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.

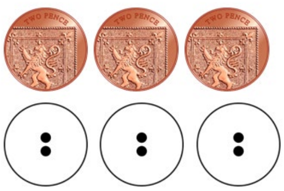
Question 5

Are you confident that you understand and can support children to unitise?

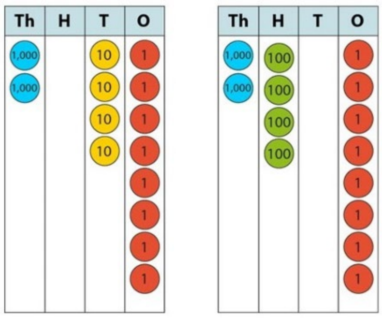
1 ☑ 2 ☐ 3 ☐ 4 ☐

How would you respond …?

a. How do coins and pre-money tokens develop children's understanding of unitising?



b. How does unitising enable children to compare numbers



2,048 2,408

c. Using your understanding of unitising, explain how you would solve the calculation.

What are 3 lots of a half?

Responses

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

Did you notice that…?

a. Children will learn to count in different units such as two, five and ten in preparation for the exploration of multiplication and place value (working on 10s and 100s). Cardinal representations, such as pre-money tokens allow the cardinality to be seen within. The size of the coins and the dots within should be the same, so the children's focus is on the defining features: the number of dots on a token. The move to coins, such as 2p coins, where the cardinality is not visible, allows them to explore the value of the coin and that two 2p coins have a value of 4p, by counting in multiples, two groups of two is 4.

b. When comparing numbers, unitising allows children to compare the numbers more easily, beginning with greatest place value digit. Ask the children to look at the thousands digit, describing with unitising language: *'There are two thousands'*. If the thousands are the same, they would then look at the hundreds and repeat until there are digits of different value.

In this example, there are two thousands in both numbers, so the next column needs to be looked at. There are four hundreds in one number and four tens in the other. This could be used as an opportunity to explore what is the same and what is different about the number. Discuss with the children the importance of different digits and which are the most significant when comparing. Using place value counters initially to demonstrate will secure understanding, so they should not be needed once the concept has been understood.

c. Each ½ is one unit, so there are three halves. Children should draw on prior knowledge that two halves make a whole, so it is 1½ or they could skip count, e.g, *'Half, one whole, one and a half'*.

Unitising

In this section we are focusing on unitising: what it is, how understanding is built through small steps, and how it supports calculation.

What is unitising?

How can you quickly work out the number of eggs contained in a stack of egg boxes? How would you calculate the total amount of money in a pile of 50p pieces? You'd probably count the boxes, or the coins, and then do a multiplication.

The mathematical term for counting the egg boxes (rather than opening the boxes and counting individual eggs) is 'unitising'. This means treating groups that contain, or represent, the same numbers of things as 'units' or 'ones'.

Being able to 'unitise' is fundamental in handling money and in understanding place value. It forms the base of understanding throughout further development of multiplication and division concepts. It allows children to move from additive to multiplicative thinking.

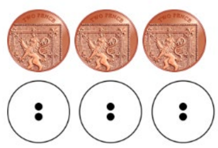
The concept of unitising should be coherently sequenced through a primary maths curriculum with new knowledge being built on solid prior understanding from Year 1 to Year 6.

Progression through the curriculum

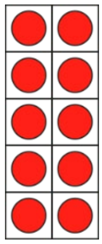
In Year 1, unitising is first introduced when exploring low-denomination coins and their value. Initially, the idea of unitising is built through familiarity with counters representing 1, 2, 5 and 10 (pre-money tokens) before handling real coins. Establishing concepts of unitising helps children avoid being confused by the relative size, shape and colour of coins rather than their value.

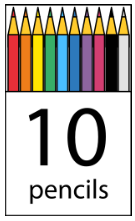
They would then begin to link the pre-money tokens and coins, with their understanding of skip counting, when finding amounts.

I have one two pennies, two two pennies, three two pennies. I have three two pennies. I can count 2p, 4p, 6p.



As they continue in Key Stage 1, children are exposed to different representations to secure their understanding in unitising.



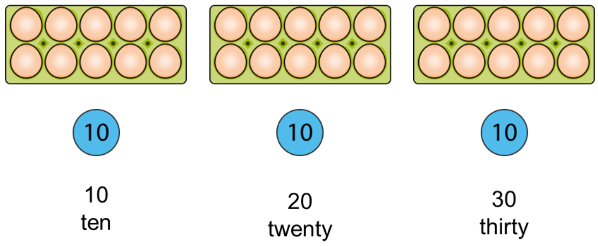


In the first picture the group of 10 objects are clear, so cardinality is visible, where as in the second picture the groups are not as clear, so cardinality cannot be seen as easily.

This helps develop the link that one box of pencils represents 10 pencils.

In the same way the children did with the pennies, they would then count one group of ten, two groups of ten, before shortening it to one ten, two tens…

This then leads children into representing the grouped objects with a multiplication equation.



$3 \times 10 = 30$

Various different representations should be used, including coins, as children begin to learn their 2, 5 and 10 times tables.

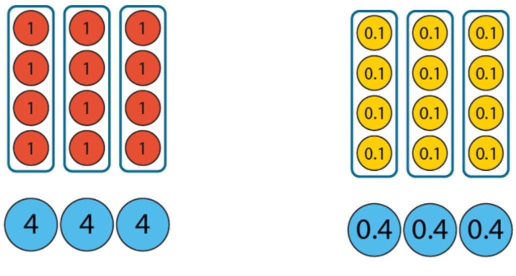
This understanding of unitising continues into Key Stage 2 as children continue to learn their multiplication facts.

Our place value system is based on unitising. When describing numbers children are building their understanding. For example, 362 is composed of three hundreds, six tens and two ones or 2.73 is composed of two ones, seven tenths and three hundredths.

How would understanding unitising support solving 3×0.4? If children are confident unitising they can use this to explore decimal multiplication.

The image demonstrates that three times four ones is equal to 12 ones, so three times four tenths is equal to 12 tenths.

The multiplicative reasoning subject knowledge audits will explore the structures of calculation in more detail, further exploring how unitising supports children calculating efficiently.



$3 \times 4 = 12$ | $3 \times 0.4 = 1.2$

3 × 4 ones = 12 ones | 3 × 4 tenths = 12 tenths

Common errors in this area may include

- when comparing and ordering, children focus on the largest digit, rather than the digit with the greatest value
- not being able to describe numbers by different units, for example 342 has 34 tens and 2 ones.
- counting each one within the group, rather than counting in steps
- linking the value of a coin to its size, rather than the number of pennies it represents
- not counting in equal steps

What to look for

Can a child:

- understand the steps being counted in are representative of the number in each group
- describe the structure of the place value system, understanding 1 ten is made of 10 ones and that if 10 tens makes 1 hundred, then 100 ones is also equivalent to 1 hundred.
- decide how to group items to support efficient counting

Links to supporting materials:

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

- Topic 1.18: Composition and calculation: three-digit numbers
- Topic 1.22: Composition and calculation: 1,000 and four-digit numbers
- Topic 1.23: Composition and calculation: tenths
- Topic 2.1: Counting, unitising and coins

NCETM Primary Professional Development materials, Spine 2: Multiplication and Division:

- Topic 2.1: Counting, unitising and coins

Notes:

Key learning from support material and self-study:

What I will focus on developing in my classroom practice: