

Summary of learning goals

- This task focuses on organising a collection of objects and using skip counting as an efficient way to count.
- Students then look at unitising 10; that is, seeing 10 ones as 1 ten. This allows students the opportunity to explore the patterns formed and build a deeper understanding of our place-value system.

Australian Curriculum: Mathematics (Year 2)

ACMNA028: Group, partition and rearrange collections up to 1000 in 100s, 10s and 1s to facilitate more efficient counting.

Summary of lessons

Who is this sequence for?

- Year 2 students but it can be easily adapted for use in earlier or later grades by adjusting the size of numbers in the count.
- It is assumed students have developed an understanding of one-to-one counting skills and can recite numbers to at least 100.
- Students should have experience using equal groupings and be developing an understanding of unitising groups.

Lesson 1: Counting Large Collections

Students count a large collection of Unifix cubes. As they count, students are encouraged to think of efficient counting strategies and effective ways to keep track of their count. This will lead students to thinking about ways in which they can order their count so that the place-value properties can be clearly seen. Using groups of 10, the place-value structure will be evident to students.

Reflection on this sequence

Rationale

Place value is a complex understanding developed over time through mathematical reasoning. One important understanding in place value is that of unitising. Unitising describes the cognitive process of recognising a group as a unit. In place value, students must create 10 ones as one unit; that is, 10 ones become 1 ten. This makes sense of 24 as being made up of 2 tens and 4 ones, where the tens are each a complete unit, and the ones are also a unit, just smaller in value. As such, unitising is a multiplicative understanding that is not limited to place value. The concept is used in many areas in maths, including skip counting, multiplication and measurement. Rather than being a teachable skill, it is an understanding built over time through multiple experiences of creating and using groups.



reSolve mathematics is purposeful

- This task looks at our place-value sequence through counting a collection of cubes. Creating a stack of 10 loose ones makes a new unit that is 1 ten. Organising the cubes in stacks of tens and loose ones neatly models the number in the collection and its place-value parts.



reSolve tasks are inclusive and challenging

- This is a task that all students can engage in. The teacher moderates the number of cubes provided to students based on the ability of the students.
- A scaffold is provided to help teachers assess students' skills based on the way they count. This helps the teacher pose appropriate questions to promote deeper inquiry and challenge the thinking of students.



reSolve classrooms have a knowledge-building culture

- This task promotes learning through active engagement and exploration, initially using concrete materials and then moving into a more abstract count.
- Students share their methods and are encouraged to re-count their collection based on what they have seen and learnt from their classmates. As there is not one right way to count, students are confident to take risks and explore multiple ways to approach the task.

re(Solve) MATHS BY INQUIRY Counting Large Collections

Counting Large Collections

Y2

About this lesson

Students count a large collection of Unifix cubes. As they count, students are encouraged to think of efficient counting strategies and effective ways to keep track of their count. This leads students to consider ways to order their count so that the place-value properties can be clearly seen. Through ordering their count into groups of 10, the place-value structure becomes evident to students.

Australian Curriculum: Mathematics (Year 2)

ACMNA028: Group, partition and rearrange collections up to 1000 in hundreds, tens and ones to facilitate more efficient counting.

Mathematical purpose

- This task focuses on organising a collection of objects and using skip counting as an efficient way to count.
- Students then look at unitising 10; that is, seeing 10 ones as 1 ten. This allows students the opportunity to explore the patterns formed and build a deeper understanding of our place-value system.

Learning intention

- To think about the best way to count a large collection.



Time

A lesson of approximately 1 hour.



Resources

- a large box of Unifix cubes



Vocabulary

- efficient
- skip counting
- unitising

How many cubes?



Resources: Show the students a large box of Unifix cubes.

Pose the challenge: *How many Unifix cubes are in this box?*

Emptying out the box in front of the students can be a useful strategy to give the students an idea of how large the collection is.

Counting the collection

Provide each student with a collection of the Unifix cubes. Use what you know about a student's ability to match them with an appropriate quantity to count.

Ask the students to count their collections. Take note of their strategies as they count.



Possible student responses:

- **Organising their count**
 - ◊ Arranging cubes in a line or small groups helps the students to keep track of the cubes that they have counted. The benefit of using Unifix cubes is that students can stack the cubes to make groups or 'towers'. If students do not organise their count, it can be easy to count some blocks multiple times.
- **Counting by ones or skip counting**
 - ◊ Students should be encouraged to use efficient counting strategies.
 - ◊ Using one-to-one correspondence is an inefficient counting method for a large collection and it is very easy to make a mistake or lose count.
 - ◊ Making composite groups is an efficient strategy. Counting small groups and then stacking the Unifix cubes is much more efficient, and the height or length of each group can be compared to make sure there are the same amount in each group.
- **Using equal-sized groups**
 - ◊ Students might explore grouping as a way to organise their count. For some students these groups might be based on an attribute such as colour rather than size. Other students might use groups to create a pattern rather than as a skip count tool. They might also use groups of a certain number because it is a number they like, rather than choosing a number that is easy to skip count (e.g. create groups of 3 or 4). These grouping methods will mean that the students are still counting by ones to find the total in a collection.
 - ◊ When students make and use equal groups as a way to count, they are unitising. Students who unitise are coordinating the number of cubes in each group, as well as the number of groups that they have. For example, 10 groups with 5 in each group is 50 altogether.
- **Strategies to calculate the total**
 - ◊ Observe whether students use the groupings as a way to skip count or calculate the total in their collection. Some students who group might still revert to counting by ones or counting on after skip counting some groups.

Comparing findings

Participate in a class 'gallery walk' to look at some of the different strategies that students have used. Where appropriate, students share how their strategies are reflected in the way they have organised the count.

Provide students with the opportunity to re-count and reorganise their own collection based on the strategies they have seen. This time, encourage them to consider appropriate ways to group cubes to make counting easier.

Ask students to record how many cubes are in their collection and also the strategy that they used to count their collection.

Reflection

Bring the students together to discuss the strategies used. Use tables to compare different grouping strategies, such as those shown below.

- Counting in twos

Towers of 2	Loose ones	Total number
30	4	64
35	8	78
65	2	132

- Counting in fives

Towers of 5	Loose ones	Total number
12	4	64
14	8	78
26	2	132

- Counting in tens

Towers of 10	Loose ones	Total number
6	4	64
7	8	78
13	2	132

Discuss the power of counting in tens as a way to show the place-value properties of numbers. When else would it be useful to count like this?

Further activities

Activity 1

Can the class figure out how many fingers there are in the class? In the Year level? In the whole school? In the whole community?

Just like the focus of the original lesson was to find a more efficient strategy (counting by tens), it would be hoped that the class can progress to find even more efficient strategies as the numbers get larger (counting by 100s, counting by 1000s).

Activity 2

Counting anything! Set a challenge for students to count some other large collections that can be gathered easily from the classroom or school.

Activity 3

Pose the challenge: *How could you count a really large collection?*

Ask students to think of how they could count the number of people at an event, such as a football game.