

YEAR
FIVE



Diagnostic Assessment Toolkit

Assessing Prior Learning in Mathematics

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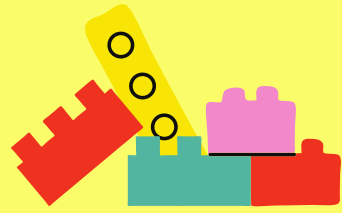
How to Carry Out a Diagnostic Assessment

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.



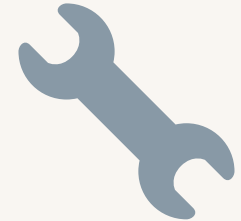
3. Reasoning and comparing

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 Five

Place Value and Number

Prior Learning

In Year 4, children are likely to have counted backwards through 0 and in multiples of 6, 7, 9, 25 and 1000. They recognise the place value of each digit in a 4 digit number, as well as ordering and comparing numbers beyond 1000 and decimals. They would have rounded numbers to the nearest 10, 100 or 1000 and tackled problems that involve all of the above.

This Year

In Year 5, children build on this prior learning by extending their understanding of numbers to at least 1 million. They will be given chances to interpret negative numbers. They learn to round any number to the nearest 10, 100, 1,000, 10,000 and 100,000.

Place Value and Number



Show me Partition this number in as many different ways as you can. 	Compare Place the following numbers on the line. 2.01 1.6 0.75 1.25 2.1
Estimate Estimate where the following numbers would go on the number line. -2 4 7 -5 0 	Who do you agree with and why?

Key vocabulary: Words for describing the place value of digits, including: hundredths, tenths, ones, tens, hundreds, thousands, tens of thousands, hundreds of thousands and millions. Words for comparing quantities, including: greater than ($>$), less than ($<$), equal to ($=$), most, least, fewer or fewest. Words for rounding and estimating, including: rounded to the nearest, approximately equal to (\approx), exactly and equivalence. Words for describing properties of numbers, including: odd, even, positive, negative, integer, decimal, below zero, minus.

Common Misconceptions

Some pupils may:

- Not understand that numbers can be partitioned in different ways, e.g. 12,356 can be made up of 123 hundreds, 5 tens and 6 ones
- Ignore the place value of each digit in a number leading to the number four thousand and twenty six being written either as 400026 or 426
- Think that in a given context, -10 is greater than -1
- Assume that 1.54 is greater than 1.8 because it has more decimal places or because they read it as, "one point fifty four"
- Misunderstand the rules for rounding, e.g., think that 3470 to the nearest 1000 is 4000 because 3470 rounds to 3500 which rounds up to 4000

Addressing Misconceptions


- Make regular use of arrow cards and base 10 apparatus to help to strengthen children's understanding of partitioning numbers and to address the incorrect recording of written numbers.
- Ensure children have a strong understanding of the value of zero and positive numbers, before introducing negative numbers. Teaching negative numbers in context, e.g. through the use of temperature, may support some pupils as well as seeing the number line as a vertical representation (as on a thermometer) before placing them on a horizontal number line.
- When learning to round numbers, seeing them on a number line may help children with rounding to the nearest 10, 100 or 1000 so they can see the 'physical' distance.

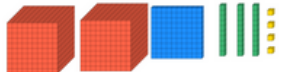
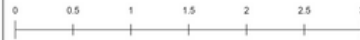



Diagnostic Activities

- **Show me** - After recording the number using numerals, how many different ways can it be partitioned?
- **Compare** - After reading each decimal number aloud, can they be placed correctly on the number line and the children explain why they have been placed where they have?
- **Estimate** - Give the children a blank number line and get them to place a small range of positive and negative numbers on it.
- **Who do you agree with?** - Show a concept cartoon of children's attempts at rounding. Which one is correct? What errors have been made?

Show Me -
Look out for incorrect recording of the 4 digit number.

Place Value and Number



<p>Show me</p> <p>Partition this number in as many different ways as you can.</p> 	<p>Compare</p> <p>Place the following numbers on the line.</p> <p style="text-align: center;">2.01 1.6 0.75 1.25 2.1</p> 
<p>Estimate</p> <p>Estimate where the following numbers would go on the number line.</p> <p style="text-align: center;">-2 4 7 -5 0</p> 	<p>Who do you agree with and why?</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid blue; border-radius: 10px; padding: 5px; width: 45%;"> <p>When I round 345 to the nearest 100, the answer is 400 because 345 is closest to 350 so that means you round up to 400.</p> <p> Olivia</p> </div> <div style="border: 1px solid blue; border-radius: 10px; padding: 5px; width: 45%;"> <p>When I round 345 to the nearest 100, the answer is 300 because 345 is below 350 so that means you round down to 300.</p> <p> Harry</p> </div> </div>

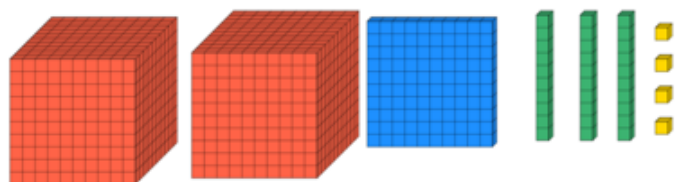
Compare -
Listen out for incorrect reading of the decimal numbers.

Estimate - Are children able to correctly explain where 0 goes on the number line and use this as a starting point for placing the other numbers?

Place Value and Number

Show me

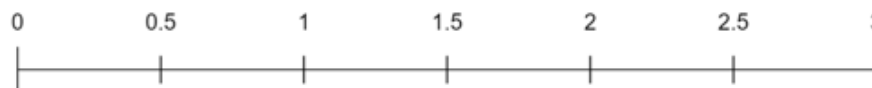
Partition this number in as many different ways as you can.



Compare

Place the following numbers on the line.

2.01 **1.6** **0.75** **1.25** **2.1**



Estimate

Estimate where the following numbers would go on the number line.

-2 **4** **7** **-5** **0**



Who do you agree with and why?

When I round 345 to the nearest 100, the answer is 400 because 345 is closest to 350 so that means you round up to 400.



Olivia

When I round 345 to the nearest 100, the answer is 300 because 345 is below 350 so that means you round down to 300.



Harry



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