

**YEAR
FOUR**



Diagnostic Assessment Toolkit

Assessing Prior Learning in Mathematics

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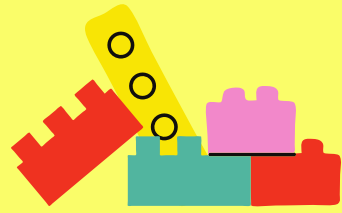
How to Carry Out a Diagnostic Assessment

The diagnostic assessment activities in this booklet have been designed with small groups in mind, however they can be used on a 1:1 basis or with a larger group with some adaptation. There is a printable notes page at the back of this document that you can use to record your observations and next steps.



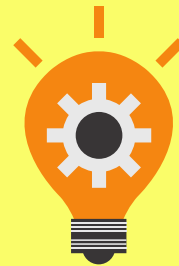
1. Primer

Begin by talking about the children's prior learning. Find out what the children remember, including any key words they know. If you can, look at examples of their previous work.



2. Build it, draw it...

Move on to a task involving models and images. Ask the children to find, make or draw an example of the key concept or word. Use practical equipment, if it's relevant to do so.



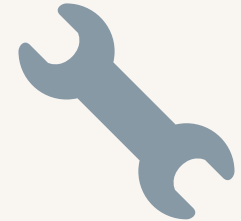
3. Reasoning and comparing

Asking children to explain their thinking can provide an insight into their conceptual understanding and use of key words. Comparison activities provide a good opportunity for this.



4. Inform planning


Use what you have found out to inform your planning. Some children may require support before the topic begins, whilst others may need to spend longer on one or more small steps.




Supporting resources

An accompanying PowerPoint presentation has been created to be used alongside this toolkit so that you can present the questions to the children on a screen, if you wish.


Features of the Diagnostic Toolkit




Prior learning and key vocabulary: At the start of each section there is a brief description of what the children will have learnt about previously and how this links to the new content that will be taught this year. It's recommended that teachers use this alongside the statutory and non-statutory guidance in the national curriculum. For each topic there is also list of key words. Although the children may not know all of these words yet, they should be aware of most of the words in this list. If not, it is recommended that you revisit or teach these words before introducing new words.



Common misconceptions: This list contains several common misconceptions and barriers to progress related to this topic. If a child has one of these misconceptions or barriers to progress, and they are not addressed, it is likely that they will have greater difficulty understanding the new concepts you are planning to teach. Therefore this section can help you to know what to look out for when carrying out the diagnostic activities. Most of the misconceptions in this toolkit link to previous learning from last year (or earlier), however some other misconceptions included in the list may arise during this topic if a child misunderstands the key concepts or procedures when they are introduced. Please be aware that this list is not exhaustive and doesn't include all of the possible misconceptions that could arise. If you think that a child demonstrates a misconception that is not on the list for your year group, it could be highlighted in the diagnostic toolkit for another year group - where it may be more commonly found.



Addressing misconceptions: This section provides advice for helping you to address some of the highlighted misconceptions and barriers to progress. This section can inform planning for whole class teaching, pre-teaching or interventions. If references have been made to methods or representations that you do not use in your school, such as bar models perhaps, please consider how you might adapt the suggested approach, representation or method that you use in your setting.



Diagnostic activities: These pages in the toolkit contain suggestions for activities and questions that you can use to find out about children's understanding of prior learning. The tasks have been designed to be used with small groups, but they could be adapted for larger groups of children or if you intend to use them on a 1:1 basis. Some of the questions require the use of diagrams or other images, examples of which have been provided in the accompanying PowerPoint presentation. In addition to the list of suggested activities, each page contains a picture of the questions and activities with annotations. The annotations are designed to support the adult leading the activity, including suggestions for things to look out for and possible adaptations. Read the section called *How to carry out a diagnostic assessment* before using these activities.

Year Four

Place Value and Number

Prior Learning

In Year 3, children learn more about place value, extending their understanding of two- and three-digit numbers. Children are likely to have used the symbols $<$, $>$ and $=$ to order and compare three-digit numbers; and positioned them on a number line. In Year 3 children are likely to have been introduced to counting in multiples of 4, 8, 50 and 100; and solved problems involving three-digit place value.

This Year

In Year 4, children build on this learning by representing, ordering and comparing 4-digit numbers; and they are introduced to rounding to the nearest 10, 100 and 1000.

Key vocabulary: words for describing the place value of digits, including: ones, tens, hundreds and thousands. Words for comparing two or more numbers or quantities, including: greater than ($>$), less than ($<$), equal to ($=$), most, least, fewer/fewest, first..., tenth..., last etc. Words for rounding and estimating, including: rounded to the nearest, approximately equal to (\approx) and exactly. Words for describing properties of numbers, including: multiple of, divisible by, factor, odd/even, positive, negative, integer, decimal, below zero and minus.

Place Value and Number



What comes next? What do you think will come next in these sequences? A) 960, 970, 980, —, — B) 850, 900, 950, 1000, — C) 1002, 1001, 1000, —, —	Compare Write these numbers in order and place them on the number line: 609 97 980 150 775 495
Odd One Out Which one do you think is the most different from the others? Explain your answer.	Multiple Choice Which answer correctly shows this number rounded to the nearest 10? 473 a) 400 b) 470 c) 480 d) 47

Common Misconceptions

Some pupils may:

- Have difficulty bridging hundreds or thousands when counting or calculating
- Not understand how to write numbers with three or more digits. For example, they may record three hundred and fifty seven as 300507
- Be unfamiliar with representations of three-digit numbers created using different manipulative resources or images, such as arrow cards or place value counters
- Not understand how to round numbers to the nearest 10 or 100 accurately, truncating numbers instead


Addressing Misconceptions





- Children can find it helpful to explore counting patterns using practical equipment and pictorial representations.
- Use arrow cards to help children to see how to partition and construct numbers with many digits, and show how this links to the position of numbers on a number line.
- Support counting (forwards and backwards) with showing movement along a number line to visualise numerals and representations of number, particularly when counting in 10s and 100s and when crossing 100s.
- To support understanding of rounding numbers to the nearest 10, begin by positioning the numbers on a number line. This may help children to see the distance between a number and the multiples of ten it is between.

Diagnostic Activities

- What comes next in this sequence? – Ask children to say what will come next in the given sequences and why.
- Compare - Order a set of numbers and place them on a number line. Ask children to talk about how they know where a number should be positioned.
- Odd One Out - Comparing different representations of three 3-digit numbers and one 4-digit number.
- Multiple Choice – Which of the answers shows the given number rounded to the nearest 10?

Look out for errors when crossing 10, 100 or 1000 boundaries.

Place Value and Number 

<p>What comes next?</p> <p>What do you think will come next in these sequences?</p> <p>A) 960, 970, 980, —, —</p> <p>B) 850, 900, 950, 1000, —</p> <p>C) 1002, 1001, 1000, —, —</p>	<p>Compare</p> <p>Write these numbers in order and place them on the number line:</p> <p>609 97 980 150 775 495</p> 
<p>Odd One Out</p>    <p>Which one do you think is the most different from the others? Explain your answer.</p>	<p>Multiple Choice</p> <p>Which answer correctly shows this number rounded to the nearest 10?</p> <p>473</p> <p>a) 400 b) 470 c) 480 d) 47</p>

Talk about the place value of each digit and what this tells us about the position on the number line.

Is it clear to see whether children see the links between place value, partitioning and rounding? Can children talk about how these concepts are connected? Listen out for children's reasoning and whether their explanations, descriptions and vocabulary choices are accurate.

Place Value and Number

What comes next?

What do you think will come next in these sequences?

A) 960, 970, 980, ,

B) 850, 900, 950, 1000,

C) 1002, 1001, 1000, ,

Compare

Write these numbers in order and place them on the number line:

609 97 980 150 775 495



Odd One Out



Which one do you think is the most different from the others?

Explain your answer.

Multiple Choice

Which answer correctly shows this number rounded to the nearest 10?

473

a) 400 b) 470 c) 480 d) 47



Acknowledgements

The authors would like to thank colleagues and pupils from The Bellbird Primary School, Isleham CE Primary School, St Philip's CE Primary School and Spring Meadow Infant School for providing their feedback on the first draft of the Year 1 Toolkit.

Credit: Some images of manipulative resources were created using mathsbot.com - created by Jonathan Hall (@studymaths).

To find out more about the Cambridgeshire Maths Team and to keep up to date with new resources, like our page on Facebook - www.facebook.com/cambsmathsteam