Fractions

This document is part of a set that forms the subject knowledge content audit for Key Stage 1 and Key Stage 2 maths. Each document contains: audit questions with tick boxes that you can select to show how confident you are (1 = not at all confident, 2 = not very confident, 3 = fairly confident, 4 = very confident), exemplifications; explanations; and further support links. At the end of each document, there is space to type notes to capture your learning and implications for practice. The document can then be saved for your records.

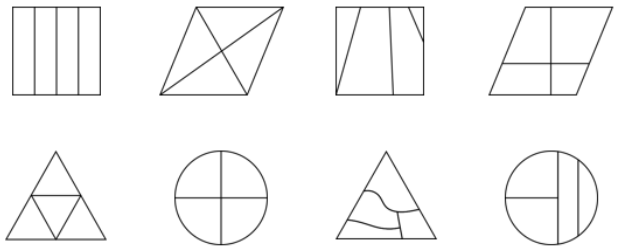
Question 2

How confident are you that you understand and can support children to recognise that a whole can be divided into equal and unequal parts and these parts may not look the same?

1 ☑ 2 ☐ 3 ☐ 4 ☐

How would you respond …?

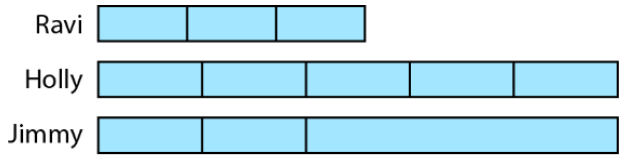
a. How would you describe the way these shapes have been divided?



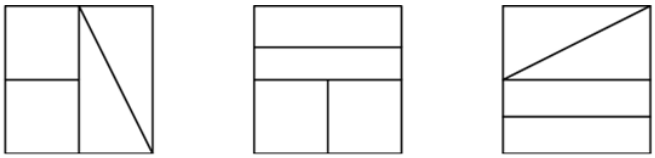
b. Three children have folded their paper strips in different ways.

Which strip is the odd one out?

Can you find a way to make each of the strips the odd one out?



c. Have each of these shapes been divided into equal or unequal parts?



Responses

Note your responses to the questions here before you engage with the rest of this section:

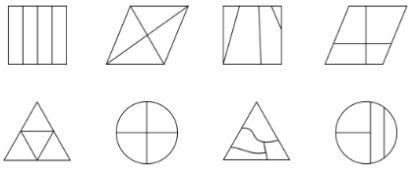
Did you notice that…?

a. In part a, we are looking for the number of parts the shape has been divided into and whether they are equal or unequal.

Top row, left to right:

This shape has been divided into:

- four equal pieces.
- four equal pieces.
- four unequal pieces.
- four unequal pieces.



Bottom row, left to right:

This shape has been divided into:

- four equal pieces.
- four equal pieces.
- four unequal pieces.
- four unequal pieces.

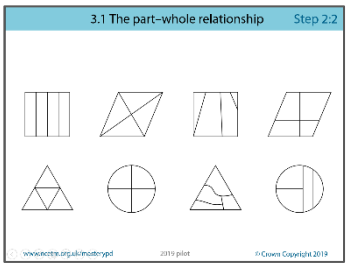
b. Ravi could be the odd one out as he has a different whole to the other two people, or his shape parts are smaller than Holly or Jimmy's.
Holly could be the odd one out because she has five parts, whereas Jimmy and Ravi both have three parts.
Jimmy could be the odd one out because he is the only one who has unequal parts.

c. In each of these cases, the square has been divided in half and each half has been divided into two equal pieces. Each part has the same area ($\frac{1}{4}$ of the whole) and the parts are not congruent (they do not look identical. Congruent shapes can be repositioned or reflected but not resized) but they are equal.

Recognising equal and unequal parts

Children will have been introduced to the concept of equal and unequal groups through their work on multiplication. When looking at equal and unequal groups, the language will focus on equal and unequal parts.

In the early stages of developing understanding, children should experience how to divide a whole into different parts by cutting and reassembling. This will reinforce the concept that a whole is made from many parts and that many parts make a whole.



How would you sort these shapes?

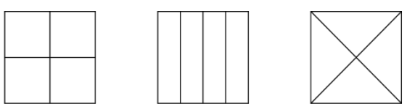
The children could be provided with images (usually shapes) to explore, compare and sort.

Some children may sort according to either the shape of the whole or whether the pieces are equal or not. It is also helpful to encourage the children to comment on how the shape has been divided. For example,

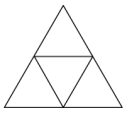
'The whole has been divided into _____ equal/unequal parts.'

It is important to vary the examples given to prompt their thinking and expose possible misconceptions. For example:

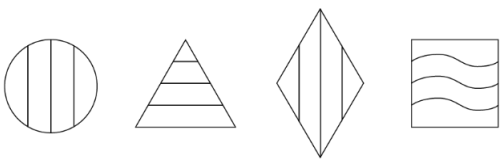
Squares divided into four equal parts in different ways.



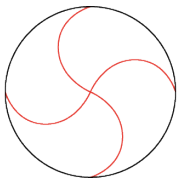
An equilateral triangle divided into equal parts



Shapes divided into parts of equal width but not of equal size.



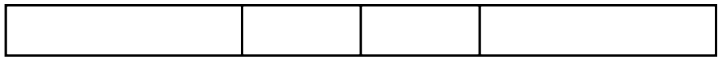
At this early stage, the shapes given to children should have been divided into equal, congruent parts (parts that have been repositioned or reflected but not resized). Parts that are non-congruent but have the same area are addressed later in the children's understanding of fractions, as part of identifying, representing and comparing. Include examples where the lines are not straight (see right).



Children should also be given the opportunity to explore this in a linear model. In this case, a strip of paper will be a helpful representation. Children can fold it into parts and identify if they are equal or unequal.

Other linear examples may involve length, so ribbon or string may be used. It may be harder to see the folds with these materials so pegs can be used as markers.

'I have folded my whole length of paper into four unequal parts.'

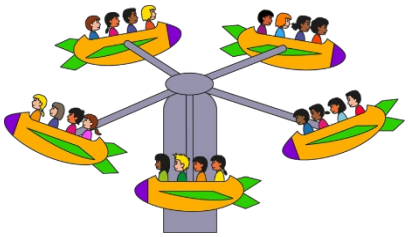


After exploring equal and unequal parts in area and length, move on to a third model: sets of objects. Children have already looked at equal and unequal groups of objects in their multiplication work.

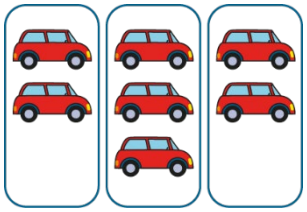
Are these sets divided into equal parts or not?

In this case, the children in each set are not the same but the quantity of children is. Children need to be exposed to examples where the parts may not look the same but the quantity within each part is equal.

'The parts are equal. I know this because the number of people in each part is the same.

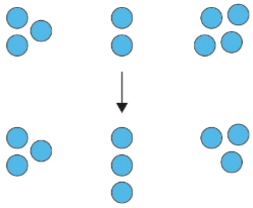


In this case, the set size is equal but the quantity of cars within each set is not the same.



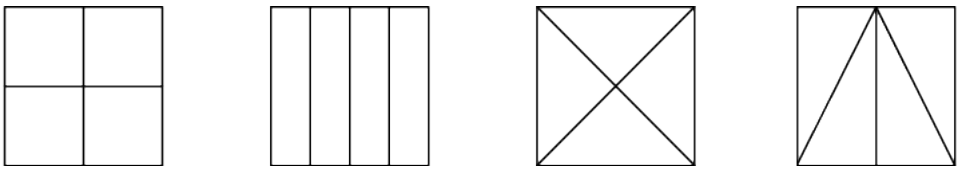
'The parts are unequal. I know this because the number of cars in each part is not the same.'

As children become confident with recognising sets that are equal or not equal, their thinking can be extended by presenting sets that are unequal and asking if these can be made equal. For example:



As children begin to understand that groups or parts can be equal, even though they may appear to be different, expose them to more examples that challenge the idea that equal parts must look the same. For example:

- *'Has each square been divided into four equal parts?'*
- *'What can you say about these parts?'*
- *'What is the same?'*
- *'What is different?'*



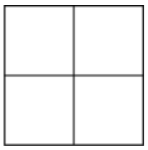
Common errors in this area may include:

- children thinking that equal means they must look identical.

What to look for

Can a child:

- identify which wholes have been divided into equal parts and which have not?
- identify where parts are equal, even if they don't look the same?
- create different equal parts, not just overlearning one fixed image, e.g. is this the only way to divide a square into four equal parts?



Links to supporting materials:

NCETM Primary Professional Development materials, Spine 3: Fractions:

- Topic 3.1: Preparing for Fractions: The Part–Whole Relationship

Notes:

Key learning from support material and self-study:

What I will focus on developing in my classroom practice: