YuMi Deadly Maths

Year 3 Teacher Resource:

NA – School Challenge

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

YuMi Deadly Maths Year 3 Teacher Resource: **NA – School Challenge**

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ACKNOWLEDGEMENT

We acknowledge the traditional owners and custodians of the lands
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refined and presented in professional development sessions.

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Prepared by the YuMi Deadly Centre
Queensland University of Technology
Kelvin Grove, Queensland, 4059

ydc.qut.edu.au

Year 3 Number and Algebra

School Challenge

Learning goal

Students will:

- represent four-digit numbers to 2000, with materials
- read, write and compare three-digit and four-digit numbers.

Content description

Number and Algebra – Number and place value

- Recognise, model, represent and order numbers to at least 10 000 (ACMNA052)
- Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems (ACMNA053)

Big idea

Number – place value: read, write, say; additive structure

Resources

Odometer tracks, calculators, Montessori numbers, 0–2000 number line, small blank cards, MAB blocks, Place Value Chart (PVC), number expanders, arrow cards

Reality

Local knowledge

Discuss places where thousands are found in the local environment, e.g. some large schools, a tennis match, cricket/football game.

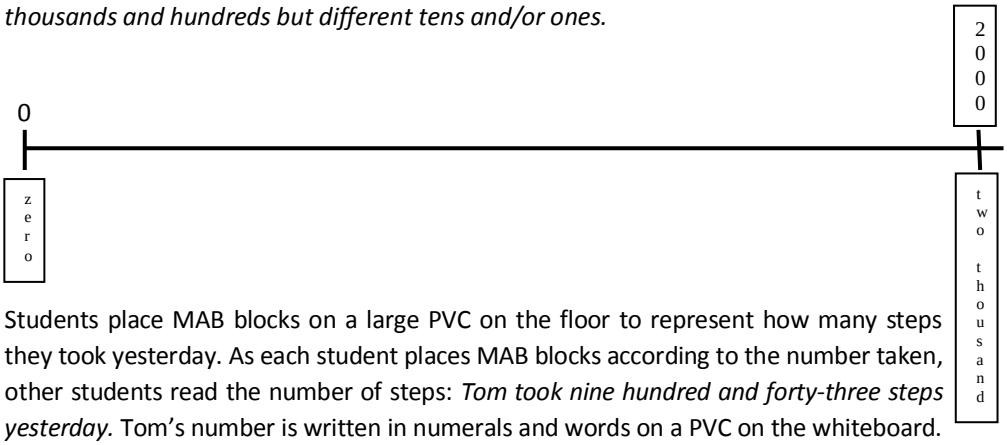
Prior experience

Check that students can say, read and write three-digit numbers in numerals and words.

Kinaesthetic

We have joined the School Challenge and want to walk at least 1000 steps every day at school.

On small cards students write, in numerals and words, the number of steps they took yesterday with numbers in the hundreds or up to two thousand. One by one, they place their numeral and word in the appropriate place on opposite sides of the 0–2000 number line made with masking tape on the floor, saying, e.g. *I took 1673 steps at school yesterday*. Discuss position as the numbers are ordered on the line. Compare bigger than, smaller than, more than 500, 1500, less than 500, 1500, numbers that come between 1300 and 1400, and so on. After all the number of steps have been placed on the line, ask: *Are all these cards in order? If not, what ones need to be moved?* Discuss: *What is the biggest/smallest number of steps taken? Tell me a number that has the same number of thousands and hundreds but different tens and/or ones.*



Students place MAB blocks on a large PVC on the floor to represent how many steps they took yesterday. As each student places MAB blocks according to the number taken, other students read the number of steps: *Tom took nine hundred and forty-three steps yesterday.* Tom's number is written in numerals and words on a PVC on the whiteboard. Students draw the MAB representation and write the numeral and word in their pads. The blocks are returned to the box and the process is repeated. The aim is to see how many students are able to beat the challenge of 1000 steps per day. Once all the students' steps have been recorded, the whole list of steps is read by all the class.

Reversal: Story – *I have walked many steps today, but not farther than yesterday. I walked over 785 steps but not as many as 790 steps. How many steps could I have walked?* Write the words that show one possibility. One at a time, students show the number of steps in numerals and words and the class says the number.

Abstraction

Body

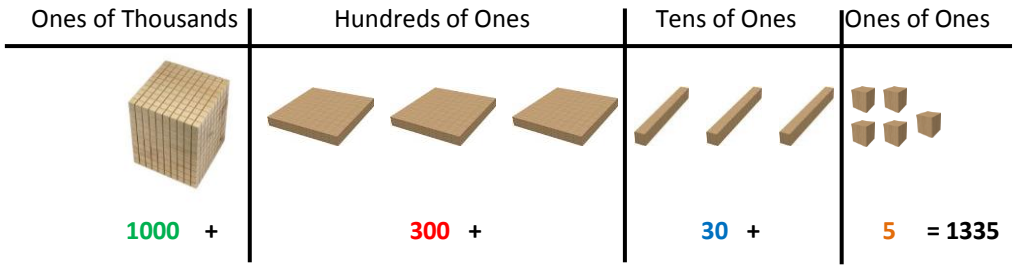
Students act out the odometer/pedometer by using four 0–10 tracks with a student sitting at each of the 0–9 places on each track as far as is possible according to number in the class. As the count begins, the student in the ones track at 0 stands to indicate that no steps have been taken. As the class slowly counts, number 1 in the ones place stands, sits when 2 is called and number 2 in the ones place then stands. Repeat the process: the former number sits while the next number stands as in the odometer principle – one number is shown then ticks over to the next number. When number 9 is called the student in that position stands but sits as 10 is called and then 1 in the tens place stands with the 0 student in the ones place also standing. Eleven has the 1 ten continuing to stand and 1 one standing together and so on, the ones only standing then sitting, to 19 when the student in the 1 tens place is replaced by the student 2 in the tens place and also the 0 student in the ones place. Repeat until 46 has been made on the track (4 lots of 0–9, and changing until the number 4 student is standing in the tens, then add another 6 ones). The students follow using calculators and adding one for each step. (This activity requires 15 students.) After 46 has been reached, represent it using Montessori numbers on a PVC.

After the process has been introduced, students use the pedometer to monitor their steps; e.g. three students stand at 989 in appropriate tracks and follow the odometer strategy to make 1000. This activity requires 31 students or a combination of students and dolls. (Other students always follow using calculators and adding one.) Other students stand at 998 and make 1014, and so on. Represent all numbers with the Montessori numbers. Repeat: Start at 1996, make 2017.

Reverse: Ask students to place the number of steps (cards) on the correct track; e.g. *Sam has walked a number of steps that has 6 in the tens track, 3 in the hundreds track, 7 in the ones track and 1 in the thousands track. How many steps has Sam walked?*

Hand

Using MAB on PVC, expanders and arrow cards, students make number of steps nominated by the teacher. Identify standard place-value parts, e.g. 1335 as:



What is 1335 made up of? [one thousand, three hundreds, three tens and five ones]. *In 1335 how are the red and the blue threes different? What is the value of the red three and the blue three? What tells us that the value of these threes is different?* [their place or position]. *Make a smaller/bigger number than 1335*.

Use a number expander to show 1335: *Why are the words put on this expander? What happens when we fold the numbers together? What number is shown?*

1	thousands	3	hundreds	3	tens	5	ones

Use arrow cards to show how standard place-value parts combine to "build" the numeral form for each number, e.g. 3 tens are added to 5 ones to make 35, then 3 hundreds are added to 35 to make 335 and 1 thousand is added to 335 to make 1335. *In 1335, what does the digit 1 represent? What value is represented by the digit 5? What does the red/blue 3 stand for?*

Does this arrow card look like the MAB blocks on the PVC? How is it the same/different? How many groups of ten ones/tens/hundreds were needed to make 30/300/1000?

Repeat with other examples using all the above materials. Using place-value parts, confirm the value of each model.

Distribute materials so that students, in groups, are able to rotate to each station to use the representations above to make, read and write given numbers. Make three-digit numbers with the MAB and four-digit numbers with the other two models.

Mind

Close your eyes and see arrow cards that combine 1000 steps with 400 steps, 90 more steps and 5 steps. Reverse: *Now make in your mind the arrow cards for 1963 steps.* Give other examples.

Creativity

Students draw and number places where they would take a few steps (ones), more steps (tens), many steps (hundreds) and lots of steps (thousands). They then link these together to make the total number of steps taken that day.

Mathematics

Language/ symbols

count, place, ones, tens, hundreds, thousands, larger than, smaller than, symbols > <, more, less, numeral, number name, digit, value

Practice

1. Compare three-digit and four-digit numbers:
   - Compare pairs of numbers, e.g. 694 and 1285; 1528 and 1872.
   - Represent each number with MAB, arrow cards, expanders.
   - Position numbers on a number line to show their relative position.
   - Identify the larger number; make a number smaller than the ones given.
   - Give numbers that are 100 larger/smaller than each of the above.
   - Record outcomes in words and use symbols < >.
2. Read and write four-digit numbers:
   - Check your spelling of single-digit number names, teen number names, multiples of ten, “hundred”, “thousand”.
   - Write four-digit numbers as a numeral, e.g. 1847, and in words, *one thousand eight hundred and forty-seven*.
3. Worksheets – prepare column worksheets with one column filled in (students fill in others) as follows:

Picture (MAB on PVC)	Language	Symbol
	One thousand two hundred and seventeen	
		1638

4. Practise with virtual materials.

Connections

Relate to measurement (metres, grams, litres) and money.

Reflection

Validation

Students check to see where hundreds and thousands are found in their world, e.g. some schools have hundreds of students, big P–12 schools have thousands of students; books in the school and municipal libraries.

Application/ problems

Provide applications and problems for students to apply to different real-world contexts independently, e.g. comparing numbers of students at various schools to identify smaller/ bigger than and representing the statement using symbols, < smaller than, > bigger than; list schools in ascending order in relation to number of students.

Extension

Flexibility. Students are able to recognise, read and make numbers to hundreds and thousands in various forms (numeral, word name, MAB, arrow cards, expanders) and tell stories that represent those numbers.

Reversing. Students are fluent in understanding and using all ways of number representation and can start at any representation and then give all others, e.g. story ↔ write (numeral and word name)/read/say the number ↔ use symbols ↔ show many different representations.

Generalising. *When we have ten in a group, we move the group of ten over to make one of the next group: 10 ones = 1 ten; 10 tens = 1 hundred; 10 hundreds = 1 thousand (odometer principle). The digit in the thousands (then hundreds, tens and lastly ones) determines the size/value of the whole number, whether it is larger or smaller than another number.*

Changing parameters. Look at the pattern of threes (HTO) and read numbers that have ten or hundred thousands. (Once students can read e.g. 472, they have the capacity to continue into the HTO of thousands/millions/billions when the three digits are clearly marked as thousands or millions above the group of three.) Extend to five and six digits.

Teacher's notes

- Make big visual movements of transferring a group of ten into the next group. Ensure the teacher uses a reflection of the movement so that students are seeing the correct directional move.
- Ensure that students know and can use the smaller/bigger signs correctly. Relate to reading left to right – *Students in Year 4 are < than students in Year 6 and > than students in Year 2. In the reading sequence, which part of the sign comes first?* [The sharp part first in the reading sequence means smaller than, the open part first means bigger than.]
- Students need to be taught the skill of visualising: closing their eyes and seeing pictures in their minds, making mental images; e.g. show a picture of a kookaburra, students look at it, remove the picture, students then close their eyes and see the picture in their mind; then make a mental picture of a different bird.
- Suggestions in Local Knowledge are only a guide. It is very important that examples in Reality are taken from the local environment that have significance to the local culture and come from the students' experience of their local environment.
- Useful websites for resources: www.rrr.edu.au; https://www.qcaa.qld.edu.au/3035.html
- Explicit teaching that **aligns with students' understanding** is part of every section of the RAMR cycle and has particular emphasis in the Mathematics section. The RAMR cycle is not always linear but may necessitate revisiting the previous stage/s at any given point.
- Reflection on the concept may happen at any stage of the RAMR cycle to reinforce the concept being taught. Validation, Application, and the last two parts of Extension should not be undertaken until students have mastered the mathematical concept as students need the foundation in order to be able to validate, apply, generalise and change parameters.

