

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 1

How confident are you that you understand and can support children to identify a whole and a part in different contexts?

1

2

3

4

How would you respond ...?

a. Can you complete this sentence in different ways?

If Europe is the whole, then _____ is part of the whole.

b. Can you identify a generalisation that can be made from all your sentences?

c. Do you agree or disagree with these statements?

- The United Kingdom can only be the whole; it cannot be a part.
- The United Kingdom can not only be the whole but can also be a part.

d. Are the following examples true or false?

- If the UK is the whole, then Italy is part of the whole.
- If the children in Year 3 are the whole, then the school is a part of the whole.
- If the school is the whole, then the classroom is a part of the whole.
- If the black sheep are the whole, then the lambs are part of the whole.
- If my face is the whole, then my toe is a part of the whole.



Responses

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

Did you notice that...?

If Europe is the whole, then ___ is part of the whole.

- a. Here, the name of any country shown could complete this sentence. Encouraging children to share different examples is important; it may seem repetitive but strategies like this ensure that no child gets left behind by not understanding the one example given.
- b. Once lots of examples (across this and different contexts) have been collected, support children to identify a generalisation: *'What do all these examples have in common?'* In this case, Europe might have been used as the whole and different countries used as each part. The generalisation that can be made is that a part is always smaller than the whole.
- c. As the children use a context for the part-whole relationship, encourage them to look for different parts and wholes. This may include 'zooming in' on a part, e.g. the United Kingdom, and redefining that as the whole:
 - If the United Kingdom is the whole, then Cheshire is part of the whole.
 - If Cheshire is the whole, then Chester is part of the whole.
 - If Chester is the whole, then Chester Zoo is part of the whole.
 - If Chester Zoo is the whole, then Lemur Island is part of the whole.

This 'zooming in' helps the children to understand that the same thing can be either a part or a whole depending on the context.

d.	If the UK is the whole, then Italy is part of the whole.	→ False. The part needs to be within the whole identified.
	If the school is the whole, then the classroom is a part of the whole.	→ True. A classroom is part of a school building.
	If the children in Year 3 are the whole, then the school is a part of the whole.	→ False. The part needs to be within the whole identified.
	If the black sheep are the whole, then the lambs are part of the whole.	→ This depends on the image given and emphasises that the children need to have a clear understanding of the context. If there are black lambs within the image, this would be true. If there are only white lambs, this would be false.
	If my face is the whole, then my toe is a part of the whole.	→ False. The part needs to be within the whole identified.

The part-whole relationship

By the time the children are introduced to fractions, they will be familiar with the language of parts and wholes due to the work they have done in addition and subtraction, where the term part-part-whole is used to express additive relationships.

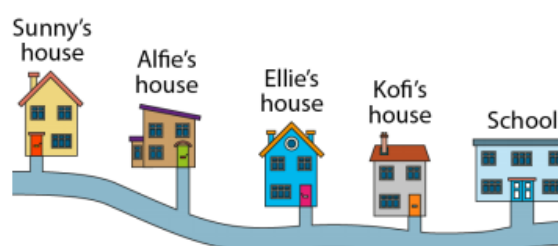
When developing the concept of parts and wholes, the children are not yet using the term fraction; the focus here is on looking at the relative sizes of parts and wholes. This will support them in later work as they focus on the proportional aspects of fractions and recognise that fractions are essentially multiplicative comparisons between a part (expressed by the numerator) and a whole (expressed by the denominator).

Children should have the opportunity to recognise parts and wholes in different contexts.

Length

If the journey from Sunny's house to school is the whole, then the journey from Ellie's house to Kofi's house is part of the whole.

Representing fractions on a linear model will support children later on when they are positioning fractions on a number line and recognising that fractions are also numbers. This area is often under-represented and children often think of fractions as only being part of something.



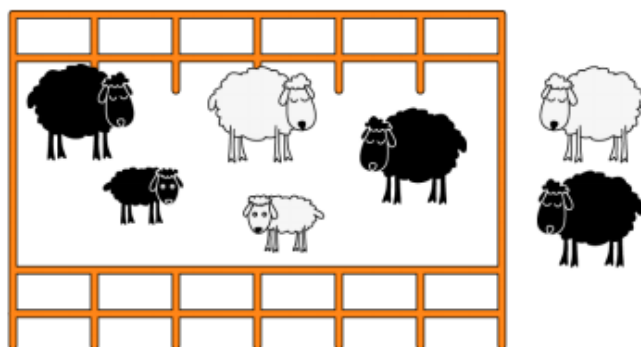
Area

See the map example above.

Sets of objects

The individual items within a set may have characteristics that allow parts to be identified in a number of different ways. Look at this example:

How many ways can you describe a part–whole relationship involving these sheep?



Some examples may include:

- there are adult sheep and lambs
- there are black sheep and white sheep
- there are sheep facing left and sheep facing right.

Encourage the children to look for parts and wholes in many contexts, for example children playing on different equipment in the playground, different items of food making up a picnic and different parts of the human body. This will help them understand that multiple objects (that may be the same or different) can be defined as a part of the whole.

It is important to embed the concept that it is possible to move from a part to the whole, as well as from a whole to its parts. Moving from a part to a whole will also help children's understanding of the inverse, for example when they are given a fractional amount and are required to calculate the whole from this amount. Ensure children understand this by including non-examples, through a series of true or false statements.

Are these statements true or false?

- If the United Kingdom is the whole, then Scotland is a part of the whole.
- If my sandwich is the whole, then my packed lunch is part of the whole.
- If the pencil is the whole, then the pencil sharpener is part of the whole.

Common errors in this area may include:

- children overgeneralising that because something is small it must be a part. For example, 'If my face is the whole, then my toe is a part of the whole.'

What to look for

Can a child:

- identify parts and wholes in different contexts?

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: