YuMi Deadly Maths

Year 6 Teacher Resource:

NA – An equal share

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

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ACKNOWLEDGEMENT

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Year 6 Number and Algebra

An equal share

Learning goal Students will compare and order proper and improper fractions and mixed numbers with related denominators on a number line.

Content description Number and Algebra – Fractions and decimals

- Compare fractions with related denominators and locate and represent them on a number line (ACMNA125)

Big idea Number – part-whole

Resources Paper shapes, apples, cord, Unifix cubes, two long ropes of unequal length, arrow cards for proper, improper, mixed numbers, equivalent fractions ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{9}$, $\frac{1}{10}$, their multiples, improper fractions, mixed numbers, equivalent fractions and words to 2 wholes), paper strips the same length and other strips of unequal length, colouring pencils, mix-and-match cards, Bingo game, fraction discs, Whole/Part charts and cards with fraction names

Reality

Local knowledge Discuss with students where they find fractions, what type of fractions they use and why we need fractions, that is, for what purpose fractions are used.

Prior experience Display a collection of materials showing partitioning into halves and quarters, e.g. **different** wholes of paper shapes, pieces of cord, Unifix cubes and apples, most of which have been cut into halves and quarters. Emphasise that halves, quarters etc. of the **same whole** give **equal parts**, but when comparing halves of **different wholes**, they are **not** the same (equal) because the wholes each half came from were not equal.

As revision, ask various students to show proper, improper, mixed numbers, equivalent fractions using each of the media provided, e.g. $1\frac{1}{2}$ pieces of rope, $\frac{6}{4}$ of apple, etc. Revise understanding of terms: *numerator* [how many parts we take], *denominator* [what type of parts they are] and *vinculum* [same as division, e.g. $\frac{1}{2}$ is one divided into two parts].

Kinaesthetic One long rope, arrow cards (0, $\frac{0}{4}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{4}$, 1, $\frac{4}{4}$, $1\frac{1}{4}$, $\frac{5}{4}$, $1\frac{1}{2}$, $1\frac{2}{4}$, $\frac{6}{4}$, $1\frac{3}{4}$, $\frac{7}{4}$, 2, $\frac{8}{4}$), numeral and word cards for these amounts, apples to represent the same amounts. Distribute the cards randomly to students and have apples (whole and cut) in a basket. Each rope represents two wholes (0–2). Ask the students with the word and numeral for both zero and two to place those cards in the appropriate order on the rope. Follow this order: Place word and numeral for 1, then $\frac{0}{4}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, counting and stepping out as you go. Discuss that to be quarters, each quarter must be the exact size as the other quarter. Reposition if necessary. From the $\frac{3}{4}$ mark, ask: *What will another quarter give us?* [$\frac{4}{4}$]. *What does this equal?* [1]. *Is there another fraction card that should be placed between 0 and 1?* [$\frac{1}{2}$] *Why?* Place apples to align with fractions. Proceed, counting and stepping out in quarters to $\frac{8}{4}$, making links to mixed numbers and equivalent fractions. In a horizontal line, all students (half on one side of the rope and half on the other side) count and step out the quarters from zero quarters, saying the quarters, equivalent fractions and mixed numbers for each step.

Reverse: Have a student stand e.g. at $\frac{3}{4}$ and step out another $\frac{3}{4}$. *Where are you now?* [$\frac{6}{4}$, no surprise really, 3 + 3 = 6 of quarters or of anything]. *How else can $\frac{6}{4}$ be said?* [one and two quarters or one and a half]. Give similar examples.

Abstraction

Body Two long ropes of unequal length a metre apart, different-coloured arrow cards for thirds and fifths, their multiples and equivalent fractions to one (thirds, sixths, ninths, twelfths, and fifths, tenths, twentieths). Have two groups of students folding and marking one rope per group into halves, thirds, sixths, ninths, twelfths, and fifths, tenths, twentieths. (Thirds on the

shorter rope and fifths on the longer rope.) Compare and discuss the fractions in the two ropes. Have one student stand at half of each rope. *What fractions are smaller than half? How do you know? Which fraction is bigger, a fifth or a third? Why do you think that? Describe how thirds are always made, how fifths are made*. [A whole cut into equal parts.] *When are thirds (fifths, halves, etc.) the same? When are they different?* (refer back to Prior experience).

Reverse: Give a fraction, student stands at it and gives the improper fraction, mixed number and equivalent fraction. Start at any type of fraction and state the other equivalent types.

Hand Distribute paper strips to students, who fold and colour a fraction of the strip, choosing halves, quarters, eighths or twelfths. Move among other students to find equivalent coloured strips. Form groups of equivalent fractions. Discuss the different denominators and corresponding numerators that represent equivalent fractions. *What do you notice about the wholes?* Each group of students stands in order from smallest to largest.

Mind Students shut their eyes and visualise shapes cut into given fractions using proper, improper, mixed numbers and an equivalent fraction to the one given.

Creativity Students make a fraction collage or fraction pattern.

Mathematics

Language/ symbols proper fractions, improper fractions, mixed numbers, thirds, sixths, ninths, whole numbers

Practice

1. Worksheets:
   - Fraction wall
   - Circle the equivalent fraction: $\frac{3}{4}$ $\frac{11}{16}$ $\frac{15}{20}$
   - Fill in the box with < = > $4\frac{5}{8}$ ☐ $\frac{39}{8}$
   - Write fractions in ascending or descending order on the number line.
2. Games:
   - Mix-and-match cards; Bingo
   - Use the fraction discs, Whole/Part charts and cards with appropriate fraction names (e.g. 3 tenths, 2 eighths) for the following games. “Lose 5 ones”: Students start with 5 wholes on the Whole/Part chart, take turns in drawing a card and taking away that number of tenths, eighths, etc. The first student to reach zero is the winner. “Win 5 ones”: The opposite to the game above – start with zero and build to 5 ones.

Connections Relate to division and measuring with units.

Reflection

Validation Students use knowledge to demonstrate how different lengths of paper can represent different fractions that measure the same size.

Application/ problems Provide applications and problems for students to apply to different real-world contexts independently; e.g. *A builder needs $24\frac{3}{4}$ metres of guttering and $24\frac{5}{8}$ metres of timber for renovations to a house. Does he need more or less timber than guttering?*

Extension **Flexibility**. Show different ways of representing fractions; e.g. look for all the places/objects where fractions can be shown in any of the forms: proper, improper, equivalent, mixed number.

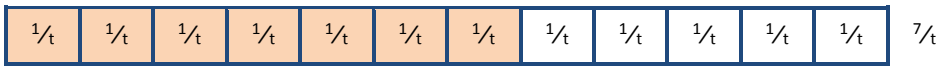
Reversing. Students need to be able to understand and move between all fraction types:

- WHOLE → PART (give students a paper square, say it is one whole, and ask them to fold to get $\frac{3}{4}$; give students 12 Unifix, say it is one whole, and ask them to show $\frac{2}{3}$)

- PART → WHOLE (give students a paper square, say it is $\frac{3}{4}$, and ask them to make one whole; give students 12 Unifix, say it is $\frac{2}{3}$, and ask them to make one whole)
- WHOLE/PART → WHOLE/PART (give students a paper square, say it is $\frac{11}{4}$, and ask them to construct $\frac{1}{2}$; give students 20 Unifix, say it is $\frac{12}{3}$, and ask them to make $\frac{21}{2}$)
- EQUIVALENT (give students a paper strip, fold it into quarters, shade $\frac{3}{4}$ and ask students to show $\frac{9}{12}$; reverse: give students a paper strip, say it is $\frac{6}{10}$ and ask them to show $\frac{1}{5}$).

Generalising. *The whole must be identified before the parts can be shown. Fractions are made by dividing the whole into a given number of equal parts. The denominator is the bottom number under the vinculum or dividing line; the numerator is the top number above the vinculum. The denominator tells what kind of equal parts we have (how many equal parts the whole has been divided into); the numerator tells how many of those parts we are talking about. Equivalent fractions are made by folding the fraction parts into smaller and smaller equal pieces or combining smaller parts to make larger equal pieces. Equivalent fractions have been made / must come from the same whole*.

Changing parameters. *How do we show the fraction where the whole has been divided into t bits and we take 7 of them? Draw a diagram and write the fraction*.



Teacher's notes

- 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.
- 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.