How Many Birds? Picture* (for display or A3 size or larger printout)
- reSolve PDF 1a *How Many Birds? Picture* (one per student, A4 size)
- reSolve PDF *1b Music Notes* (one per student)

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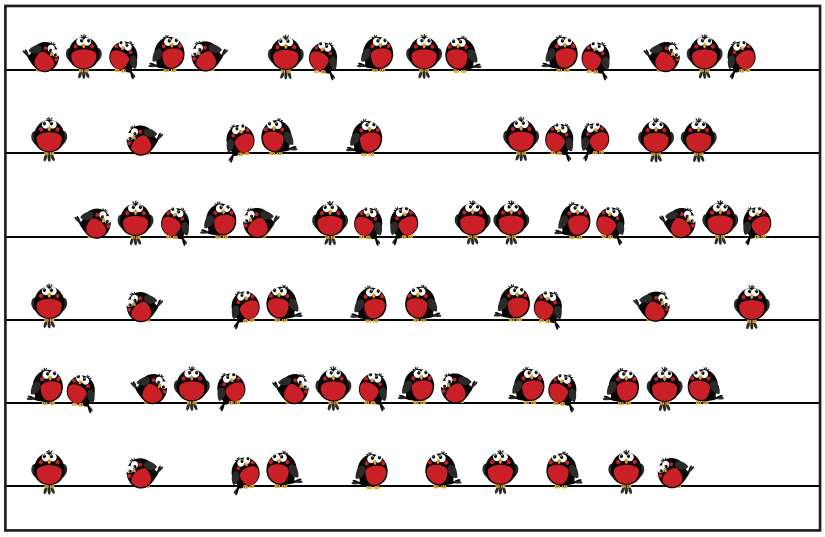
How many birds?

Estimating

Resources: Display reSolve PDF *1a How Many Birds? Picture*.



Ask the students to estimate how many birds are in the picture. Record the estimates, which will be reviewed later in the lesson. Have students explain how they came up with their estimates.

Pose the question: *Exactly how many birds are in this picture?*

Finding the exact number

Resources: Give each student an A4-size printout of reSolve PDF 1*a How Many Birds? Picture*.

Allow students to use their own strategies to calculate the total number of birds. After most students have reached a total, discuss the strategies that they used.

Possible student responses:

- Counting by ones: an inefficient strategy for counting a large number, which increases the chance of error.
- Skip counting: counting in 5s and/or 10s is most straightforward; counting in 2s can be used but is not as convenient.

Teacher note:

- The arrangement of the birds is designed to encourage skip counting in 5s and 10s. Notice that the first row of birds is clearly grouped into 5s. This grouping grows more ambiguous as you move down the image.

Students are likely to have a range of different totals. Finding a single correct answer can be used as a stimulus for re-counting the collection.

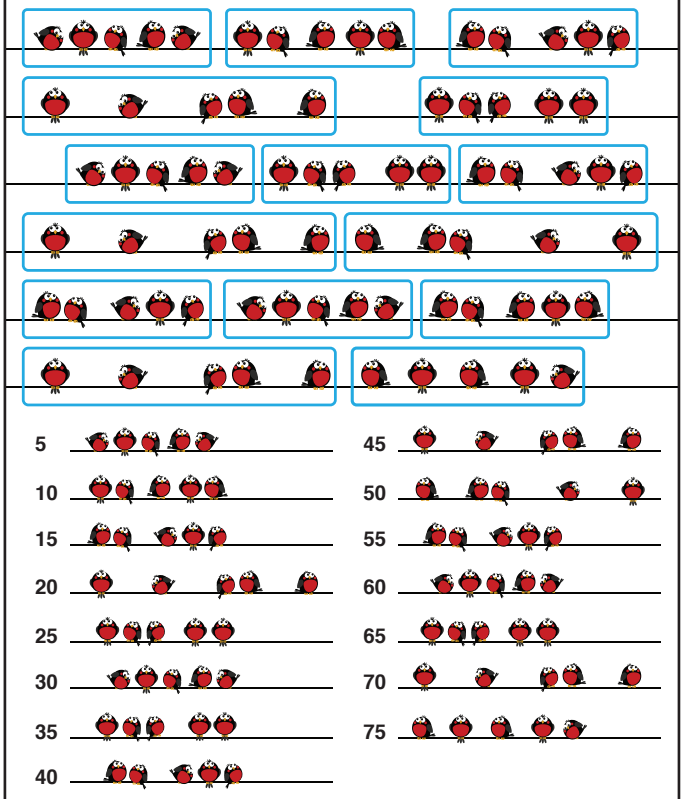
Re-counting

Ask students to re-count the birds and to think about ways in which they can use efficient counting strategies, such as skip counting and keeping track of their count. Have students record their work in a way that shows how they counted. For example, students might draw rings around the groups counted or cut out and paste so that groups of the same size can be collected together.

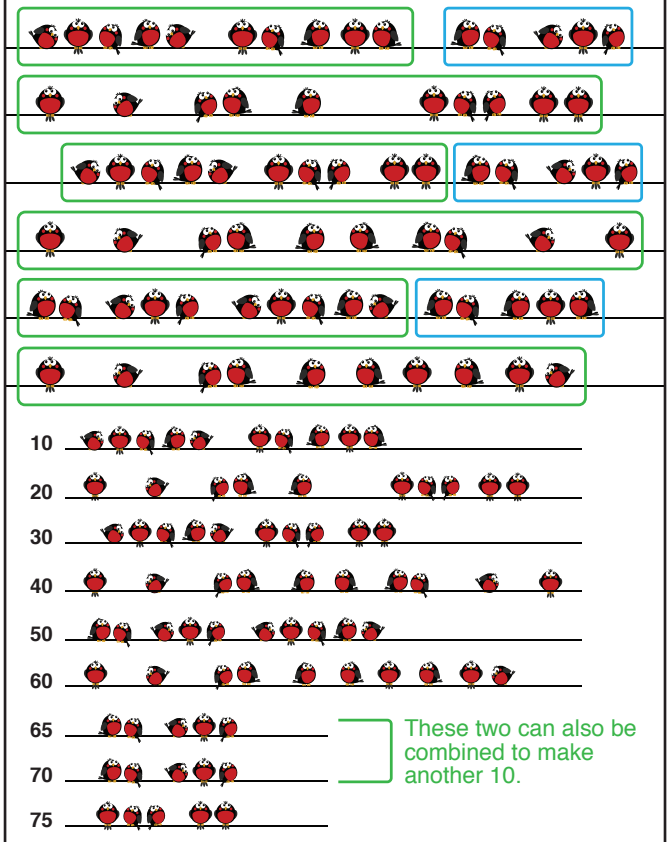
Key questions: *How many birds are there?*
How do you know?
How would you check?
Why did you decide to count the way that you did?

Possible student responses:

Grouping into 5s and skip counting



Grouping into 5s and 10s and skip counting



Reflection

Select students to share their work, showing how they grouped and counted the birds.

Discuss the benefits of skip counting in this context:

- more efficient with a larger number
- less chance for error
- when items are grouped, it is easy to keep track and to re-check the count.

Ask students when people might skip count in their everyday life.

Further activities

Activity 1

Resources: reSolve PDF *1b Music Notes* (one per student)

Present students with the picture of music notes in the reSolve PDF *1b Music Notes*. Ask them to work out how many notes are in the line of music. The notes can be grouped in 2s and skip counted.

Teacher note:

- This is part of the sheet music to 'Waltzing Matilda'. Technically the notes are quarter notes (crotchets) and eighth notes (quavers) with four beats to the bar. This is shown by the 4/4 time signature at the beginning of the line of music. Students will count 52 notes.

Activity 2

Students take a handful of pebbles or counters and count the collection. Ask students to think about an efficient counting strategy and how they might arrange the pebbles or counters to help them keep track and to show the counting strategy they have used.

Activity 3

Present students with other pictures, such as a school photo or a section of a crowd at a sporting match or concert. How would you count the number of people?