

Summary of learning goals

- To build students' understanding of place value of numbers up to at least 200.
- Students develop skills in identifying the value of digits in a number and also build correct terminology to sort and describe one-digit, two-digit and three-digit numbers.
- The second task uses a Venn diagram to sort and describe numbers.

Australian Curriculum: Mathematics (Year 1)

ACMNA013: Recognise, model, read, write and order numbers to at least 100. Locate these numbers on a number line.

Summary of lessons

Who is this sequence for?

- Students will need to be able to recognise, name and model numbers up to at least 200. They will need to understand early place-value concepts, specifically that the place of a digit in a number gives its value. These concepts will be built on further through the explorations.

Lesson 1: How Will You Sort?

Students are presented with a variety of one-, two- and three-digit numbers. They are asked to sort and then re-sort these numbers. Students participate in a gallery walk to look at the different ways that others in the class have sorted the same collection of numbers.

Lesson 2: Groups Within Groups

Students sort numbers using Venn diagrams, to show commonalities between groups. Initially, students are presented with some numbers already placed in Venn diagrams and are asked to explain how the numbers are sorted. They are then presented with a collection of numbers and are asked to use a Venn diagram to sort the numbers themselves.

Reflection on this sequence

Rationale

Place value is a complex understanding developed over time through mathematical reasoning. Students might appear to understand place-value concepts through fluent counting or naming digits that appear in different place-value columns in a number, but the reality is that many students do not have a deep understanding of our number system at all. Place value requires students to name, order and represent numbers. It requires students to recognise 10 as foundational to our number system, and to fluently regroup 10 ones as one group of 10, 10 tens as 1 hundred and so on.

The place-value properties of a number are represented multiplicatively; for example, $24 = 2 \text{ tens} + 4 \text{ ones}$ or $24 = (2 \times 10) + (4 \times 1)$. Considering students do not learn to multiply until the middle primary years, stating '2 tens' or '4 ones' can hold little or no meaning to students. It is important to reiterate the value of the digits; for example, 2 tens is the same as 20 or the value of 2 in 24 is 20. This sequence introduces to students a multiplicative representation of the place-value parts of a number.



reSolve mathematics is purposeful

- This sequence focuses on the substantial mathematical ideas of place value. Students sort different representations of numbers based on their place-value properties. Venn diagrams are introduced to show similarities between the groups.
- This sequence presents an abstract mathematical concept to students, using the practical task of sorting.



reSolve tasks are inclusive and challenging

- Students are engaged in sustained inquiry and problem-solving as they decide how to sort collections of numbers. They are required to clearly communicate to others in the class how they have sorted their collection.
- The openness of tasks allows students to access the activities at a level appropriate to their understanding. Students use their existing knowledge of place value to develop new knowledge and explore relationships between numbers.



reSolve classrooms have a knowledge-building culture

- Students participate in a gallery walk to see how others have sorted numbers. Opportunity is then provided for them to sort the numbers again, drawing on what they've learned from others in the class.
- Students work collaboratively to come to a shared understanding of Venn diagrams as a way to highlight similarities and differences between groups.

How Will You Sort?

Y1

About this lesson

Students are presented with a variety of one-, two- and three-digit numbers. They are asked to sort and then re-sort these numbers. Students participate in a gallery walk to look at the different ways that others in the class have sorted the same collection of numbers.

Australian Curriculum: Mathematics (Year 1)

ACMNA013: Recognise, model, read, write and order numbers to at least 100. Locate these numbers on a number line.

Mathematical purpose

- To build students' understanding of place value as they sort numbers.

Learning intention

- To use place value to help sort numbers.

**Time**

A lesson of approximately
1 hour.

**Vocabulary**

- hundreds
- ones
- place value
- tens

**Resources**

- reSolve PDF *1a Numbers to Sort* (one copy per student)
- reSolve PowerPoint *1b Number Sort Reflection*

Teacher background information

Place value

It is important that students realise that the value a digit holds within a number is dependent on its **place** in that number.

Example 1: The value of the digit 2 in the number 25 is 20. The value of the digit 5 is simply 5.

- 25 is made up of 20 and 5 $\Rightarrow 25 = 20 + 5$
- 25 is made up of 2 tens and 5 ones $\Rightarrow 25 = 2 \times 10 + 5 \times 1$

Example 2: The value of the digit 4 in the number 342 is 40. The value of the digit 3 in the number 342 is 300.

- 342 is made up of 300, 40 and 2 $\Rightarrow 342 = 300 + 40 + 2$
- 342 is made up of 3 hundreds, 4 tens and 2 ones $\Rightarrow 342 = 3 \times 100 + 4 \times 10 + 2 \times 1$

Sorting numbers



Resources: Present to students the numbers in the reSolve PDF *1a Numbers to Sort*.

Pose the question: *How could you sort these numbers?*

Allow students time to sort the numbers. After they have sorted their numbers one way, ask: *Can you sort the numbers a different way?* The numbers can be sorted multiple ways. It is beneficial for the students to look at different ways of sorting.

Have students make a poster of one of the ways that they sorted their numbers. Students should label each group with a title or an explanation of the classification.

Questioning to prompt deeper inquiry

- *How are the numbers within a group similar and how are they different?*
 - ◊ The numbers in the group will be sorted based on one obvious similarity. There will be other similarities within each group as well. Prompt students to consider the numbers within the group more deeply. They may then look at making smaller groups within the larger group.
- *Are there any numbers that could fit in more than one group in your sort?*
 - ◊ Some numbers may fit into more than one group. This is the focus of the second lesson in this sequence.

Reflection

Conduct a gallery walk around the classroom so students can look at the different ways the numbers have been sorted. As students share their sorting, focus on their use of place-value language.



Resources: Present reSolve PowerPoint *1b Number Sort Reflection*.

On these slides, a collection of numbers has been sorted in three different ways.

Pose the question: *How have the numbers been sorted?*

- Slide 1 – The numbers have been sorted based on the number of tens:
 - ◊ Green circle: 9 tens or ninety
 - ◊ Blue circle: 8 tens or eighty
 - ◊ Red circle: more than 10 tens or over one hundred.
- Slide 2 – The numbers have been sorted based on the digits that appear within the number. However, these digits hold different values within each number. Discuss the value of these digits.
 - ◊ Yellow circle: 9 in each number
 - ◊ Red circle: 3 in each number
 - ◊ Purple circle: 8 in each number.
- Slide 3 – These numbers have been sorted based on tens and ones:
 - ◊ Orange circle: 1 one
 - ◊ Blue circle: 8 tens or eighty
 - ◊ Green circle: no single tens; all tens make whole groups of one hundred.

Where to next?

Lesson 2: Groups Within Groups is the second activity in this sequence, whereby students sort numbers using Venn diagrams to show commonalities between groups.

Groups Within Groups

Y1

About this lesson

Students sort numbers using Venn diagrams to show commonalities between groups. Initially, students are presented with some numbers already placed in Venn diagrams and are asked to rationalise the arrangement. They are then presented with a collection of numbers and are asked to use a Venn diagram to sort the numbers themselves.

Australian Curriculum: Mathematics (Year 1)

ACMNA013: Recognise, model, read, write and order numbers to at least 100. Locate these numbers on a number line.

Mathematical purpose

- To extend students' place-value reasoning and to familiarise students with the use of Venn diagrams.

Learning intention

- To investigate how some groups of numbers are similar and different and how we can show this using a Venn diagram.



Time

A lesson of approximately 1 hour.



Vocabulary

- hundreds
- ones
- place value
- similar and different
- tens
- Venn diagram



Resources

- Student Sheet 1 – Sorting Sheet (one per student) and/or reSolve PowerPoint *2a Sorting*
- reSolve PDF *2b Numbers to Sort* (one copy per student)
- reSolve PDFs *2c Sorting into Two Groups* and *2d Sorting into Three Groups* (one copy each per student)

Identifying sorting strategies



Resources: Provide each student with Student Sheet 1 – Sorting Sheet and/or display reSolve PowerPoint *2a Sorting*.

Pose the questions: *How have these groups been sorted?*
Why are there numbers in the overlapping parts of the circles?

Allow students time to discuss the ways that the numbers have been sorted and why there are numbers in the overlapping parts of the circles. Conduct a class discussion for students to share their thinking on how the numbers have been sorted.

Creating strategies



Resources: Provide each student with a copy of reSolve PDF *2b Numbers to Sort*.

Pose the question: *How might you sort these numbers?*

Allow students time to sort their numbers in different ways. Prompt students to consider if any of their numbers belong in two or even three groups. Ask them to think about ways to represent the fact that some numbers belong in more than one group.

Students record their work by pasting the numbers onto paper and drawing interlocking circles/loops. Discuss the different ways that students have sorted their numbers. Ask students to explain how they know that some numbers belong in more than one group.

What goes here?



Resources: Provide each student with a copy of reSolve PDF *2c Sorting into Two Groups* (and reSolve PDF *2d Sorting into Three Groups* when students are confident).

Ask the students to work out what numbers might go in the circles based on the numbers that are in the overlaps. Students will need to use the place-value properties of the numbers to determine categories for sorting.



Enabling prompt:

- Use reSolve PDF *2c Sorting into Two Groups* page 1. Place 35 in one circle but not in the intersection.

Ask: What other numbers might fit in this circle with the 35? What numbers might go in the other circle?

Reflection

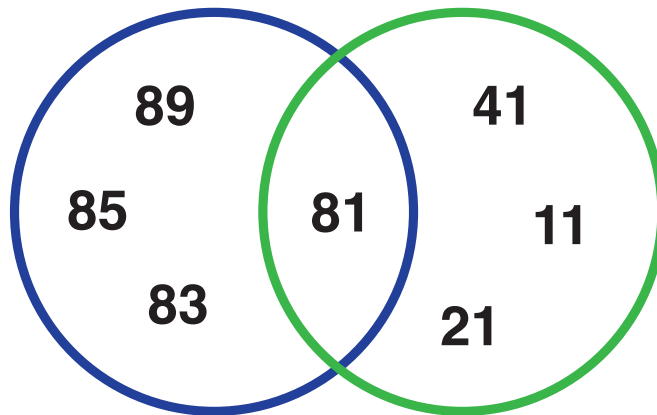
Discuss the variety of solutions that the students have created.

Sorting Sheet

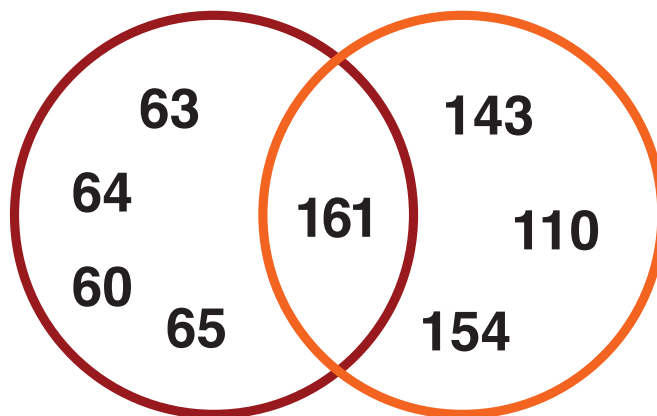
Name: _____



Hugo



Kayla



Max

