

Summary of learning goals

- To build students' counting skills, particularly their ability to subitise a collection.
- Students consider ways of structuring a collection so that the total can be quickly identified. They will see that some arrangements allow the number in the collection to be identified more quickly than do other arrangements.
- The opportunity to explore additional skills in skip counting, addition and partitioning may arise through the task.

Australian Curriculum: Mathematics (Foundation)

ACMNA001: Establish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point.

ACMNA002: Connect number names, numerals and quantities, including zero, initially up to 10 and then beyond.

ACMNA003: Subitise small collections of objects.

Summary of lessons

Who is this sequence for?

- Students who have developed early counting skills, including one-to-one correspondence and cardinality. They should have confidence and accuracy when counting a collection of objects up to at least 20.
- It is important that students have had some exposure to activities involving subitising. These opportunities should include, but are not limited to, recognising dot arrangements on dice, subitising flash cards and the use of ten frames.

Lesson 1: Handfuls

Students take a 'handful' of counters and count how many they have. They are asked to organise their count in a way that makes it easy to see the total of the collection. Students participate in a gallery walk and consider the way that others have arranged their collection. The benefits of different arrangements are considered. Students are then provided the opportunity to reorganise their collection.

Reflection on this sequence

Rationale

Subitising is a fundamental aspect of number sense. Most, if not all, children are able to instantly recognise numbers up to four or five, an ability known as perceptual subitising. Students can build on these smaller parts to recognise larger numbers; for example, recognising six as two groups of three, or seven as one group of three and another group of four. This development is known as conceptual subitising.

Conceptual subitising helps to develop a part-part-whole understanding of numbers; that is, that a number can be represented as the sum of smaller parts. Seven is three and four, but it can also be represented as six and one or five and two. This understanding is foundational for fluency with operations.



reSolve mathematics is purposeful

- This task is designed to build students' perceptual and conceptual subitising skills and to deepen their number sense. This is accomplished by encouraging students to move from counting by 1s to visualising a collection. Perceptual subitising is an innate process, whereas conceptual subitising is a skill that needs to be practised.
- Asking why some arrangements might be easier to subitise than others requires students to practise critical reflection on their own skills.



reSolve tasks are inclusive and challenging

- This task draws on concepts that students are already familiar with, and incorporates commonly seen arrangements that are easily subitised such as dice, playing cards, ten frames, etc. It also begins with an accessible common experience of estimating the count of their handful.
- The task has a low floor, as counters can be simply counted individually. The task has a high ceiling in that it allows students to consider multiple representations and the benefits of some arrangements over others. It also provides opportunities for building additional skills, such as skip counting, and considering some early place-value concepts.



reSolve classrooms have a knowledge-building culture

- The lesson promotes sharing of strategies by setting aside time for silent observations and creating a gallery of student work. As students participate in the gallery walk, they consider the organisational strategies used by others. The opportunity to reorder their collection allows them to experiment with the thinking of others and adapt it to form their own understanding.
- Students are required to verbalise their reasoning for their solutions and are encouraged to share insights and responses. The lesson relies on collaboration through peer feedback and students' ability to work with others to develop ideas.

Acknowledgements

Ann Gervasoni, Associate Professor in Numeracy at Monash University.

Handfuls

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About this lesson

This task asks students to take a 'handful' of counters and to count how many they have. They are asked to organise their count in a way that makes it easy to see the total of the collection. Students participate in a gallery walk and consider the way that others have arranged their collection. The benefits of different arrangements are considered. Students are then provided the opportunity to reorganise their collection.

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ACMNA003: Subitise small collections of objects.

Mathematical purpose

- Students build flexible mental imagery for numbers. They consider ways of structuring a collection of objects so that the total can be quickly identified using subitising skills. They will see that some arrangements for numbers are more quickly identifiable than others.
- Opportunities to explore additional skills in skip counting, addition and partitioning may arise throughout the task.

Learning intention

- Arrange a collection of objects to make it easy to count them.



Time

A lesson of approximately 1 hour.



Vocabulary

- arrange
- count
- efficient
- estimate
- how many
- structure
- subitise



Resources

- A collection of uniform materials for counting, such as counters, Unifix cubes, tiles, teddies, gumnuts, buttons, beads, corks, etc. The smaller the size of the materials, the more students will need to count.

Presenting handfuls

Present students with the collection of materials and ask them to each take a handful of items (about 10 to 20 items).

Ask the students to estimate how many items are in their handful. The focus of the estimation is to ensure a reasonable estimate, not to get the 'right answer'.

Pose the challenge: *Carefully count your collection. Organise your collection in a way that makes it easy to see how many items there are.*

Sorting handfuls

Allow students to count and organise their collection.



Enabling prompt:

- Offer students resources such as ten frames and sorting rings/plates to help them organise their collections.
- Use a smaller number of objects.



Extending prompt:

- Use a larger number of objects.

Ask students to show their organised 'handful' to someone else and compare the different ways they have arranged their collections. Students can consider which of the two arrangements makes it easier to work out the total number in the collection and why this is so.

Reflection and refinement

Conduct a class gallery walk to look at different arrangements that students have used.

Ask: *Which arrangements made it easy to see how many were in the collection? Why?*

- Students might think about patterns (e.g. subitising patterns such as those on dice) that made numbers easy to count.
- Some students may use groups of 10 when there are more than 10 objects. This is the beginning of an understanding of place value.
- Make a comparison to familiar objects that are designed for easy counting/recognisable collections; for example, egg cartons or dice.

Ask the students to return to their own collections and organise their items again, using the strategies they have seen to make their collection easier to count.

Again, ask students to show their organised 'handful' to someone else and compare the different ways they have arranged their collections.

Further activities

Activity 1

This activity can be repeated several times, varying the number of objects each time. Note how the students' counting and organising strategies develop with each iteration of the task.

Activity 2

Provide students with flash cards that show the numbers 0 to 10 arranged in subitising patterns.

- Remove one card from the collection. Ask: *Which card is missing? Can you draw an organised pattern on a blank card to replace the missing card?*
- Ask: *What numbers will come after 10? How could you arrange the dots on these cards so they are easy to count?*

This activity could also be done using dice.