NCETM
NATIONAL CENTRE FOR EXCELLENCE
IN THE TEACHING OF MATHEMATICS

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 3

How confident are you that you understand and can support children to iterate a whole from a given part?
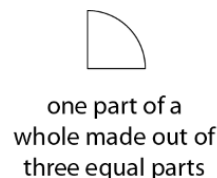
1 ☐   2 ☐   3 ☐   4 ☐

How would you respond …?

a. Liz has folded her paper strip into three equal parts. Lara has folded her paper strip into four equal parts.
Part of their strips are hidden.
Whose paper strip is longer?

Liz

Lara

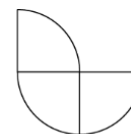b. Four children have been given part of a shape and have been asked to draw the whole shape.

one part of a
whole made out of
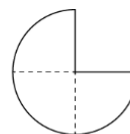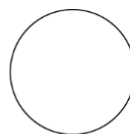three equal parts

Who has drawn a correct shape and why?

Max   Beth   Ellen   Florent

Responses

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


Did you notice that…?

a. Lara will have the longer strip as we can see that the parts are the same size. Lara has four of these parts while Liz only has three.

Liz

Lara

b. Max – incorrect, wrong number of parts
Beth – correct, right number and shape of parts
Ellen – correct, right number and shape of parts
Florent – incorrect, right number of parts, wrongly shaped parts

---

Iterating a whole

One definition of iteration is to create something by building on previous versions. For example, I may show a room full of people this… △ one part … and say *'Draw the whole'*.

This sort of task is likely to elicit a lot of different responses, with people drawing on where they may have seen this part of the image before. For example:
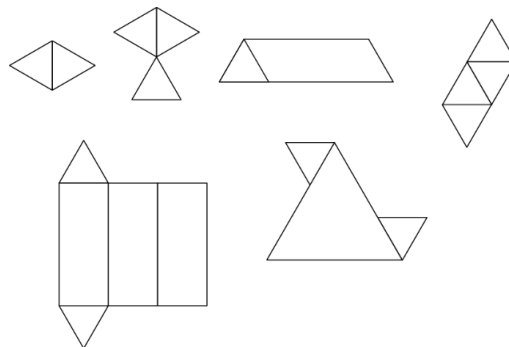
This would probably also cause confusion and people would want more clarity. They would want to know:

- the size of the part
- the number of parts
- whether the parts are of equal size.

All of this must be identified for us to feel that we can be successful.

When we understand that parts in fractions are equal and we know how many parts we have, we can use this knowledge to construct the whole.

This is one part of a whole made from three equal parts. What could the whole look like?
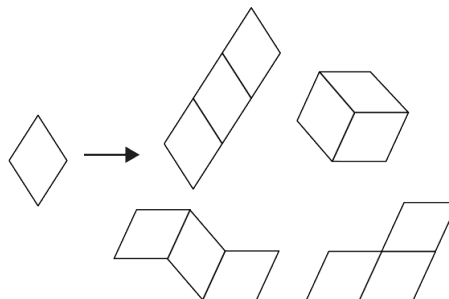
When children are engaging with activities like this, targeted questioning can be used to deepen their understanding. For example:

- *'What is the same about these completed shapes?'*
- *'What is different about these completed shapes?'*

This draws their attention back to the fact that there are three parts to each shape, each part is the same size, and the parts can be arranged in different ways.

It is important that children make sure the whole has the number of parts identified, not the original part plus the additional amount.
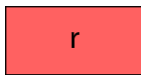
☐ one of five parts

✗	✔
1 2 3 4 5	1 2 3 4 5

Provide opportunities for the children to apply this understanding in a range of situations, such as:
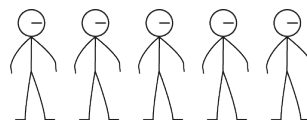
Cuisenaire® rods

'Here is a red Cuisenaire® rod. It is one of four equal parts of another rod. Which rod is that?'

r

### Examples that include the cardinal amount (a numerical quantity)

'The class has been divided into four equal teams. Here is one of the teams. How many children are in the class? Draw the whole class.'

Every opportunity should be taken for children to show that they can move from part to whole and from whole to part. For example:

Moving from the right-hand column to the left-hand column

'This is the whole. The whole is divided into three equal parts. This is one of the parts.'

Part	Number of equal parts	Whole
△	3	△△
▭	5	▭▭▭▭▭
👥	4	👥👥👥👥

Then, moving from the left-hand column to the right-hand column

*'This is a part. There are three of them. This is the whole.'*

Common errors in this area may include:

- children thinking that 'equal' means they have to 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?
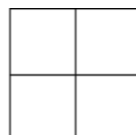
Links to supporting materials:

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: