

SERVICES FOR SCHOOLS

# Diagnostic Mathematics Tasks

## Year 5 summer term to Year 6 spring term/SATs

A set of half-termly mathematics tasks supporting diagnostic assessment to find gaps in pupil learning and inform teaching and planning.

**Sample Booklet**

# Contents

Introduction	1
How to use the Diagnostic Mathematics Tasks	1
Understanding the layout of the Tasks	2
What to look for	3
Ready-to-progress criteria	4
Diagnostic maths tasks – Year 5/6	
- Year 5 Summer Term: Key Tasks 1-6	11
- Year 6 Autumn Term 1: Key Tasks 1-6	18
- Year 6 Autumn Term 2: Key Tasks 1-6	24
- Year 6 Spring Term: Key Tasks 1-14	30



# Introduction

This resource has been designed to support Year 5 and Year 6 teachers in using diagnostic assessment to inform teaching that addresses significant gaps in pupil learning. The booklet contains a series of mathematical questions/activities which enable teachers to progressively explore pupils' knowledge, conceptual understanding, and skills from the end of the summer term in Year 5 to the spring term in Year 6. The tasks cover a range of mathematical domains including Number & Place Value, Calculation and Fractions.

## How to use

The activities are intended to be used by class teachers or teaching assistants (under the direction of a class teacher), for short focussed one-to-one pupil conferencing with pupils whose gaps in knowledge and conceptual understanding need a more forensic approach than might be possible in a whole class lesson.

Each task has:

- some suggested questions focussed on both assessment of the pupils' subject knowledge and their reasoning to inform next steps in teaching
- the purpose for using the task with National Curriculum links
- common misconceptions (from Spring term Y6)
- suggestions for next steps in learning.

It is recommended that as one-to-one conferencing is intensive, that sessions last no more than 20 minutes. During the session, more than one task could be used to support discussion.

# Understanding the layout of the Tasks

Colour coded for ease of reference for different terms

Key task/mathematical activity for the pupil

Year 5 Summer Term: Key Task 3	Year 5 Summer Term: Key Questions	Year 5 Summer Term: Purpose
<b>Number and Place Value:</b> 	<ul style="list-style-type: none"> <li>Can you read the number cards out loud?</li> <li>Can you order the number cards from smallest to largest?</li> <li>Which number cards were the easiest to order? Why?</li> <li>Which number cards were the hardest to order? Why?</li> <li>How could you prove it?</li> <li>What is the purpose of the zero in 63015? How many hundreds are there in 63015 (as a whole number)?</li> <li>Can you make the numbers using place value counters on a place value chart?</li> </ul>	<ul style="list-style-type: none"> <li>To read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit [Year 5 NC]</li> <li>Pupils identify the place value in large whole numbers [Year 5 NC – non statutory guidance]</li> <li>Ability to reason and explain mathematical thinking</li> </ul>
		<b>Next Step</b> <ul style="list-style-type: none"> <li>Ask pupils to position number cards on a number line. Activity then repeated with decimal number cards</li> </ul>

Purpose of task linked to National Curriculum including non-statutory guidance

Suggested next step

Key questions for class teacher/teaching assistant

Year 6 Spring Term: Key Task 3	Year 6 Spring Term: Key Questions	Year 6 Spring Term: Key Misconceptions
<b>Addition and Subtraction:</b>   	<ul style="list-style-type: none"> <li>Can you interpret the question and read it aloud?</li> <li>What is the question asking you? Can you tell me in your own words?</li> <li>What maths will you have to use to solve it?</li> <li>Will you use 'MJF?' (mental, jottings, formal methods?)</li> <li>Which is the most efficient method here?</li> <li>Are there any models or images that would help you here? E.g. use of place value chart / number line</li> <li>How could you estimate a reasonable answer?</li> <li>How could you prove your answer is correct?</li> </ul>	<b>Pupils might:</b> <ul style="list-style-type: none"> <li>Find it difficult when calculating with decimals with a different number of decimal places. It is important to encourage pupils to estimate a reasonability of answer initially [NC Y5]</li> </ul>
		<b>Next Steps</b> <ul style="list-style-type: none"> <li>Encourage pupils to use a suitable model or image e.g. the use of a number line if appropriate or if using formal column method pupils need to make sure that they line digits up correctly, adding extra place holders if necessary</li> </ul>

Common misconceptions from Spring term linked to National Curriculum

Suggested next steps to help address misconceptions

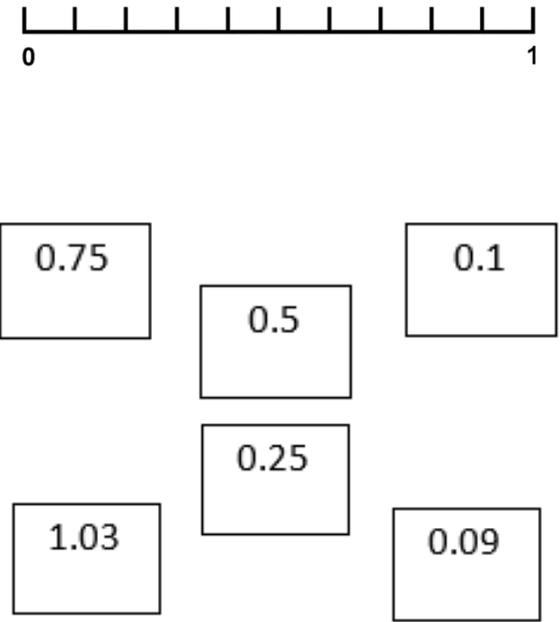
## *What to look for*

In addition to the key tasks, pupils should also have access to a range of concrete resources. For example, structured and unstructured laminated number lines, counters, tens frames, bead strings, place value arrow cards, Dienes rods, Numicon, coins, hundred squares and digit cards. For some tasks squared paper may also be useful.

Teachers and teaching assistants should take this opportunity to observe how well individual pupils:

- explain their reasoning using appropriate vocabulary
- model the mathematics using a combination of the available concrete resources and informal jottings (pictures, number lines and part-part whole diagrams such as bar models and 'cherry' models)
- use formal notation, for example equations to show the operation(s) needed
- make decisions about when to solve calculations mentally using number facts, explaining the strategy they have used
- can identify the steps needed to solve the problem in the most straightforward way.

'Contains material developed by the Standards and Testing Agency for 2018 national curriculum assessments and licensed under Open Government Licence v3.0' <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Year 5 Summer Term: Key Task 5	Year 5 Summer Term: Key Questions	Year 5 Summer Term: Purpose
<p><b>Number and place value</b></p>  <p>Provide each pupil with a blank number line and the decimal number cards as a concrete resource to label and position number cards.</p>	<ul style="list-style-type: none"> <li>• Can you position <b>all</b> the number cards on this number line? (The exception is 1.03 as <math>\frac{3}{100}</math> larger than one whole).</li> <li>• Which is the easiest number card to position? Why?</li> <li>• Which is the hardest number card to position? Why?</li> <li>• What is the halfway point? How do you know?</li> <li>• Where would you position each of the number cards on the number line?</li> <li>• Do you know what 0.5 is the same as? What is it as a fraction?</li> <li>• How would you record 0.5 on a place value chart?</li> </ul>	<ul style="list-style-type: none"> <li>• To recognise and write decimal equivalents of any number of tenths or hundredths. [Year 4 NC]</li> <li>• Pupils should connect hundredths to tenths and place value and decimal measure. [Year 4 NC – non statutory guidance]</li> <li>• To extend the use of the number line to connect fractions, numbers and measures. [Year 4 NC – non statutory guidance]</li> <li>• To read and write decimal numbers as fractions. [Year 5 NC]</li> <li>• To read, write, order and compare numbers with up to three decimal places. [Year 5 NC]</li> </ul> <p style="text-align: center;"><b>Next Step</b></p> <p>How could pupils represent each of the decimal number cards on a blank hundred square?</p>

Year 6 Spring Term: Key Task 10	Year 6 Spring Term: Key Questions	Year 6 Spring Term: Key Misconceptions
<p><b>Addition, subtraction, multiplication and division</b></p> <p>A farmer is packing eggs. Each box holds six eggs.</p>  <p>The farmer has 960 eggs to pack.</p> <p>How many boxes can the farmer fill using 960 eggs?</p> <p>full boxes</p> <p>How many eggs will be left over?</p> <p>left over</p> <p><b>NB:</b> Encourage pupils to answer in the context of the problem.</p>	<ul style="list-style-type: none"> <li>• Can you interpret the question and read it aloud?</li> <li>• What is the question asking you? Can you tell me in your own words?</li> <li>• What maths will you have to use to solve it?</li> <li>• What known facts could you use to help you?</li> <li>• Will you use 'MJF?' (mental, jottings, formal methods?)</li> <li>• Which is the most efficient method here?</li> <li>• How could you use the image of the box of eggs to help you? What could you label?</li> <li>• What jottings could you use to help you check your answer?</li> <li>• How could you prove your answers are correct?</li> </ul>	<p><b>Pupils might:</b></p> <ul style="list-style-type: none"> <li>• find it difficult to 'unpick' the maths needed to solve this type of problem and to make sense of what the question is asking them, particularly within the context of the problem</li> <li>• not use informal jottings/annotations to support them in solving the problem.</li> </ul> <p style="text-align: center;"><b>Next Steps</b></p> <ul style="list-style-type: none"> <li>• Encourage pupils to use the image of the box of eggs to help them in unpicking the problem to identify a 'way in' within the context of the problem.</li> <li>• Pupils will need practice at answering a range of contextual problems which require either 'rounding up' or 'rounding down' depending on the context, e.g. how many boxes can the farmer <b>fill</b>...?</li> </ul>

'Contains material developed by the Standards and Testing Agency for 2018 national curriculum assessments and licensed under Open Government Licence v3.0' <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>