

**YEAR  
THREE**



# **Diagnostic Assessment Toolkit**

**Assessing Prior Learning in Mathematics**

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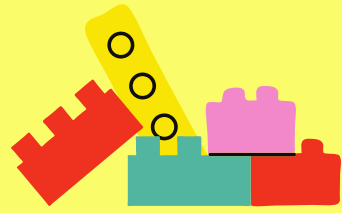
# How to Carry Out a Diagnostic Assessment

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 Three

## Place Value and Number

### Prior Learning

In Year 2, children are likely to have counted in steps of 2, 3 and 5 from 0, and in tens from any number; read, written, compared and ordered numbers from 0 to 100, using  $<$ ,  $>$  and  $=$ ; identified and represented numbers using different representations; recognised the place value of each digit in a two-digit number; used place value and number facts to solve problems.

### This Year

In Year 3, children will be introduced to finding 10 or 100 more or less than a given number; reading, writing, comparing and ordering numbers up to 1000; recognising the place value of each digit in a three-digit number; solving number problems involving these ideas.

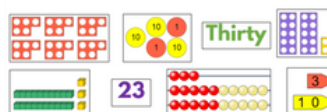
**Key vocabulary:** digit, place value; ones, tens, hundreds, represent, sequence, continue, predict, pattern, rule, relationship, compare, order, size, equal to, less than and greater than.

### Place Value and Number



#### Match It

Which representations have the same value?



#### Complete It

Fill in the missing numbers:

14, 15, , , 18, 19, , 21  
, 70, 80, 90, 100,   
84, 83, 82, , ,

#### Compare It

Make your own number sentences using these values and the symbols  $<$ ,  $=$  or  $>$ .

123 15 103 50 32 321 130

Which number is the greatest?

Which of these numbers are smaller than fifty?

#### Record It

How would you record these numbers using digits?

One hundred and five  
Eighty  
Seventeen  
One hundred and twenty three

## Common Misconceptions

Some pupils may:

- Muddle the 'teen' and the 'ty' numbers
- Read the ones digit before the tens or hundreds digits
- Record numbers incorrectly (for example one hundred and twenty three as 10023)
- Not understand the importance of 0 as a place holder and may therefore make errors in recording (for example one hundred and five as 15)
- Not spot patterns because they are not secure in the stable order of our number system
- Not understand that the position of the digits in a number represents the value
- Misread the greater than  $>$  and less than  $<$  signs

## Addressing Misconceptions


- Count aloud and support with movement along a number line (increase and decrease in value) to visualise numerals and representations of number, particularly around multiples of 10 up to 100, and spot patterns.
- Use resources that can be grouped into bundles of 10 and separated into ones, e.g. straws, multilink cubes and tens frames with counters, to show standard (e.g.  $36 = 3$  tens and 6 ones) and non-standard partitioning (e.g.  $36 = 2$  tens and 16 ones).
- Use part-whole representation and a variety of models and images to explore number composition.
- Use practical equipment to develop conceptual understanding of  $<$ ,  $>$  and  $=$  (e.g. comparing multilink cube towers inside models with two strips of card and split pins to represent inequality and equals symbols) rather than trying to memorise a rule (e.g. involving crocodiles).


## Diagnostic Activities

- **Match it** - Identify numerals and images that represent the same number.
- **Complete it** - Count or fill in missing numbers in a sequence, including -teen and -ty numbers (counting in ones and tens, up to 110).
- **Compare it** - Compare or order numbers, including -teen and -ty, using numerals, pictorial images or manipulatives and the use of  $<$ ,  $>$  and  $=$  signs.
- **Record it** - Write numbers after reading or hearing them, including above 100 and with 0 as a place holder.

Look out for children who transpose digits or who count the number of objects, not their value.

### Place Value and Number



<p><b>Match It</b> Which representations have the same value?</p> 	<p><b>Complete It</b> Fill in the missing numbers:</p> <p>14, 15, <input type="text"/>, <input type="text"/>, 18, 19, <input type="text"/>, 21</p> <p><input type="text"/>, 70, 80, 90, 100, <input type="text"/></p> <p>84, 83, 82, <input type="text"/>, <input type="text"/>, <input type="text"/></p>
<p><b>Compare It</b> Make your own number sentences using these values and the symbols <math>&lt;</math>, <math>=</math> or <math>&gt;</math>.</p> <p>123   15   103   50   32   321   130</p> <p>Which number is the greatest?</p> <p>Which of these numbers are smaller than fifty?</p>	<p><b>Record It</b> How would you record these numbers using digits?</p> <p style="text-align: center;">One hundred and five</p> <hr/> <p style="text-align: center;">Eighty</p> <hr/> <p style="text-align: center;">Seventeen</p> <hr/> <p style="text-align: center;">One hundred and twenty three</p>

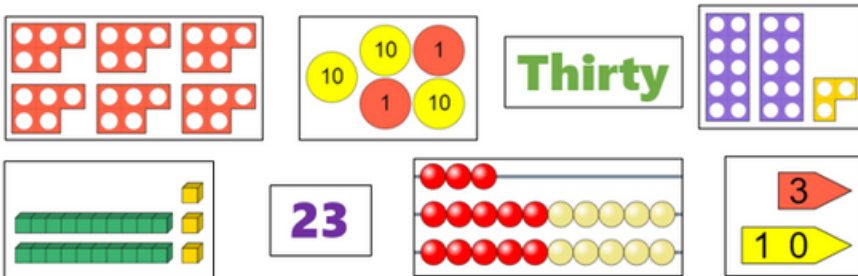
Numbers in words may be read aloud - the focus is on how the child records the number in digits.

If you would like to see more about ideas for teaching comparisons and why it is important, visit [www.ncetm.org.uk/classroom-resources/primm-1-01-comparison-of-quantities-and-measures/](http://www.ncetm.org.uk/classroom-resources/primm-1-01-comparison-of-quantities-and-measures/)

# Place Value and Number

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How would you record these numbers using digits?



## **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](http://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](http://www.facebook.com/cambsmathsteam)**