

## Additive Reasoning

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 7

How confident are you that you understand and can support children to explore different written algorithms for subtraction?

1

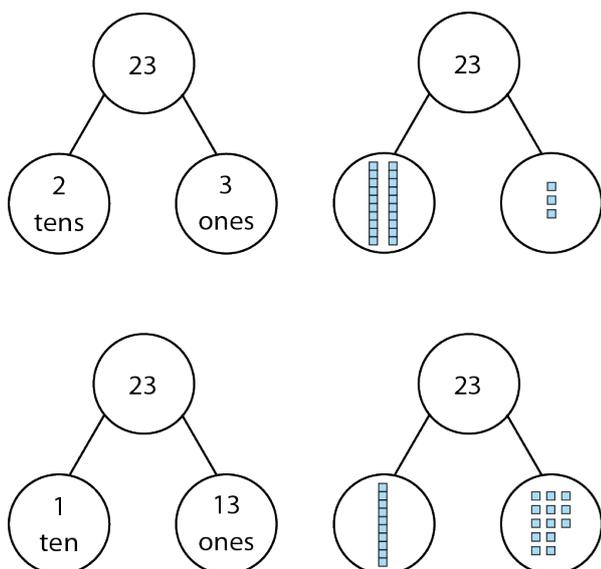
2

3

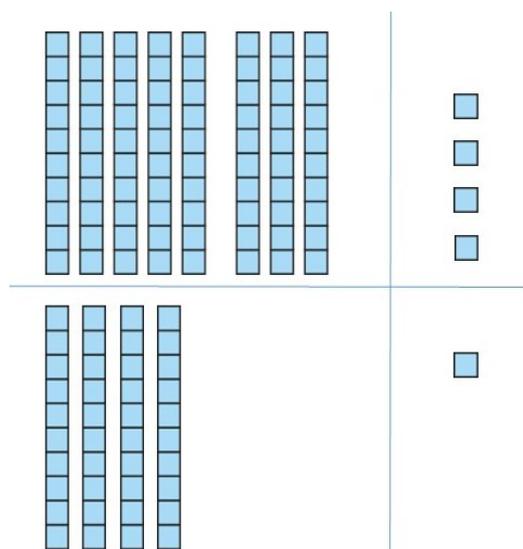
4

### How would you respond ...?

a. How does partitioning numbers in these ways support children's understanding of subtraction?



b. When using a concrete representation for the calculation  $84 - 41$ , Mia uses Dienes for her minuend and subtrahend as shown in the image.



What error or misconception might this create for Mia?

### Responses

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

### Did you notice that...?

- a. When introducing exchanging in subtraction, a good understanding of place value and partitioning is required for children to be able to exchange confidently. If the digit in the subtrahend is greater than the corresponding digit in the minuend, the children will need to use exchanging to subtract. For example, 6 cannot be taken away from 4 so more ones are required.

10s	1s
<del>9</del> 8	14
	6
8	8

In order to have more ones, the nine tens need to be partitioned into eight tens and ten ones. The ones can then be grouped with the four ones that are already in the ones column so 6 can be subtracted.

It is important that children understand how the abstract written representation corresponds to the partitioning of the numbers.

- b. Mia has not understood that the minuend is the amount there is and the subtrahend is the amount that is being taken away. This may cause confusion as she may combine the two amounts, rather than subtracting them. Putting the calculation into a context, or revisiting subtraction with smaller amounts, to consolidate the understanding of the minuend and subtrahend, may be required.

When removing the subtrahend from the minuend, discuss with the children where to put these objects, to demonstrate they have been removed from the minuend and do not form the difference being found.

### Developing written algorithms

In this section, developing children's understanding of the written **algorithm** for subtraction is explored. The use of different representations is discussed, with a focus on potential misconceptions that may develop if representations are not used correctly, in parallel with the written algorithm, before being removed.

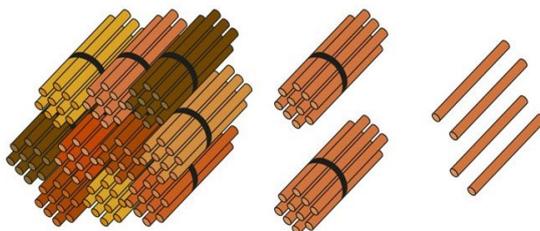
Children should understand the language associated with subtraction. For example:

$$125 - 57 = 68$$

In this calculation, 125 is the **minuend**, 57 is the **subtrahend** and 68 is the **difference**.

For children to efficiently use the column method, they should have confidence subtracting single digits and know subtraction facts within 20. They should also have a range of mental strategies for subtraction that they can use and apply when appropriate. Although manipulatives are used to represent the structure of the calculation, they should not be used as a tool for calculation and children should be encouraged to use known facts to perform the calculations in each column.

When introducing exchanging in subtraction, a good understanding of place value and partitioning numbers in different ways is required for children to be able to exchange confidently. Using manipulatives such as straws where the ones can be physically partitioned and separated will help to deepen understanding of partitioning the same number in a different way. Depending on confidence, straws or sticks could be used when demonstrating exchanging as children are not required to swap an object but partition the ones they have.



When children are confident with this process, other representations, where a different object is used when exchanging, such as place value counters, can be used. For example, the children will exchange one tens counter for ten ones counters.

There could be misconceptions that both the minuend and the subtrahend need to be represented with a manipulative. It is only the minuend that is represented with the manipulative and the subtrahend is the amount that is subtracted. Ensure the subtrahend is removed, when using manipulatives, so it does not get confused as part of the answer.

## Subject Knowledge Audit (Key Stage 1 and 2 Mathematics)

### Common errors in this area may include:

- subtracting the smaller digit from the larger digit
- not recording the exchanging process correctly
- not recognising the value or significance of zero.

### What to look for

#### Can a child:

- confidently partition numbers when exchanging, representing this with the correct written algorithm?

### Links to supporting materials:

NCETM Primary Professional Development materials, Spine 1: Number, Addition and Subtraction

- Topic 1.21: Algorithms: column subtraction

### Notes:

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

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