YuMi Deadly Maths

Year 4 Teacher Resource:

NA – Act it out

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

YuMi Deadly Maths Year 4 Teacher Resource: **NA – Act it out**

QUT

YuMiDeadly
Growing community through education

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

Act it out

Learning goal

Students will:

- revise and extend fluency of recall of the 10× facts
- solve multiplication and division problems
- describe and continue patterns created from multiplication.

Content description

Number and Algebra – Number and place value

- Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9 (ACMNA074)
- Recall multiplication facts up to 10 × 10 and related division facts (ACMNA075)
- Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder (ACMNA076)

Number and Algebra – Patterns and algebra

- Explore and describe number patterns resulting from performing multiplication (ACMNA081)
- Solve word problems by using number sentences involving multiplication or division where there is no remainder (ACMNA082)

Big idea

Number – base 10 number system – multiplicative structure

Resources

Play money ($1 coins, $10 notes); place-value cards ones, tens, hundreds, thousands and digits 0–9; thinkboard, hundred board

Reality

Local knowledge

Students in class = how many fingers/toes/fingers + toes, e.g. 24 lots of 10 fingers/toes and 48 lots of fingers and toes; counting money in lots of ten.

Prior experience

Check that students know the 10s fact family and related division facts.

Kinaesthetic

Students are bank tellers. Each student has a number of $1 coins and $10 notes that they count into groups of 10. They then count how many groups of 10 are in each set of coins and notes to calculate and record the total amount of money received that day:

e.g. 14 × 10 × $10 = $1400
27 × 10 × $1 = $270
Total = $1670

Students swap their money with a partner who repeats the process. They then compare the total result that should be the same for both counts. If not, a third person may be asked to check the count.

Abstraction

Body

Give place-value cards to four students in a mixed order and ask the class to order the places in the correct sequence.

With correct place value established, ask one student to get the digit 4 and stand in front of the student with the flashcard of the ones place. Say: *This shows 4 ones. What operation do we need to make the 4 ones 10 times bigger?* Elicit multiplication. *What happens to the 4 in the ones place when we multiply 4 by 10?* [The 4 moves over/up one place into the tens place.] Student holding the digit 4 moves into the tens place. *What digit is the place holder?* [Zero] Ask another student to take a zero flashcard and stand in the ones place. *How many ones are there now?* [40] Say: *4 multiplied by 10 equals 40*.

Repeat the process using more one-digit numbers to reinforce the pattern: *Multiplying by 10 means the digit is moved one place into the tens place, making the original number ten*

times bigger. Once students have grasped the pattern, introduce multiplying two-digit then three-digit numbers by 10, e.g. 57 × 10: To multiply by 10, move the students holding 5 in the tens place and 7 in the ones place up one place – BOTH students move up one place so we have 57 tens or 570 ones; the ones place is kept by a student with zero; 57 × 10 = 570. 296 × 10: Move all the digits (students) up one place to make the number ten times bigger. Keep the ones place with a zero which is the place holder.

Once the pattern for multiplication by 10 has been established, introduce multiplying by 100 using the same process: start multiplying one-digit numbers to understand the student (number) needs to move two places, from the ones to the hundreds place. Pattern is: multiplying by 100, the digits (students) move two places to make the number one hundred times bigger. Then multiply two-digit numbers by 100. Reinforce the pattern: *To multiply by 100, all the digits move up two places*; e.g. 71 × 100 – the students move up two places, 71 × 10 = 7100. Keep the other places with zeros. Say: *71 has been made 100 times bigger*. *There are 71 hundreds or 7 thousand 1 hundred ones or 710 tens.*

Reverse: Start dividing even tens to 90 by 10 using the reverse pattern. *How many tens are there in 30?* [3]. *What operation do we use?* [Division] *30 ÷ 10 = 3. What does the student with the digit 3 in front of the student holding the tens place do when we divide 30 by 10?* [Moves back one place to stand in front of the student holding the ones place.] Repeat until students understand the division by 10 pattern: *Dividing by 10 means the digits move back one place – 4 tens become 4 ones; it is ten times smaller*. Progress to division by 10 with three-digit and four-digit numbers. (ALL the digits move back one place to make the number ten times smaller.)

Repeat process to establish the pattern for division by 100. Always start with whole hundreds then progress to four-digit whole hundreds. Pattern is: to divide by 100, all the digits move back two places. The number is one hundred times smaller.

Set multiplication and division word problems for students to solve by acting the problems. Use the thinkboard. Always restate the pattern for multiplication/division by 10/100.

Hand

Students make the Metric Slide Rule (Appendix A) and a number of strips on which to write various numbers so that they can be pulled through the slide to multiply and divide by 10; e.g. 34 × 10 will be pulled one place to the left along the slide to give 34 tens so that the 3 is in the hundreds place, the 4 in the tens place and zero inserted as a place holder in the ones place: 34 × 10 = 340.

Mind

Students visualise a given number and then make it 10/100 times bigger/smaller.

Creativity

Students use pictures to show the growing by 10 pattern, e.g. a short seed/person/flower, 10 times bigger, 10 times bigger again. Reverse and come back, 10 times smaller, 10 times smaller again.

Mathematics

Language/ symbols

multiply, divide, fact family, multiples, extended facts, fluency, patterns, repetition, part, whole, number sentence, operation

Practice

1. Complete number patterns based on multiples of 10:
   - ascending and descending, working with three- and four-digit numbers
   - discuss strategies used to complete patterns.
2. Apply mental and written strategies to:
   - investigate multiplication and division word problems, identifying the parts, the whole, missing elements and the operation required to solve the problem
   - match or write number sentences required to solve word problems
   - solve multiplication and division problems, using informal recording methods to show working out.

3. Calculator practice with multiplication and division by 10/100 that consolidates the kinaesthetic examples in the Abstraction section above. Record the number sentences of examples given.
4. Colour the tens pattern on a hundred board to 500.

Connections Connect to measurement, extended place value.

Reflection

Validation Students look in their world where they see growth in tens; e.g. walk in the bush, notice young trees through to great mature trees; roads – driveway into the house, length of street, road to school, and so on.

Application/ problems Provide applications and problems for students to apply to different contexts independently; e.g. solving number sentences and word problems using money/measurement (grams/ kilograms etc.)

Extension

Flexibility. Students' understanding of the principle allows them to move easily from one to more digits in multiplying or dividing by 10 or 100.

Reversing. Students are able to tell stories about the multiplicative structure of 10, make models, act it out, use the language and symbols, multiply and divide a number by 10/100; given two numbers (e.g. 46 and 4600) students can describe the operation (e.g. 46 × 100 = 4600), beginning at any point and going to all others.

Generalising. *The number of zeros tells us how many places to move the digits – up for multiplication to make the number bigger/back for division to make the number smaller.* Look for the pattern, for example:

- 10, one zero, move the digits one place
- 100, two zeros, move the digits two places
- 1000, three zeros, move the digits three places
- 10 000, four zeros, move the digits four places; and so on ...

Multiplication by 10/100 makes the number bigger, division makes it smaller.

Changing parameters. Students investigate multiplication and division by 1000 and 10 000; investigate the patterns created by multiplying by 101.

Teacher's notes

- Practise acting out many examples, simple to more complex, before progressing to written examples.
- 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: Metric Slide Rule

TH	H	T	O
1000	100	10	1

✂ slit ✂ slit

How does it work?

		3	0	0	

What is my new number?

TH	H	T	O
	3	0	0
1000	100	10	1

✂ slit ✂ slit

Pull the slider one place to the left to multiply by 10; Pull the slider two places to the left to multiply by 100 etc.
Pull the slider one place to the right to divide by 10; Pull the slider two places to the right to divide by 100 etc.
3 in the Hundreds place – how many ones is that? etc.