YuMi Deadly Maths

Year 4 Teacher Resource:

NA – Spending the Lotto millions!

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

YuMiDeadly
Growing community through education

YuMi Deadly Maths Year 4 Teacher Resource: **NA – Spending the Lotto millions!**

ACKNOWLEDGEMENT

We acknowledge the traditional owners and custodians of the lands
in which the mathematics ideas for this resource were developed,
refined and presented in professional development sessions.

TERMS AND CONDITIONS OF YOUR USE OF THE WORK AND RESTRICTED WAIVER OF COPYRIGHT

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

ydc.qut.edu.au

Year 4 Number and Algebra

Spending the Lotto millions!

Learning goal Students will apply standard and non-standard partitioning to seven-digit numbers.

Content description

Number and Algebra – Number and place value

- Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems (ACMNA073)
- Recognise that the place value system can be extended to tenths and hundredths. Make connections between fractions and decimal notation (ACMNA079)

Big idea Number – part-whole, place value, additive structure

Resources Pictures of real estate with prices, Place Value Charts (PVC – Appendix A), number expanders (Appendix B), MAB blocks, strip mat, key-ring digit cards, calculators, PV word cards, Montessori number cards to millions, number line and pegs, brightly coloured velour strips, odometers

Reality

Local knowledge Ask students to think of any number that they are able to read, say and tell a story about. Discuss where we find large numbers, e.g. crowds at sporting events, population, distances between cities in the world, cost of houses or luxury items (cars, boats, jewellery), how much their favourite singer earns, how much money the wealthiest person in Australia has.

Prior experience Revise representing thousands and ones in standard Hundreds, Tens, Ones pattern of three using the PVC and MAB:

Thousands			Ones		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
3	8	5	2	9	9

Begin by making and reading three-digit numbers. Make six-digit numbers with key-ring digit cards, then read the number emphasising the HTO pattern of three in the thousands and ones: three hundred and eighty-five **thousand**, two hundred and ninety-nine. (We know these are ones so the "ones" is not said.)

Kinaesthetic Students are given PV cards to order on the strip mat. Students with key-ring digit cards (starting at 0) sit in front of each place. Reinforce face/place value.

Spending the Lotto win (whole to parts): Read six/seven-digit numbers from real estate pictures using patterns of three.

Show picture and cost of house. Students with key-ring digits flip the digits over to correspond with the item's cost. Other students stand behind with another set of PV cards: Ones, Thousands, Millions with patterns of three (HTO). Students read, say, make different numbers from house pictures with key-ring digit cards from the amount shown in the pictures of items to be bought. For example:

Millions			Thousands			Ones		
H	T	O	H	T	O	H	T	O
		4	6	5	9	9	5	0

*This house costs 4 **million**, six hundred and fifty-nine **thousand**, nine hundred and fifty dollars.*

Each time, students take a Montessori card and Blu Tack it in the correct column, e.g. a student who is asked to make four million takes the 4 000 000 card and places it in the millions column. Other students record 4 000 000 on calculators. Another student who is asked to make six hundred thousands takes the 600 000 card and places it in the hundred thousands column. Other students record 600 000 on calculators. Similarly students fill the other places. After they have made a seven-digit number, all students state the recorded number with its standard place-value parts, e.g. 4 659 950 = 4 000 000 + 600 000 + 50 000 + 9000 + 900 + 50 + 0. Peg the number made on the number line. Repeat process with other numbers.

Emphasise the flexibility in the numbers' representation (e.g. $370K, $785,000+, $54,900.00).

Using pictures of real estate houses and apartments/yachts/mobile homes, build up to ten millions. Could this be easily extended to hundred millions? Each picture activity includes strip mat with PV words, key-ring digit cards, Montessori numbers, the number line and calculators being used simultaneously.

Reverse (parts to whole): Key-rings start at zeros. One place at a time – *The cost of this house has 9 thousands, 6 hundred thousands, 9 hundreds, 9 ones, 4 ten thousands and 9 tens. How much does this house cost?* Use the key-ring cards and calculators. Say the number, discuss and peg on the number line. Give another couple of examples.

Expanders: Provide students with completed and blank number expanders (Appendix B) to reinforce that numbers can be seen in patterns of three; e.g. the number expander below shows that 1 759 806 is 1 million 759 thousands and 806 ones.

1	Millions	7	5	9	Thousands	8	0	6	Ones

Abstraction

Body

Whole to parts: Using pictures and the strip mat, students with key-ring digits stand in squares to make a seven-digit number. *How many hundred thousand dollars are there in $3 825 000.00?* (Note that students may say 8. That is the digit in the hundred thousands place.) *Where does this number start?* The teacher gives one end of a velour strip to the student standing in the millions place to hold. *What place are we talking about?* [hundred thousands] The teacher goes to the hundred thousands place with the other end of the velour strip for the student standing there to hold. *How many whole hundred thousands have been looped together?* [38 hundred thousands] *There are also 25 thousands that are part of a hundred thousand.* Demonstrate other non-standard place-value parts by looping velour strips to the designated parts. Repeat the process using other items and linking different places.

Reverse: Give the parts, make the whole using key-ring digit cards, Montessori numbers and calculators. Read the numbers. Discuss and make with key-ring digit cards, numbers that would be within 200 000 of a given number.

Hand

Group 1 – Work with the odometer principle: *Start at zero. Make 34. What do you notice?* [Numbers go to 9 and return to 0 but one more is added in the next column.] *Start at 1 524 698, make 1 524 713. How did you get there? Explain to the class.*

Group 2 – Calculator activity – play "Wipe-out": *Enter 1524713. As you spend your Lotto million, how would you wipe-out the digit 2? How much did you spend? Use the expander to help you. What number did you get? What operation did you use? Work with a partner to take turns in asking your partner to wipe-out the digits, one at a time. Record what you do. Share the process with the class.*

Group 3 – Use a number expander to find non-standard place-value parts: *Given your Lotto winnings of $3 174 682, find as many non-standard place-value ways as you can for telling your friends how much you have won. Record as you go and share with the class.*

Group 4 – Within 300 000: *Use Montessori numbers to make the following number: 1 524 713. What numbers would be within 300 000 of that number? Hint: The numbers would be between 300 000 more and 300 000 less than that number.*

Group 5 – Number order: *Arrange the costs of the items in these pictures in order. Draw a vertical number line to show the order. Arrange the cards in ascending order on the rope*.

Group 6 – Number cards: Students classify numbers by sorting costs into place-value groups. Give students cards with numbers between 1000 and 10 000 000 and ask them to organise the cards into the appropriate groups, e.g. *This number is in the thousands. What does this group of numbers have in common? Share with the class.*

Mind

Story: *Close your eyes and think of a house that costs over a million dollars. What digits do you see? Visualise the cost of a watch made up of 40 ones and 52 hundred dollars.*

Creativity

Spending my Lotto millions: Students choose and draw items they would buy if they won $5 000 000 in the Lotto.

Mathematics

Language/ symbols

count, record, place, ones, tens, hundreds, thousands, millions, tenths, hundredths, next, after, before, more, less, digit, value, partition, standard place-value parts, non-standard place-value parts

Practice

1. Calculators: *Enter 34 672 and add 1000. Keep on pressing the = sign; say the new numbers in the thousands place. What do you notice?* Repeat with other examples adding 10 000 and 100 000. Reverse and subtract 1000, 10 000, 100 000.
2. Worksheet: Given six- or seven-digit numbers:
   (a) write these numbers on a PV Chart;
   (b) write their names;
   (c) write the numbers one/ten/hundred/thousand smaller/bigger than.
3. Give a six- or seven-digit number. Students partition the number using coloured pencils to loop place-value parts together, then state (a) how they have partitioned the number, and (b) how it is conventionally partitioned.
4. For virtual activities, search: www.apples4theteacher.com/math.html; www.ixl.com/math/

Connections

Relate to decimals on PVE; pictures of cent items.

Reflection

Validation

Students check where thousands are used in the world, e.g. fans attending a sporting event, some in the members' stand, others around the ring, and so on; cost of houses, cars, boats, mobile homes; people at the Show (Exhibition or "Ekka" in Brisbane); distances from Australian cities or towns to other cities in the world; kilograms of wheat grains in a silo; kilolitres of water in a local dam.

Application/ problems

Provide applications and problems for students to apply to different real-world contexts independently; e.g. Search "Top 10 best selling singles of all time" to find sales numbers for the top 10 songs. Arrange in descending order of popularity.

Extension

Flexibility. Show different ways of representing a number, e.g. $370K, words, non-standard partitioning, explaining the methods to partition six-digit numbers. Justify by reversing the process to re-establish the given number.

Reversing. Students are able to move between telling a millions story ↔ acting it out ↔ writing the whole number ↔ partitioning it (both standard and non-standard), starting from and moving between any given point.

Generalising. *The number system is based on groups of 10. Any group of 10 is moved over to the next place. The only digits we have are digits 0–9. In any place, the digits start at 0 and go to 9, then back to 0 again, while the digit in the next column to the left increases by one. The value of a digit depends on its place-value position and its face value. Patterns of three are constant in reading numbers to any power of 10. A whole number is made up of the sum of its parts that may be arranged in many different ways to display the same whole number (or decimal number).*

Changing parameters. Measurement: metres, grams, litres. Students are able to partition numbers to the seventh and eighth power of 10.

Teacher's notes

- Ensure that students have a sound understanding of the HTO pattern in three-digit numbers before proceeding to higher numbers and of standard partitioning before introducing non-standard partitioning.
- 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.

Appendix A: Millions Place Value Chart

H	T	O	H	T	O	H	T	O
Millions			**Thousands**			**Ones**		

Appendix B: Millions Number Expander