

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 7

Are you confident that you understand and can support children to estimate and round using their knowledge of the relative position of numbers?

1

2

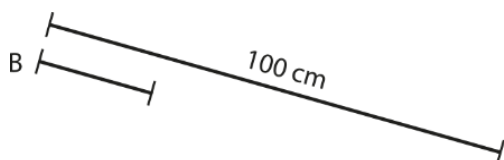
3

4

How would you respond ...?

- a. How would proportional reasoning support a child to answer this question?

Guess the length of B by comparing it to the 100cm line.



- b. A child says that the answer is 440. How could you support them to develop their understanding of rounding?

Round 452 to the nearest 10.

- c. How could this question be used to demonstrate children's understanding of rounding and estimating?

Three children are asked to estimate the answer to the sum $4243 + 1734$.

Andrew: 'To the nearest 100, the answer will be 5,900.'

Bilal: 'To the nearest 50, the answer will be 6,000.'

Cheng: 'To the nearest 10, the answer will be 5,970.'

Do you agree with Andrew, Bilal or Cheng? Can you explain their reasoning?

Responses

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

Did you notice that...?

- a. Estimation in this context is carried out relative to the pre-drawn 100 centimetre line and should not involve use of the metre stick. This keeps the focus on developing children's understanding of where two-digit numbers sit in the number system (rather than their ability to manipulate and read a metre stick) Children can use knowledge of estimating the position of multiples of 10 as a starting point, before refining the estimate down to the ones digit. For example: 'I know that 50 is in the middle of zero and 100. I know that 25 is in the middle of 0 and 50. So I think this line is less than 50, but more than 25. I think it is nearer to 25, so I think this line is 30cm.'

Encourage the children to talk in this way in pairs. You can show or tell them the exact length of each line, but make sure they do not think of the exact length as the 'right answer' – reasonable estimates should be celebrated for showing good proportional understanding.

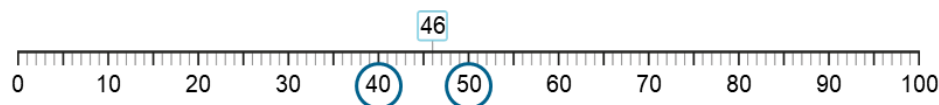
- b. In this example, the child may be using the generalisation that 'numbers ending in a two digit round down' but have not understood the position of this number on the number line. By positioning 452 on a number line, they will be able to visually see the 10 before and the 10 after 452, and the number's relative position.
- c. This can be used as a discussion question, so children can demonstrate understanding as to who they think is right and why. They can support their answers with mathematical understanding, applying their knowledge in a different context. For example, 'All the pupils have found the correct answer for the way they have rounded, but it depends on the degree of accuracy required for estimation. I think I would use Andrew's way, as it is easier to mentally add numbers to the nearest 100 to find an estimation.'

Rounding and estimating

Rounding is an important skill for children to be secure in as it can aid them in calculation, as well as within different practical contexts. Children are taught to round to the nearest number, in different degrees of accuracy, with links made to real-world contexts.

Children can use a number line to identify the relative position of numbers as a structure for rounding. This allows them to visually see the position of a number so they are able to identify the multiple before and the multiple after, as well as the number's position in relation to these.

For example, when rounding to the nearest 10, the previous multiple is 40 and the next multiple is 50, so 46 will round to 50



As a discussion point, show children a variety of headlines or facts that have included rounding and explore how the numbers have been presented.

- Why do they think these numbers have been presented in this way? Do we always need to know the exact amount?
- What purpose does it have?

Real-world contexts they may be familiar with will include decimal numbers as well as whole numbers, such as rounding prices to the nearest pound or heights to the nearest centimetre. It is essential that they are able to make the link between the skill they are learning and how they will use it in different situations.

The ability to calculate mentally or draw upon different calculation strategies is supported by rounding.

For example, when adding these items together, the children can add £3, £2 and £1 and then adjust their answer by subtracting 3p.



Children use rounding and estimating when approximating a number. It allows you to make an 'educated guess' to give you an answer that is broadly correct. For example, when considering how long a journey is going to be and estimating a time for arriving.

Using rounding and estimating supports children to check the reasonableness of answers when they are calculating. For example, when calculating 7.5×6.45 , they can round to the nearest whole number. 8×6 is 48. They will then know that their answer needs to be somewhere in this area.

Common errors in this area may include

- children rounding 91 up to 100, rather than down to 90 when rounding to the nearest 10, so they are focused on 9 being a large number
- not recognising which is the significant digit when rounding different amounts, for example, looking at the ones digit when rounding to the nearest 100
- rounding to the 10 below, for example rounding 341 to 330

What to look for

Can a child:

- identify the scale being used on a number line
- explain the position of numbers on the number line, in relation to the scale
- use a representation to explain why a number rounds up or down
- know how a zero in the significant digit column effects rounding a number
- round in different contexts

Links to supporting materials:

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

- 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: