

Grandma's Soup

Lesson 2: Devise Phase

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.

- Developing fluency with forwards counting in a meaningful context.

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

- Modelling numbers with a range of materials.
- Identifying numbers that are represented on a number line and placing numbers on a number line.

ACMMG019: Measure and compare the lengths and capacities of pairs of objects using uniform informal units.

Lesson abstract

Students are informed that Grandma's handful was 100 pieces of macaroni. A cut-out of Grandma's hand is added to the display of hands from the Discover phase. Using a number line is suggested, and students write their totals on a class number line, and compare it to the hands display. Next, students make several attempts to grab 100 pieces of macaroni. They record each attempt on a number line, and use its relative location to guide their next attempt. Students use different counting strategies and attempt to find the most efficient way to count.

Mathematical purpose (for students)

Some ways of counting are better than others (easier to be accurate and more efficient).

Mathematical purpose (for teachers)

Plotting on a number line is a useful representation to show the difference in handful totals. Strategies such as grouping and skip counting provide more efficient ways to count large totals and make the total easier to check.

Lesson Length 60 - 90 minutes (may be split into two sessions)

Vocabulary Encountered

- number line
- representation
- skip counting
- accurate
- efficient

Lesson Materials

- cut-out hand (teacher size)
- large number line for display (long enough to include all the handfuls from the Discover phase, e.g. 0 to 170)
- ordered hand display from Discover phase
- macaroni (reuse from previous lesson)
- coloured markers
- [Student Sheet 1 - Recording Sheet: Devise](#) (one per group)

We value your feedback after these lessons via <https://www.surveymonkey.com/r/CV2TXTT>



Grandma's Handful

Remind students of the problem

1. Continue engaging students with the context. For example:

Last night, I rang Grandma to explain the problem with my soup. I told her that we thought there might have been a problem with the amount of macaroni in my handful. My handful could have been different to her handful. I asked her how big her handful was and she said, *'I just grabbed a little handful, not a full handful.'*

I said, *'How big?'*

She said, *'Let me check and I will ring you back'*

When Grandma rang back she told me her handful held 100 pieces of macaroni.

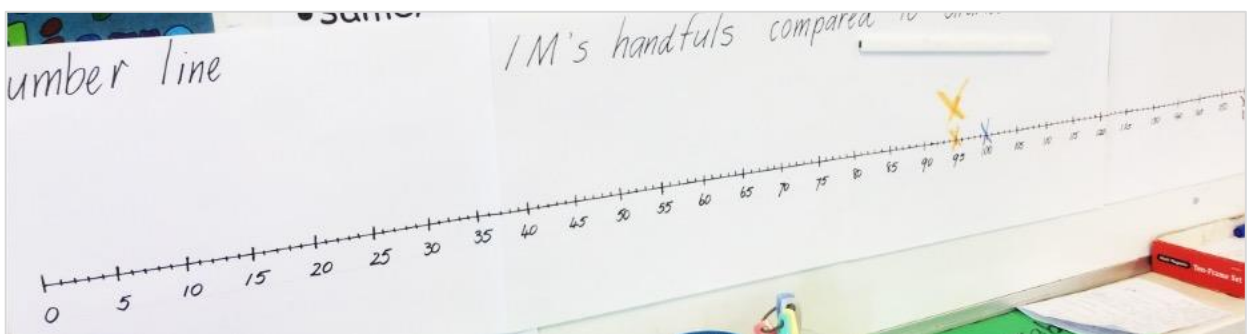
Have a cut-out hand (adult sized) and write 100 on it to represent Grandma's handful. Ask students where it could be added to the line of hands from the Discover phase and why it would be positioned there. Be alert to the language used so it is clear the students are comparing the amount of macaroni rather than the hand size.

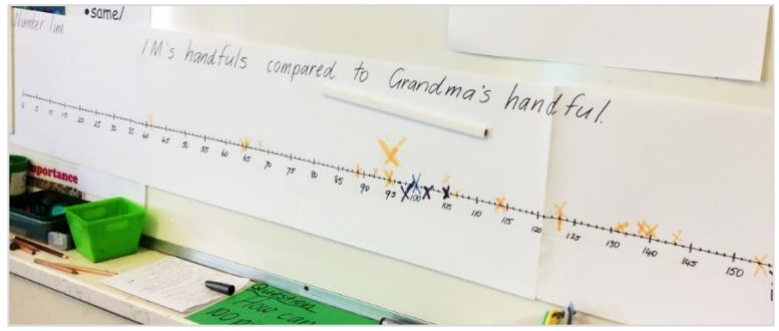
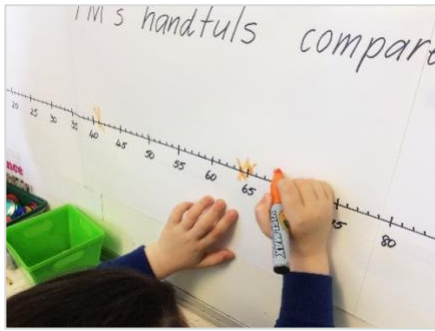
Teacher: *Did anyone have the same number as Grandma? Was anyone close to Grandma's number? Who had the number closest to Grandma's? 100 comes between our 99 and 102 handfuls.*



Represent handful sizes on a number line

2. Lead students towards the need for a representation that shows the position of numbers in relation to other numbers (e.g. number line). For example: *Look at the amount of macaroni written on our hands. Is it easy to see how different our numbers are? Can you think of another way we could represent the number of pieces of macaroni in our handful that would show how different our handfuls are?* If they don't suggest a number line, guide them towards it by recalling different ways they have represented and ordered numbers in the past. *Could we use a number line?*
3. Display the large number line (length will depend on the highest number grabbed in the Discover phase) and ask students where Grandma's handful would be positioned. Place an X at 100 on the number line and then invite all students to use an X to place their handful size on the number line. Request students to stack the Xs vertically if they have the same number (as the purpose of this representation is to focus on the relative position of handful sizes, student names are not required). Draw students' attention to the need for a title to be added to the number line so the representation is clear for others to interpret as the hands have been removed. As a class, agree on an appropriate title and add it to the number line.

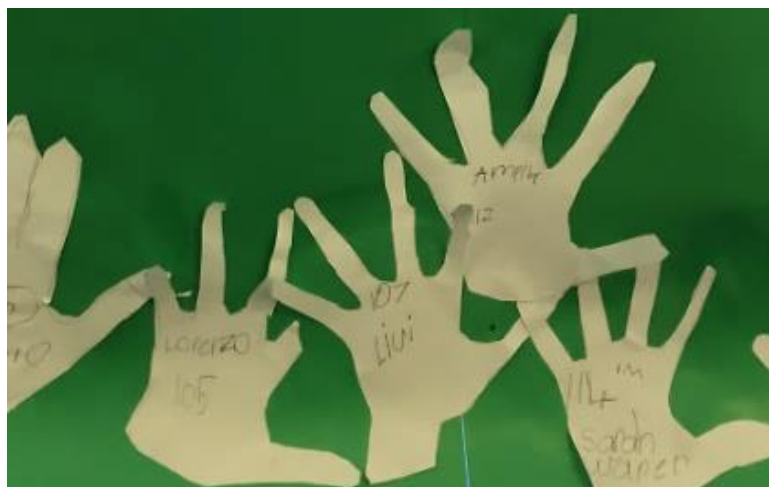




The number line with the hand representation.

Compare handful representations

4. Compare the different representations. What do you notice about the two different representations? Are they in the same order? (yes) What is different?
 - The number line has spaces and the hands don't. (Emphasise that the number line clearly shows the difference between the handful sizes. The difference between the largest and smallest handfuls is more obvious and it is easy to see where the most common handful sizes are when placed on a number line.)
 - The number line has some numbers stacked on top of each other because they show the same number of macaroni pieces.
 - There are no names on the number line.
 - The hands on the line have some above because Amelia was away and when she came back, her hand couldn't fit.



5. Discuss whether there is a relationship between the number in a grab and the hand size (you may or may not observe such a relationship). Emphasise that the number line made it easier to see how different our grabs were.

Teacher: What do you notice about where Grandma's handful is positioned in relation to our handfuls?
Grandma's hand is bigger than all the others. Why doesn't it hold the most macaroni?

Student: Because she didn't grab a full handful. She only grabbed a little bit.

Teacher: Look at Peter's grab on the number line. It has only 41. Is his hand a lot smaller than the other hands?

Teacher: Who has the biggest number? Morris has 143 pieces. Is his hand a lot bigger than the other hands? On the number line this total looks much bigger than the rest. What made his total bigger and Peter's a lot smaller?

Student: Their hands are about the same size so Peter must have grabbed a small handful and Morris must have grabbed a lot.

Teacher: Maybe Grandma only grabbed a little bit. Where might Grandma's hand be on the number line if she grabbed a full handful? Compare Grandma's hand size to the teacher's hand size (same).

Introduce the Inquiry Question

Inquiry Question: How can we grab 100 pieces of macaroni?

6. Remind the students of their focus: in the Discover phase we wondered how many pieces of macaroni were in a handful. We know Grandma's hand held 100 pieces. If our soup is to be thick and chunky, we will need to be able to grab 100 pieces just like Grandma. The question we need to investigate is, 'How can we grab 100 pieces of macaroni?' Display the Inquiry question so it can be referred to throughout the Inquiry.
7. Ask students to think about whether they had grabbed more or less than 100 pieces of macaroni. Direct them back to the number line. Highlight where Grandma's X is in comparison to everyone else's. In pairs, have students discuss how they could grab a handful of 100 pieces of macaroni. Have students share ideas with the class. Can we change the way we grab a handful? Possible responses:
- *I will need to grab a bigger handful because I only had 67.*
 - *I will push my hand right down to the bottom and grab as many as I can.*
 - *Last time I used both hands. Now I will only use one hand because I had 147.*
 - *I might need 2 handfuls because my handful was only half as big as Grandma's.*

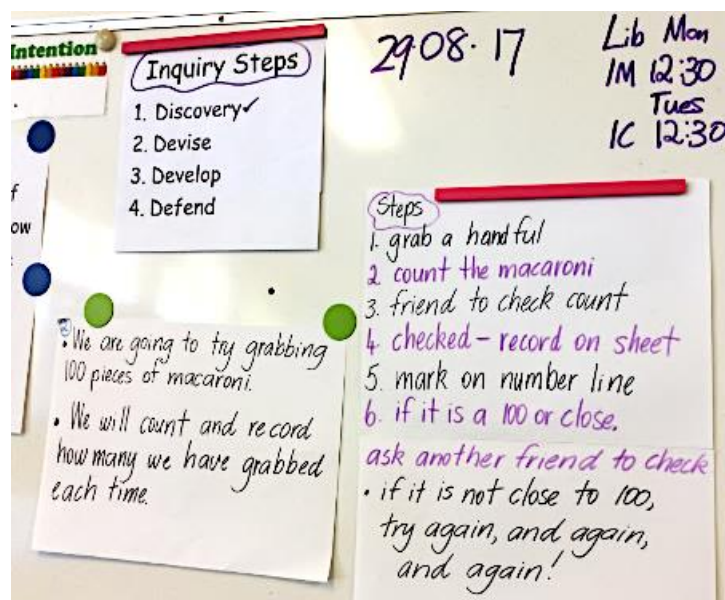
Acknowledge all ideas as possible ways to grab 100 whether they are practical or not. Refrain from offering suggestions or favouring any particular response to allow students to discover for themselves if a method needs to be refined or changed.

8. Group students into groups of 3 or 4. Provide each group with [Student Sheet 1 - Recording Sheet: Devise](#). Each student uses their chosen method to repeatedly attempt to grab 100 pieces of macaroni. Each member of the group is to use a different colour to record their attempts in the space provided and then mark their total on the number line in their colour.

Instruct students to:

- take turns to grab a handful of macaroni
- count the macaroni
- ask a friend in the group to check by counting the handful
- after it has been checked, write down the total count on the recording sheet
- mark each total on the number line
- if it is 100 or close to 100, ask another friend in the group to check the count again. Then show the teacher. Retain this handful of macaroni for later reference.
- if it is not close to 100, try again (and again if students can persist and maintain interest)

(It may be valuable to copy this checklist to display for student reference)



9. Give students time to grab, count and record. Students may be tempted to create 100 by taking extra macaroni from the container or returning macaroni to the container as required. This may be avoided if the container is removed by the teacher after each grab. Emphasise that they can grab again and try to get closer next time.

Example of worksheet with completed number line:

Recording sheet: Devise stage

How many pieces of macaroni in my handful?


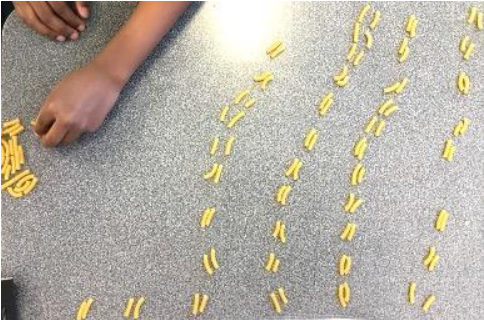
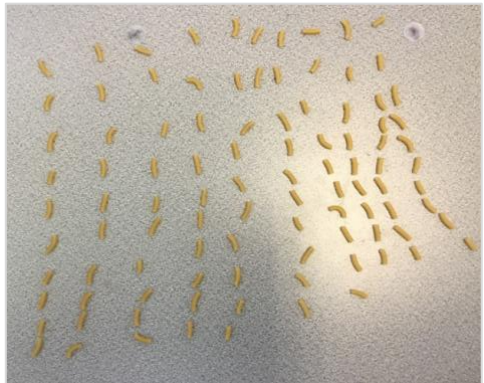

Name	Grab 1	Grab 2	Grab 3	Grab 4	Grab 5	Grab 6	Grab 7
Sam	63	141	95				
Jess	107	134	98				
Mario	98	110	88				



Number Line:

10. Ensure students are checking each other's counting before writing down the totals. They may need to take turns counting, with the rest of the group observing. It is likely that students will be distracted by the out-loud counting of others, resulting in them losing count, especially if counting in 1s or 2s. This can be used to encourage them to use other counting strategies, especially making groups of ten.
11. Observe the strategies they use and make a mental note about who is counting efficiently. Effective strategies will be summarised at the end of the Checkpoint below.
12. Students may find that counting large numbers is long and tedious. If desired, set up a competition to see who can get closest to 100: students write their total on the board, and the count must be checked by another student before it is accepted. Alternatively, take the opportunity for a checkpoint.

Checkpoint

13. Bring students together to discuss possible ways to overcome the issue of losing count. If some students are already using a strategy to overcome this problem, have them share their ideas with the class.

<p>Jose:</p>	<p><i>I am making groups of 5 so I can count in 5s. If I lose count, I can just go back and count the groups again. I had 85 and 1 more is 86. I counted on 1 more. It was easy for Sam to count my groups when he checked it.</i></p> 
<p>James:</p>	<p><i>Only one person counted and we all listened and checked. When Kym lost count, we could tell her where she was up to. I counted in 2s but I lost count. I had 107. I counted in 2s to 100 and then I went 101, 102, 103, 104... to 107.</i></p> 
<p>Karen:</p>	<p><i>I made lines of 10 so I could count in 10s. I couldn't count in 10s because the lines were wobbly and the macaroni kept rolling (Figure 1). I had to fix my lines so they were real 10s. Then I could count in 10s (Figure 2). There are 99. I counted in 10s to 90 and there were only nine left so I got 99.</i></p>  
<p>Hiromi:</p>	<p><i>I counted in 50s but it didn't work because I only had one 50 and then I had 38. I could only make one 50. When Lil counted my 50 she got 48. When I counted it again, I got 51. I think someone kept changing my macaroni.</i></p>

	 <p>Teacher: <i>I wonder if someone kept changing the macaroni or it was difficult to count 50? How can we count in 50s? What do you need to do before you can count in 50s?</i></p> <p>Hiroimi: <i>I need to count to 50 and make a group. I counted in 1s.</i></p> <p>Teacher: <i>Would you count in 50s again?</i></p> <p>Hiroimi: <i>No I would make smaller groups so I could see if any were going missing from the groups.</i></p> <p>Lil: <i>We didn't take any. It was hard to count 50 because we kept forgetting where we were. We tried to make 50 and then it wasn't 50 the next time. We changed to 5s. It was easier.</i></p>
<p>Debra:</p>	<p><i>I counted in 2's to 10 and then counted in 10s. I have 151. I counted in 10s to 150 and then added 1 more.</i></p> <p>If you look closely at this picture, you will see that not all bundles have 10 pieces of macaroni as Debra has claimed (The centre group has 12). This highlights the need for accurate checking by team members. They need to check each group size and then count for a total number.</p> 

Conclusion

- Emphasize that accuracy and efficiency are important when counting numbers. Summarise and record the efficient counting strategies used and add any of the following not discussed:
 - Counting in 1s and 2s to make bigger groups
 - Sorting into groups of manageable size- 5s, 10s and skip counting
 - Maintaining groups so others can check the count
 - Moving groups to another place after they have been counted

Keep the record of efficient counting strategies for display in the next lesson.

- Bring the task back to trying to grab 100 pieces by discussing whether the handfuls got closer to 100. Was anyone close to 100? How did you grab the macaroni? Did anyone else use the same strategy? Were you successful? Was anyone else successful with a different strategy? Is it possible to fit 100 pieces of macaroni in a handful?

Next time we are going to get better at grabbing and counting 100 so we can be just like my Grandma!

Recording Sheet: Devise

Name: _____

How many pieces of macaroni in our handfuls?

Name	Grab 1	Grab 2	Grab 3

Number line:

