

## Number

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 compose and decompose numbers, using representations to support this?

1

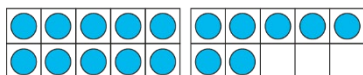
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4

### How would you respond ...?

a. Sam says he has found six ways to decompose 17. He challenges you to find more. Can you find more than six ways to decompose 17?



b. Explain, using representations, how you know which is a correct and which is an incorrect bond?

Correct bond to 100	Incorrect bond to 100

$62 + 48$

$43 + 67$

$28 + 72$

$39 + 71$

$55 + 45$

$84 + 16$

c. Jack has been asked to write the number 'ten thousand and twenty-three'. He writes '1023'. Can you use a representation to help Jack write the number correctly?

1023

### Responses

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

### Did you notice that...?

- a. Children will usually begin by decomposing numbers into two parts, using tens and ones, so may initially decompose as 10 and 7. They may consider decomposing through non-traditional partitioning, such as 11 and 6. Encourage them to develop a systematic approach to finding all possibilities.

Using questioning, encourage children to decompose into more than two parts, such as  $3 + 4 + 5 + 5$ , to aid their fluency in calculation.

- b. When finding complements to 100, it is common for children to look at the ones and tens as separate bonds, not taking into consideration the tens created by the ones bond. For example, incorrectly stating  $62 + 48$  would bond to 100. A child that does this has bonded the  $2 + 8$  to make 10 and the  $60 + 40$  to make 100 but not realised this takes them over the total amount. Using a visual model of a hundred square can help children to see the tens complement within the 100. It is a helpful representation as children are able to add the ones to get to the next 10, and then add on the number of tens needed to make 100.

**Correct bonds to 100:**  $28 + 72$ ,  $55 + 45$ ,  $84 + 16$

**Incorrect bonds to 100:**  $62 + 48$ ,  $43 + 67$ ,  $39 + 71$

- c. Jack may not have understood that zero is required as a place holder when there is no digit. A place value chart may help to support his understanding of where each digit needs to be within his whole number. He also wrote '10' instead of '10 thousand', so some focus on unitising may also be required.

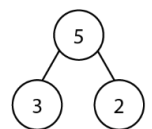
Thousands			Ones		
100s	10s	1s	100s	10s	1s
	1	0	0	2	3

### Composition and decomposition

The term **composition** refers to the parts of a number that are put together to make the whole. The inverse of this is **decomposition**, where a whole number is decomposed, or partitioned, into different parts. Children gain experience in this concept as soon as they encounter number.

Examples of composition are explored in this section, focusing on developing number sense and identifying number facts, such as complements to 100. Children benefit from being exposed to a range of representations and are able to explore the links between these, identifying the structures within the numbers; therefore, a certain amount of variety in representation is needed. However, it is important to consider why and how each representation is being used, ensuring children are not confused with different representations they do not understand. Developing a coherent progression in representations is essential in supporting children's understanding.

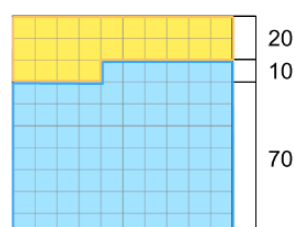
Within the Early Years, children need opportunities to explore a range of ways to partition a whole number. Initially, children begin by identifying pairs of numbers that make a total, before exploring the idea that whole numbers can be split into two groups or more.



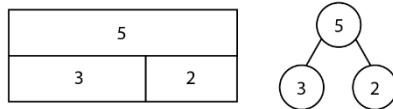
Activities designed to give children the physical opportunity to separate and construct numbers will allow for deeper exploration. For example, make a fruit skewer with five pieces of fruit, choosing from bowls of bananas, strawberries or grapes. Ask them to describe how they made theirs and compare with a partner: 'What is the same about your skewers? What is different?'

Through decomposing 10, children will begin to develop number facts and known number bonds that will build the foundations of understanding number. This can be developed when exploring number bonds to 100.

$$24 + 76 = 100$$

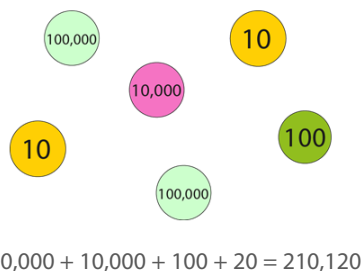


Part-part-whole models are used when exploring the composition of numbers, such as the cherry model and bar model. These models allow children to identify the place value structure within numbers.



As children reach Year 6, they need to understand the composition of larger numbers. In this example, the place value counters have been arranged randomly, meaning the children have to have a secure understanding of their value in order to compose and write the number.

Algebraic thinking can be developed through children exploring different ways of decomposing numbers. In algebra, a letter is often used to represent an unknown variable.



Children could focus on the structure of number, through algebraic reasoning. For example:

- What does  $d$  represent in the number sentence:  
 $200 + d + 3 = 253$ ?
- How many different variables can you find for  $a$  and  $b$  to satisfy this equation?



Time spent securing children's understanding in the composition and decomposition of number will develop their confidence in the structure of the place value system, supporting their ability to manipulate numbers and enhancing their mathematical fluency.

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

- children not understanding the value of the number when writing a decomposed number sentence, e.g. 324 is  $3 + 2 + 4$
- having an additional 10 when finding number bonds to 100, as they find number bonds to 10 for the ones and the tens, without seeing the ones make a group of ten so only need nine additional tens
- only decomposing by place value ( $300 + 20 + 4$ ) and not understanding numbers can be decomposed differently ( $250 + 70 + 3 + 1$ ).

**What to look for**

**Can a child:**

- explore the numbers within a number, identifying a variety of ways to decompose?
- represent the number in a variety of ways, using a range of manipulatives to explain?
- describe numbers using appropriate place value language?

**Links to supporting materials:**

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

- Topic 1.1: Comparison of quantities and measure
- Topic 1.9: Composition of numbers: 20–100
- Topic 1.10: Composition of numbers: 11–19
- Topic 1.17: Composition and calculation: 100 and bridging 100
- Topic 1.18: Composition and calculation: three-digit numbers
- Topic 1.22: Composition and calculation: 1,000 and four-digit numbers
- Topic 1.26: Composition and calculation: multiples of 1,000 up to 1,000,000
- Topic 1.30: Composition and calculation: numbers up to 10,000,000

*Notes:*

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

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