

## 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 4

How confident are you that you understand and can support children to recognise that a whole can be divided into any number of equal parts and that we use fraction notation to describe this?

1

2

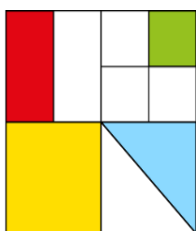
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### How would you respond ...?

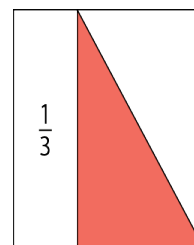
a. What fraction of the whole square is:

- red?
- green?
- light blue?
- yellow?



Can you explain how you worked each one out?

b. What fraction of the square is red? Explain your reasoning.



### Responses

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

### Did you notice that...?

- a. What fraction of the whole square is:
- **green** –  $\frac{1}{16}$  is green as the square has been divided into four equal parts and then this section has been further divided into four smaller equal parts. This means there would be 16 equal parts in this whole square. One of those parts is shaded green, which is equivalent to  $\frac{1}{16}$  of the whole.
  - **red** –  $\frac{1}{8}$  is red as the square has been divided into four equal parts and then this section has been further divided into two smaller equal parts. This means there would be eight equal parts in this whole square. One of those parts is shaded red, which is equivalent to  $\frac{1}{8}$  of the whole.
  - **light blue** –  $\frac{1}{8}$  is light blue as the square has been divided into four equal parts and then this section has been further divided into two smaller equal parts. This means there would be 8 equal parts in this whole square. One of those parts is shaded light blue, which is equivalent to  $\frac{1}{8}$  of the whole.
  - **yellow** –  $\frac{1}{4}$  is yellow as the square has been divided into four equal parts. This means there would be 4 equal parts in this whole square. One of those parts is shaded yellow, which is equivalent to  $\frac{1}{4}$  of the whole.
- b.  $\frac{1}{3}$  of the square is red. The whole square is divided into three parts. We are told that the rectangle is  $\frac{1}{3}$  so the remaining part of the square is two thirds. This has been divided into two equal parts, so each part is  $\frac{1}{3}$ .

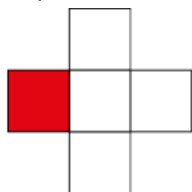
### Using fraction notation

Before we address the use of fraction notation, children should have had lots of opportunities to become familiar with dividing wholes into parts, describing if the parts are equal or unequal and identifying how many parts the whole has been divided into. However, they should not have used the word 'fraction', seen any written fraction notation ( $\frac{1}{4}$ ) or said any fraction names ('one-quarter'). The children need to understand that there is a special name for the relationship between a whole and a part and that this is called a fraction.

Teach the children that when writing fractions, they should:

- write the division bar first, as this emphasises that the whole has been divided
- write the denominator next, as this shows the number of equal pieces the whole has been divided into
- write the numerator last, as this shows the number of parts they have.

It is common for people to write a fraction 'from the top down' (writing the numerator, then the bar, then the denominator). However, the 'bar first' method supports the children in linking the notation of the fraction to the operation of division, so it is worth writing fractions in this order.



One way of doing this is to scaffold the children's thinking by using stem sentences. For example, show this image and complete the sentences.

- 'The whole has been divided into \_\_\_ equal parts.'
- '\_\_\_ of the parts has been shaded.'

Then, move onto saying and writing:

**1**  
**3**

**Say**

'The whole has been **divided**...'

'...into **three** equal parts.'

'**One** of the parts has been shaded.'

**Write**

The division bar: –

The denominator: **3**

The numerator: **1**

Question the children to check they have understood what the numerals in  $\frac{1}{3}$  represent:

- 'What does the '3' represent?'
- 'What does the '1' represent?'

## Unit fractions

Children will initially only be introduced to unit fractions. Unit fractions represent the unit being worked in, defined by the denominator; it is not the 'one-ness' that is special in a unit fraction.

For example, in the case of one-sixth, it is the 'sixth-ness', the unit of a sixth that is important. Children are more familiar with working in units of whole numbers, in particular hundreds, tens and ones. Now, they are working with a variety of different units, which are all less than one, so this is a big step.

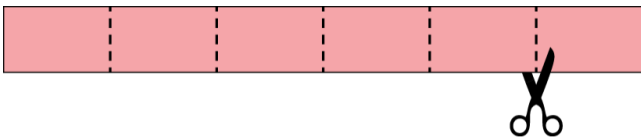
The emphasis at this stage should be on notation and the names of the different unit fractions, as this language will be new to the children. For example, make sure they say one-third not one three.

Again, it is important that children are not only introduced to wholes that are shapes. Representations should include both length and sets of objects.

Some examples have been included below to show the breadth of context that children should experience.

### What fraction of the ribbon has been cut off?

The whole has been divided into six equal parts.



Each equal part is one-sixth of the whole.

One-sixth of the whole ribbon has been cut off.

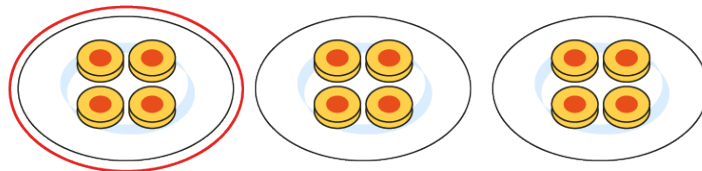
### What fraction of the tower is yellow?



### How would you describe one plate of biscuits?

The biscuits are arranged in three equal groups.

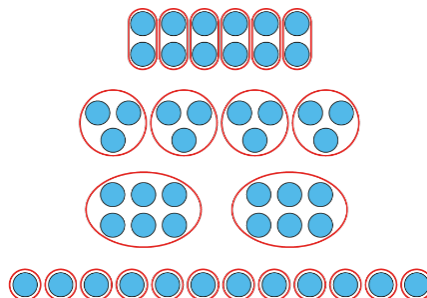
So, the biscuits on one plate can be described as one-third of all the biscuits.



### Explore how to divide 12 counters into equal groups.

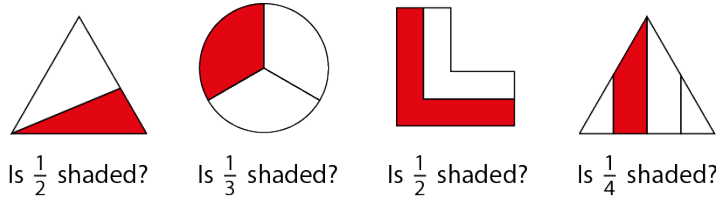
The whole has been divided into \_\_\_ equal parts.

One of these parts is one- \_\_\_ of the whole.



The emphasis is not on how many are in each part but on recognising the number of equal parts that the whole has been divided into, writing this as a fraction.

Use opportunities to check children's understanding. Using non-examples (true/false or spotting errors) is a good way to do this.

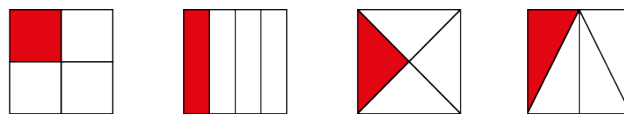


These examples have been carefully designed to expose misconceptions. In some of the shapes, the parts are not equal. This will check that children are still paying attention to the fact that parts do need to be equal.

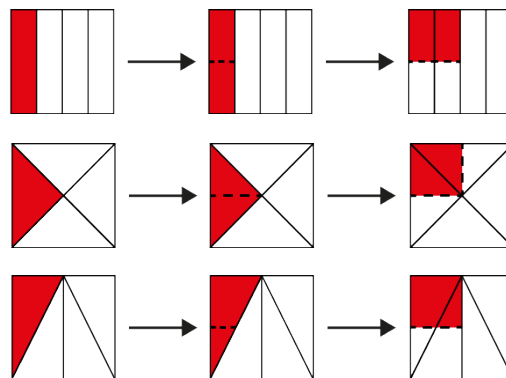
Vary the images so that children practise applying their understanding and not just learning what one fixed image looks like. For example, 'Is one-quarter shaded here?'



As children explore the concept of a whole being divided into equal pieces, they also need opportunities to recognise that equal pieces do not need to look the same. They can do this practically by exploring the area of the shaded part. For example:

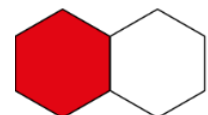


- 'What is the same about these squares?'
- 'What is different?'
- 'Can we show that all the shaded areas are the same?'



**Common errors in this area may include:**

- not recognising the whole that the part is from, e.g. stating that there are two wholes in this example
- thinking of a unit fraction as being defined by the one (numerator), as opposed to recognising that this is the unit we are operating in (the denominator).



**What to look for**

**Can a child:**

- write fractions in a certain order that matches the language being used?
- represent the same fraction in multiple ways and record a fraction with the appropriate notation?

***Links to supporting materials:***

NCETM Primary Professional Development materials, Spine 3: Fractions:

- Topic 3.2: Unit Fractions: Identifying, Representing and Comparing

***Notes:***

**Key learning from support material and self-study:**

**What I will focus on developing in my classroom practice:**