

HIAS maths team

Diagnostic Mathematics Tasks

Year 1 summer term to Year 2 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

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Introduction

This resource has been designed to support Year 1 and Year 2 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 will enable teachers to progressively explore pupils' knowledge, conceptual understanding, and skills from the end of the summer term in Year 1 to the spring term in Year 2. 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 focused 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 focused 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 Y3).
- Suggestions for next steps in learning.

It is recommended that, as one-to-one conferencing is intensive, 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 1 Summer Term: Key Task 3	Year 1 Summer Term: Key Questions	Year 1 Summer Term: Purpose
<p>Problem Solving: Addition Read the problem from the card to the pupil:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Luke had 5 stickers and Kyle had 3 stickers. How many do they have altogether?</p> </div> <p>Ensure resources are available, such as counting apparatus, Numicon, a number line. Observe if pupils choose to count (objects to find a total, or on a number line), or can they use number bonds. Continue by posing the following questions from the next card:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>What if: Luke had 6 and Kyle had 4 Luke had 10 and Kyle had 7 Luke had 15 and Kyle had 3 Luke had 8 and Kyle had 5?</p> </div>	<p>As you work through each problem, ask the following questions, and also probe the strategies the pupil uses, eg:</p> <ul style="list-style-type: none"> explain how you worked out how many they have altogether can you write the number sentence to solve the problem? <p>Do they count on in ones, or:</p> <ul style="list-style-type: none"> tell/show you that they know 5 and 3 is 8 tell/show you that 6 and 4 is 10 tell/show you that 10 and 7 is 17 tell/show you that 15 and 3 is 18 (because 5 and 3 is 8) tell/show you that 8 and 2 more would be ten, then 3 more would be 14? 	<ul style="list-style-type: none"> To check understanding of addition as combining two quantities To read, write and interpret mathematical statements involving addition (+) and equals (=) [Year 1 NC] To represent and use number bonds within 20 [Year 1 NC] To add one-digit and two-digit numbers to 20, including zero [Year 1 NC] To solve one-step problems that involve addition using concrete objects and pictorial representations [Year 1 NC] <p>Next Step</p> <p>Tom had 10 pennies and lost some. He had 4 left. How many had he lost? Can you write the calculation to show how you would work it out?</p>

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

Suggested next step.

Key questions for class teacher/teaching assistant

Year 2 Spring Term: Key Task 2	Year 2 Spring Term: Key Questions	Year 2 Spring Term: Key Misconceptions
<p>Fractions: Show the pupils the card with the two shapes on, and also the picture of the bags of crisps:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> </div> <p>[Ensure pupils have counting objects to represent the bags of crisps.]</p>	<ul style="list-style-type: none"> Sam also thinks that in both of these pictures, the whole shape is split into quarters because each one has been split into 4 pieces. What do you think? Can you work out a quarter of the bag of crisps? Sam thinks that if he had 6 bags of the crisps he would have a quarter of the whole set. Is he right? Explain why you think Sam is right/wrong. 	<p>A key part of understanding fractions conceptually is knowing that the parts must be equal in size or quantity. Children sometimes think that anything split into four parts (equal or unequal) is split into four quarters. It is important that pupils can articulate this understanding clearly, identifying when "a quarter" is shown and when it is not.</p> <p>Next Steps</p> <p>Ensure pupils have opportunities to demonstrate their understanding of a "quarter" in different contexts and link this to equal sharing between four. For example, pupils could discuss how they would split different picnic items into quarters – eg a quarter of a cake, a carton of juice, 8 tomatoes, a liquorice lace.</p> <p>Give pupils opportunities to notice that two quarters are equivalent to one half.</p>

Common misconceptions from Spring term linked to National Curriculum.

Suggested next steps to help address misconceptions.

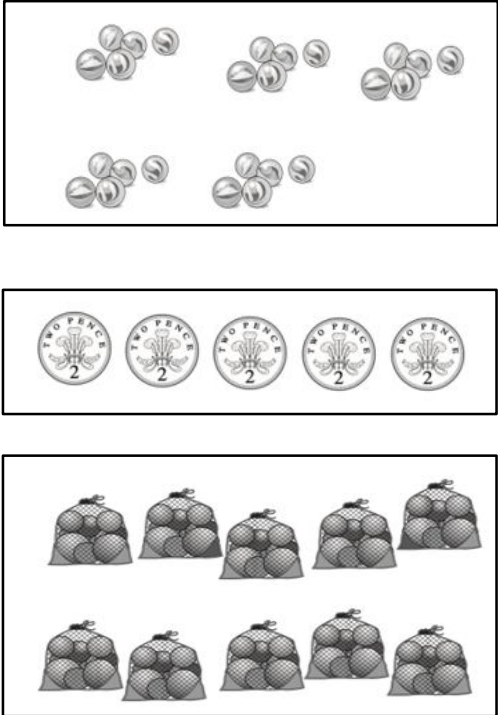
What to look for

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.
- identify the steps needed to solve the problem in the most straightforward way.

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Year 2 Autumn Term 1: Key Task 5	Year 2 Autumn Term 1: Key Questions	Year 2 Autumn Term 1: Purpose
<p>Multiplication and division</p> <p>Show the pupil the pictures on the cards</p>  <p>(You could also use counting objects and real coins to do the tasks practically.)</p>	<ul style="list-style-type: none"> • Look at the picture of the marbles. How many are in each group? • Can you find out how many marbles there are by counting in 5's? • How many marbles are in a group? • How many groups are there? • Now look at the oranges in bags of ten. Can you count in 10's to find out how many oranges there are altogether? • How many oranges are in a group (bag)? • How many groups (bags) are there? • Look at the 2p coins. • Can you find out how much money there is in total by counting in 2's? • How many 2p coins are there? • What is the value of each coin? 	<p>Year 2 Autumn Term 1: Purpose</p> <ul style="list-style-type: none"> • To check if pupils can count in different steps and use this to solve problems. • Count in multiples of two's, fives and tens. [Year 1 NC] <p style="text-align: center;">Next Step</p> <ul style="list-style-type: none"> • Offer the pupil a structured number line and a dry-wipe pen. Ask if they can work out how to count in threes. • Place objects in groups of three and ask pupils if they can count them in threes.

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Year 2 Autumn Term 2: Key Task 3	Year 2 Autumn Term 2: Key Questions	Year 2 Autumn Term 2: Purpose
<p>Addition and Subtraction</p> <p>Show the pupil the calculations on the card.</p> <div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 20px auto;"> $\boxed{16} + \boxed{4} = \boxed{}$ $\boxed{4} + \boxed{} = \boxed{20}$ $\boxed{20} - \boxed{16} = \boxed{}$ $\boxed{20} - \boxed{} = \boxed{16}$ </div>	<ul style="list-style-type: none"> • Look at the first calculation. What do you think the missing number is? How do you know? • Now look at the next one. What do you think the missing number is this time? How did you work it out? • Did the first calculation help you work out the answer to the next one? • What about the third calculation? What is the same and what is different from the others? • Can you tell me the missing number in the last one? How did you know? 	<ul style="list-style-type: none"> • To represent and use number bonds and related subtraction facts within 20. [Year 1 NC] • Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, $9 + 7 = 16$; $16 - 7 = 9$; $7 = 16 - 9$). This establishes addition and subtraction as related operations. [Year 1 NC non-statutory guidance]. • To solve one-step problems that involve addition and subtraction and missing number problems. [Year 1 NC] <div style="background-color: #d9ead3; text-align: center; padding: 5px; border: 1px solid black;">Next Step</div> <p>Sarah has written down this calculation:</p> $16 - 7 = 9$ <p>How could she check if this is correct using an addition calculation?</p> <p>Explain how you know.</p>