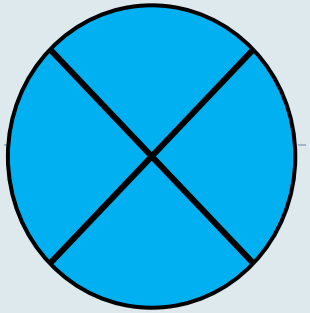
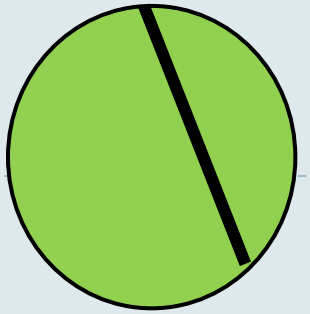
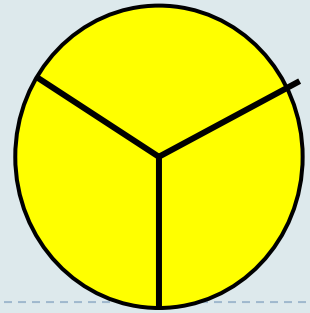
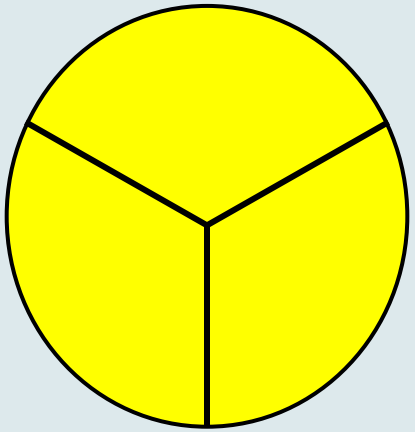




All A'Round' Fractions





FRACTIONS – Jenni Way

- http://topdrawer.aamt.edu.au/Fractions
- Most people would explain a fraction as a way of expressing **'equal parts of a whole**'.
- While the part-whole idea describes a common use of fractions, it is not the only meaning.
- The part-whole description **does not explain** a fraction as **a number positioned on a number line**, or the use of fractions to express division.

Relationship Between Quantities J. Way

- All fractions can be explained as expressing **mathematical relationships between quantities.**
- These quantities may be **discrete** (countable items) or **continuous** (like area and length).
- Modelling these various quantities leads to a range of representations for fractions — for example, **area diagrams**, **number lines** and **discrete objects**.

Misconceptions

J. Way

A range of misconceptions commonly may arise, such as:

- taking notice of the **number of parts only,** rather than their equality;
- seeing the written **fractions as a double count** of parts, existing as two whole numbers rather than a single number;
- **using different wholes** when attempting to compare the size of two fractions.

Teaching Fractions

Good teaching of the part-whole area model includes:

- developing **visualisation** skills to build a sense of the relative sizes of commonly used fractions
- using **grids and arrays** when exploring equivalence in order to promote multiplicative thinking (factors and multiples) rather than only additive thinking.

AC:M V9.0 Fractions Year 2 Content descriptor & Elaborations

- **AC9M2N03**
- recognise and describe one-half as one of 2 equal parts of a whole and connect halves, quarters and eighths through repeated halving
  - E1. creating halves of a range of **collections** sets by sharing collections into 2 equal groups; for example, comparing half of a set of 12 washers with half of a set of 8 bolts to identify how they both represent one-half of their respective set

AC9M2N03

- E2. creating halves using measurement attributes; for example, explaining that "a half is one part out of 2 equal parts of a whole"; equally folding a strip of paper, dividing a lump of playdough or separating a cup of water into 2 equal parts, then selecting one of the parts and naming it "one-half";
- comparing half of a **collection** of 10 counters with half of a shape or object and explaining how each shows **one-half of their respective wholes**

AC9M2N03

- E3. using repeated halving to **subdivide shapes and objects** in different ways to make corresponding halves, quarters and eighths; naming the parts and comparing the size of them to notice that they are all the same size, and demonstrating that a quarter is a half of a half and that an eighth is a half of a quarter
- E4. dividing a shape into equal parts and relating the number of parts to the **unit fraction**; for example, if there are 4 equal parts then each part is a one-quarter and if there are 8 equal parts then each is one-eighth

National Numeracy Learning Progression

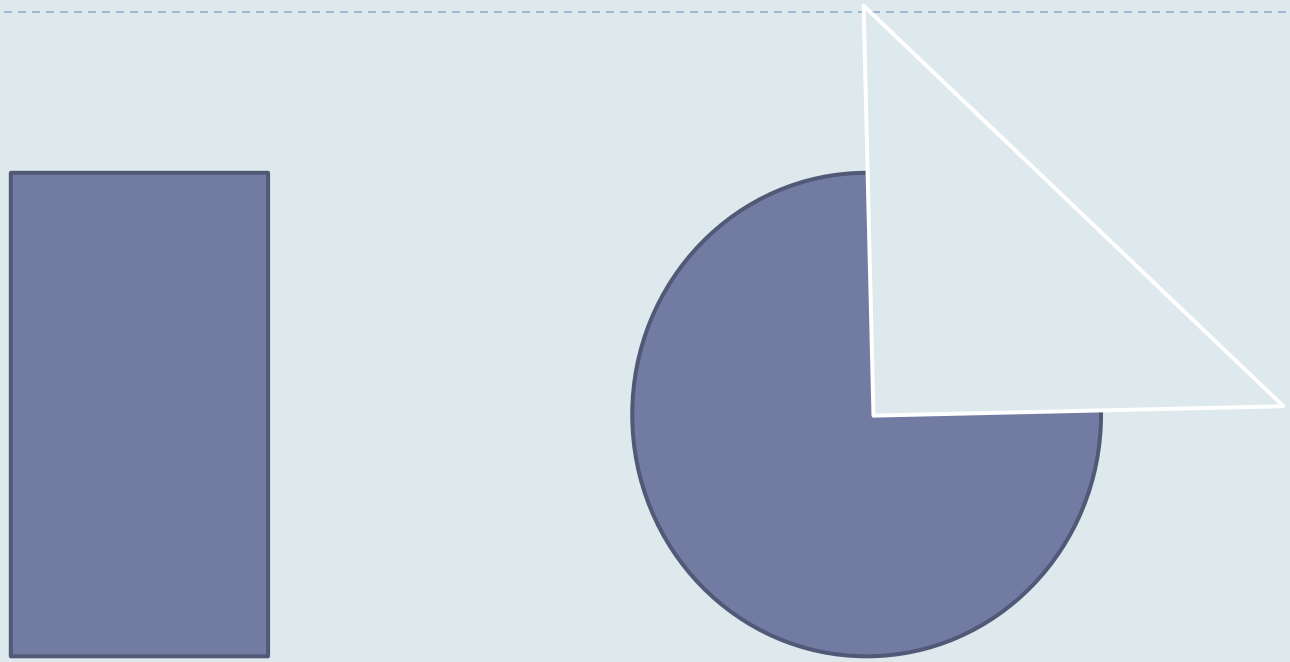
Interpreting fractions

InF1	**Creating halves** • identifies the part and the whole • recognises dividing a whole into 2 parts can create equal or unequal parts • creates equal halves by attending to the linear aspect of a model (folds a paper strip in half to make equal pieces by aligning the edges or makes 2 groups of 3 when halving a collection of 6 counters in a linear arrangement) • distinguishes between halfway and half
InF2	**Repeated halving** • recognises quarters and eighths formed by repeated halving of a length (finds halfway then halves each half, or repeatedly halves using a linear arrangement of discrete items – 8 counters halved and then halved again into 4 groups of 2)
InF3	**Repeating fractional parts** • accumulates fractional parts of a length (knows that two-quarters is inclusive of one-quarter and twice one-quarter, not just the second quarter) • checks the equality of parts by iterating one part to form the whole (when given a representation of one-quarter of a length and asked, 'what fraction is this of the whole length?', compares the size of the unit to the whole)
InF4	**Re-imagining the whole** • calculates thirds by visualising or approximating and adjusting (imagines a paper strip in 3 parts, then adjusts and folds) • identifies examples and non-examples of partitioned representations of thirds and fifths • recognises the whole can be redivided into different fractional parts for different purposes (a strip of paper divided into quarters can be redivided to show fifths) • demonstrates that the more parts into which a whole is divided, the smaller the parts become

Understanding Fractions Booker et. al

- Children acquiring fraction understanding need to **experience the partitioning for themselves** rather than being given materials already formed into parts. p.134
- The **rectangular region** has proven to be the most effective means of establishing the fraction concept as it not only shows the partitioning and naming processes and also allows an informal development of the notion that as the **number of parts increases** the **relative size decreases**. p. 140

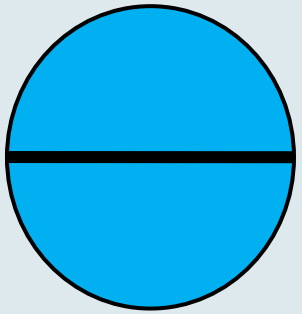
What's the Whole?



- **Complimentary or residual fraction** is the fraction required to complete the Whole.
- E.g. the complementary fraction to one quarter is three quarters.

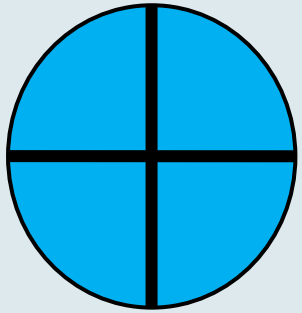
Cutting Circles – Halves

- **Need**: coloured circles, scissors, pen
- 1. Select a coloured circle;
- 2. Fold the circle in half;
- 3. Cut along the fold;
- 4. Label one half as: 1 half;
- 5. Label the other half as: $\frac{1}{2}$;
- 6. Create a number sentence;
- 7. Count to 5 using circle halves;
- 8. Record the number sequence.



Cutting Circles – Quarters

- **Need**: coloured circles, scissors, pen
- 1. Select a different coloured circle;
- 2. Fold the circle in half and in half again to create 'half of a half';
- 3. Cut along the folds;
- 4. Label one section as: 1 quarter;
- 5. Label one fraction as: 1 fourth;
- 6. Label one section as: $\frac{1}{4}$;
- 7. Label one section as $\frac{1}{2}$ of $\frac{1}{2}$;
- 8. Create number sentences;
- 9. Use circle quarters to count to 3;
- 10. Record the number sequence.



Complimentary Fractions – Quarters

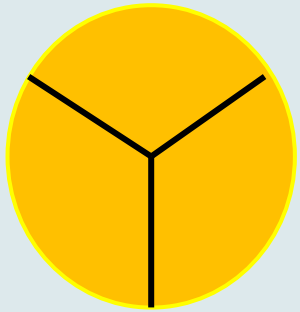
- **Need**: coloured circles, scissors, pen
- 1. Select a different coloured circle;
- 2. Fold the circle in half and in half again to create 'half of a half';
- 3. Cut along one fold from the circumference to the centre;
- 4. Cut along an adjacent radius to remove 1 quarter;
- 5. Label one section as: $\frac{1}{4}$
- 6. Label the other section as: $\frac{3}{4}$
- 7. Create number sentences.

Fraction Counting – Bruner

- Play 'First to 3'
  - 1. Take turns to count forwards from 0 by adding $\frac{1}{2}$ or $\frac{1}{4}$.
  - 2. First to say 3 wins.
  - 3. Play with your shapes;
  - 4. Play without the shapes;
  - What is the strategy?

Cutting Circles – Thirds

- **Need**: coloured circles, scissors, pen
- 1. Select a different coloured circle;
- 2. Fold the circle to create thirds;
  - Consider two ways of doing this.
- 3. Cut along the two folds;
- 4. Label one section as: $\frac{1}{2}$;
- 5. Label one section as: $\frac{2}{3}$;
- 6. Create number sentences.
- 7. Use circle thirds to count to 3;
- 8. Record sequence;



Complimentary Fractions – Thirds

- **Need**: coloured circles, scissors, pen
- 1. Select a different coloured circle;
- 2. Fold the circle to create thirds;
- 3. Cut along one fold from the circumference to the centre;
- 4. Label one section as: $\frac{1}{3}$;
- 5. Label one section as: $\frac{2}{3}$;
- 6. Create number sentences.

Ordering Fractions

- **Need:** all circle fractions created previously
- 1. Select 3/4/5 different fractions;
- 2. Give your fractions to a partner;
- 3. Partner to place fractions in order from smallest to largest and say the values.
- 4. Record from smallest to largest.
- 5. Record on a number line.
- 6. Swap roles.

Where to now?

- Which other aspects of fractions can this resource be used for?

- Comparison - >, <, =
- Addition/Subtraction of related denominators
- ?

Fraction Wheel

- **Need: two paper circles/plastic plates/circles; scissors**
- 1. Mark the centre of each circle/plate;
- 2. One cut from the circumference to the centre on both circles/plates;
- 3. Intersect the two circles/plates;
- 4. Rotate the circles/plates to create a fraction;
- 5. Name the fraction;
- 6. Name the complimentary fraction – the residual fraction.

Fractions

Students' first experiences of number are with positive integers — counting numbers and the operations of addition and subtraction. When they begin working with multiplication and division they are also introduced to rational numbers — more specifically, fractions. Many young students find the transition from whole-number thinking to rational-number thinking quite difficult.

It can be unsettling for students to discover that there are many more numbers between zero and one. To then extend that understanding beyond one (to include improper fractions and mixed numerals) can be a challenge.

One source of confusion is the fact that the symbols for fractions involve two numerals rather than just one. Two numerals are needed because a fraction expresses a mathematical relationship between two quantities.

To further complicate learning about fractions, there are various meanings and uses for fractions, such as part-whole, division and ratio. There is also a huge variety in the ways fractions can be represented, such as area diagrams, lengths, volumes and discrete items.

All of these complications make good quality teaching essential. Attention must be given to developing conceptual understanding and 'fraction sense', rather than relying on procedural understanding and practised 'rules'.

A conceptual understanding of fractions is essential for problem solving, proportional reasoning, probability and algebra.

- Big ideas
- Misunderstandings
- Good teaching
- Assessment
- **Activities**
  - Cake fractions
  - Cassowary fractions
  - Comparing non-unit fractions
  - Comparing unit fractions
  - Cut and find
  - Divide it up
  - Dividing pancakes
  - Dynamic fractions
  - Fraction fiddle
  - Fraction strips
  - Fraction wall game
  - Fraction wheel
  - Grids and jumps
  - Hit the apple
  - Number lines

Home > Fractions > Activities

Activities

These teaching activities also appear in the Misunderstandings and Good teaching sections of the drawer where they are preceded by additional important mathematical and pedagogical information to assist in your teaching. The activities include digital learning objects, the use of a variety of materials to model mathematical understandings, and games.

Cake fractions

Students use a digital learning object to predict the written fraction that best describes part of a circle. Students then reconstruct both the symbolic fraction and the area model to check the prediction.

More...

Cassowary fractions

The digital learning objects provide contexts to help focus student thinking on the equality of parts, not just the number of parts.

More...

Comparing non-unit fractions

The digital learning object provides a tool to help students develop strategies for comparing non-unit fractions.

More...

Comparing unit fractions

Search the site for keywords:

Search