YuMi Deadly Maths

Year 5 Teacher Resource:

NA – Pizza for lunch

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

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QUT

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ACKNOWLEDGEMENT

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in which the mathematics ideas for this resource were developed,
refined and presented in professional development sessions.

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Year 5 Number and Algebra

Pizza for lunch

Learning goal Students will recognise and model fractions flexibly using materials and diagrams to perform addition or subtraction of fractions with like denominators.

Content description

Number and Algebra – Fractions and decimals

- Compare and order common unit fractions and locate and represent them on a number line (ACMNA102)
- Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator (ACMNA103)

Big idea Number – part-whole

Resources Maths Mat (6 × 10 squares), elastics or velour strips, students, real-life objects, diagrams of 2D and 3D shapes, liquorice strips, paper strips, fraction mats, measuring jugs, Unifix cubes, counters, attribute blocks, chairs, geoboards, pattern blocks, number line, pegs on a rope, fraction circles, rectangles, straws, Cuisenaire rods, squared paper

Reality

Local knowledge Look for things in local environment that use fractions (e.g. half a glass of water, halfway home, quarter of an orange, eighth of a pizza). Try to find unique things.

Prior experience Check that students can count, partition in equal parts and know basic shapes.

Kinaesthetic Find objects in the environment that students can find a fraction of or cut into fractions; e.g. their bodies, fruit. For a length model, go outside and walk alongside the building – stop one quarter of the way, halfway, and so on. Choose a distance, e.g. tree to second tree – walk it – call it one whole. Ask students to estimate and walk a sixth, a third or two-sixths etc. Walk the whole way counting off sixths and end at $^{6}/_{6}$. Mark off parts of body – feet $^{0}/_{4}$, knees $^{1}/_{4}$, hips/waist $^{2}/_{4}$, chest/shoulders $^{3}/_{4}$, head $^{4}/_{4}$ – get students to point as teacher says fraction; reverse: get students to say as you point at own body.

Abstraction

Body Maths Mat and elastics or velour strips: Get four students to mark off a rectangle of 12 squares with one elastic or velour strip. Stress that this is one whole rectangle that we will divide into parts. Have two students divide the 12-squared rectangle into halves with another elastic. Ask two students to stand in each of the halves to develop the number sentence: $^{1}/_{2} + {}^{1}/_{2} = {}^{2}/_{2} = 1$. Record the calculation. Progressively, divide the whole 12-squared rectangle into thirds, quarters, sixths, twelfths. Use a similar process to develop equations, e.g. $^{1}/_{3} + {}^{1}/_{3} = {}^{2}/_{3}$; $^{2}/_{6} + {}^{3}/_{6} = {}^{5}/_{6}$. Make another congruent rectangle of 12 squares with a different group of four students. Using two other students for the new group, divide the rectangles into halves, thirds, quarters, sixths, twelfths. Repeat the same process to make number sentences such as $^{3}/_{4} + {}^{3}/_{4} = {}^{6}/_{4} = 1{}^{2}/_{4} = 1{}^{1}/_{2}$. Use the same process to model subtraction. Calculate and record all examples. Ensure students understand the terms: unit fraction, mixed number, improper fraction, equivalent.

Reverse: Give an amount. e.g. $1{}^{7}/_{12}$, and ask students to write as many addition or subtraction number sentences as they can that would give that result.

Hand There are four models that lead to two concepts for the part-whole big idea. Use examples of real-life models for representing fractions as part of a whole or set/group leading to addition and subtraction of the parts. Record calculations.

1. Area model: Include cakes, pizzas, blocks of chocolate, paper folding, circles and rectangles (fraction discs), diagrams of 2D shapes. Colour parts to be added. Cut parts to be subtracted.

2. Linear/Length model: Include continuous items such as liquorice strips, paper strips, fraction mats.
3. Volume model: Include measuring jugs, diagrams of 3D shapes.
4. Set model: Include discrete items such as Unifix cubes, counters, logic attribute blocks, students, chairs, etc.

Mind Story: *Close your eyes and visualise a pizza cut into 8 parts. If John ate 3 pieces and Mary ate 2 pieces, how many of the 8 pieces were eaten? How many eighths were left?* Construct other examples using different models for the students to imagine in addition and subtraction operations.

Creativity Students construct their own examples of adding and subtracting fractions showing drawings and calculations.

Mathematics

Language/ symbols model, unit fraction, mixed number, improper fraction, equation, equivalent

Practice

1. Complete thinkboard activities to represent addition and subtraction of fractions, beginning in any of the five areas.
2. Draw and record with materials, fractions in area, set or length models using a range of materials:
   - Measurement Mat
   - Geoboards
   - Pattern blocks
   - Number line
   - Pegs on a rope
   - Fraction circles, rectangles, straws
   - Cuisenaire rods
   - Squared paper
3. For virtual activities, search: http://www.apples4theteacher.com/math.html; http://au.ixl.com/math/

Connections Connect to spatial, length (1 dimension), area (2D), volume (3D), decimals, percentage, ratio if they come up incidentally.

Reflection

Validation Students check where fraction are added or subtracted in the real world, e.g. eating orange segments at half-time at sport.

Application/ problems Provide applications and problems for students to apply to different real-world contexts independently; e.g. *Students calculated how many pizzas they needed to order for the class. After ⅞ of the Meatlovers had been eaten, ⅝ of the Supreme and ⅞ of the Ham and Pineapple, how much had been eaten altogether?* [$^{19}/_{8} = 2\,^{3}/_{8}$] *If the Cheese and Bacon had not been touched, how much remained?* [$1\,^{5}/_{8}$]

Extension **Flexibility**. Students are able to work with fractions using unit, improper, mixed numbers and can see equivalence at least to half.

Reversing. Students are able to move between telling addition and subtraction fraction stories ↔ acting them out ↔ writing the equation, using unit, mixed number and improper fractions, starting from and moving between any given point.

Generalising. *Fractions of the same type are added together or subtracted. We look at the top number, the numerator, to know how many to put together or take away. The bottom*

number, the denominator, tells us what type of pieces or fractions we have, that is, how many parts the whole has been divided into.

Changing parameters. Work with fifths, tenths, sevenths, ninths. Use fraction sticks to introduce the notion of equivalence.

Teacher's notes

- Ensure that students have a sound understanding of unit fractions before proceeding to improper fractions and mixed numbers.
- It is crucial to ensure that students maintain the whole throughout. When a paper rectangle is folded into four, some students see four wholes not one whole. Thus, we spend time at the start stressing what the whole is and keep a coloured whole to compare the part with. Similarly, for Unifix, we spend time at the start ensuring students see the Unifix as one whole group. Other methods to do this are running a finger around the whole while saying "this is one whole" or putting the Unifix on a coloured piece of paper or drawing a circle around the Unifix. The idea is to act out the formation of the whole, so that the kinaesthetic sense is in action as well as sight, hearing and touch.
- The two notions that underlie the teaching of fraction are **unitising**, making a whole out of parts (even if only in the mind), and **partitioning**, making parts out of a whole.
- 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.