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Diagnostic Mathematics Tasks

Year 3 summer term to Year 4 spring term

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

Sample Copy

Hampshire County Council

www.hants.gov.uk

Contents

Continuing Professional Development Standard

National Centre for Excellence in the Teaching of Mathematics

Introduction

This resource has been designed to support Year 3 and Year 4 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 3 to the spring term in Year 4. 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 Y4)
- 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

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

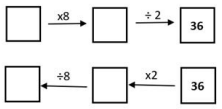
Suggested next step

Key questions for class teacher/teaching assistant

Common misconceptions from Spring term linked to National Curriculum

Suggested next steps to help address misconceptions

Year 3 Summer Term: Key Task 4	Year 3 Summer Term: Key Questions	Year 3 Summer Term: Purpose
Problem solving: Number and Place Value William has made a 3-digit number with these cards: 5 6 4 What other 3-digit numbers can he make with these cards? What is the largest number he can make? • Provide each pupil with a set of digit cards as a concrete resource to manipulate	• What number cards does William have? • How will you work systematically to make sure that you have found all the different 3-digit numbers that he can make? • Once you have found them all, how will you convince someone else? • Can you order the 3-digit numbers from smallest to largest? • Opportunity to self-check…Are you sure? Are there any number cards you would like to move? • How could you check your thinking? • Can you explain how you ordered them? How did you know that?	• To recognise the place value of each digit in a three-digit number (hundreds, tens and ones) *[Year 3 NC]* • To compare and order numbers up to 1000 *[Year 3 NC]* • To identify, represent and estimate numbers using different representations *[Year 3 NC]* • To solve number problems and practical problems involving these ideas *[Year 3 NC]*
		Next Step • Can pupils use greater than (>) and less than (<) symbols to compare numbers and complete missing number problems?

Year 4 Spring Term: Key Task 3	Year 4 Spring Term: Key Questions	Year 4 Spring Term: Key Misconceptions
Problem solving: Multiplication and Division I think of a number. I multiply it by 8 and then halve it. My answer is 36. What is my number?	• Can you interpret the question and read it aloud? • What is the question asking you? Can you tell me in your own words? • What maths will you have to use to solve it? • What will your starting point be? • Can you use any known facts to help you? • How might using the inverse here help you? • What mental jottings could you use to help you solve the problem? • How could you estimate a reasonable answer? • How could you prove your answer is correct? (9)	**Pupils might:** • Find it difficult to work out a starting point / 'way in' to this type of problem • Find it difficult when having to work backwards to solve the answer to a problem • Not be able to identify the use of the inverse [NC Y3]
		Next Steps • Encourage pupils to follow the steps through logically within the problem and use mental jottings to support them • The use of a flow diagram / function box as a key model / image here can be useful e.g. 

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.

Year 4 Autumn Term 1: Key Task 3	Year 4 Autumn Term 1: Key Questions	Year 4 Autumn Term 1: Purpose
Addition and subtraction There are 156 children at a local primary school. 86 children come to school in the car, 32 children cycle and the rest walk. How many children walk to school? **NB**: Encourage pupils to answer in the context of the problem.	• Can you read the question out loud? (Or if more appropriate, teacher to read aloud). • What is the problem asking you? Can you tell me in your own words? • Do you know what maths you have to do, to solve it? • Can you identify the number of steps needed to solve the problem? How do you know? • Can you estimate an answer? • Could you draw a bar model to help you make sense of the problem? • How will you show your workings? What strategies will you use? • How could you use a number line to help you? • How could you check your answer?	• To estimate and use inverse operations to check answers to a calculation. *[Year 4 NC]* • To solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why. [Year 4 NC] • Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly larger numbers to aid fluency. *[Year 4 NC – non statutory guidance]* **Next Step** Rachel and Michelle decide to check the answer to the following calculation using the inverse operation. 4526 + 3194 = 7720 Rachel checks by calculating 7720 – 4526. Michelle checks by calculating 7720 – 3194. Who has used the inverse operation? Explain your thinking.

Year 4 Autumn Term 2: Key Task 1	Year 4 Autumn Term 2: Key Questions	Year 4 Autumn Term 2: Purpose
Multiplication and division Jess plants carrot seeds in rows of 3. How many seeds will she need if she wants to plant 5 rows? She has planted 9 seeds so far. How many rows is this? **NB:** Encourage pupils to answer in the context of the problem.	• Can you read the question out loud? (Or if more appropriate, teacher to read aloud) • What is the problem asking you? Can you tell me in your own words? • Do you know what maths you have to do to solve it? • Can you identify the number of steps needed to solve the problem? How do you know? • How could you represent the problem using an array or a bar model? • How could you check your answer? • How could you prove your answer is correct?	• To recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. *[Year 3 NC]* • To solve problems, including missing number problems, involving multiplication and division. *[Year 3 NC]* • Pupils solve simple problems in contexts, deciding which of the four operations to use and why. *[Year 4 NC – non statutory guidance]* **Next Step** Jess plants carrot seeds in rows of 6. How many seeds will she need if she wants to plant 5 rows? She has planted 3 rows already. How many more seeds will she need?