

HIAS MOODLE+ RESOURCE

Mental Fluency Progression

Key Stage 1

HIAS Maths Team
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Overview

This document contains guidance on the development of mental fluency with calculation across and KS1.

Points to consider when using this resource

This document is to support teachers with Assessment for Learning and focusing attention on their planning and formative assessment judgements. It is not intended to be used as a test. The examples of SATs questions illustrate the type of calculation pupils should be able to tackle confidently using mental methods – sometimes with jottings – if they have the underlying understanding of the core structures and relationships within the calculation.

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Mental Fluency Progression KS1

Mental Fluency Progression Year R - 2

Addition and subtraction		
From Year R:		
Mental fluency Expectation	National Curriculum / EYFS Programme of Study	Year 2 SATs question examples
<p>Through exploration of numbers and counting across the Early Years Foundation Stage, children should know the number that is “one more” or “one less” than a given number up to 20.</p> <p>(NB: The EYFS is a “best fit” curriculum so some pupils who achieve the Early Learning goal for Number may not be secure with this in its entirety.)</p>	<p>Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing. (The Early Learning Goal for Number)</p>	

From Year 1:		
<p>Pupils explore partitioning numbers to 10 and then 20, finding and then learning to recall all number bonds for all numbers up to 10, then 20.</p> <p>They learn about the relationship between addition and subtraction so that learned and recalled number bonds enable them to mentally solve addition and subtraction calculations within 20.</p> <p>It is important that, throughout Year 1 pupils move away from counting in ones to find an answer to a calculation and start to use and apply their number bonds. They should also start to “bridge through ten” using number bonds when adding two single-digit numbers.</p> <p>(See NCETM Number Facts Chart in Appendix)</p>	<p>Add and subtract one-digit and two-digit numbers to 20, including zero (Year 1)</p> <p>Pupils memorise and reason with number bonds to 10 and 20 in several forms. They should realise the effect of adding zero. This establishes addition and subtraction as related operations (Year 1)</p>	$2 + 5 = \boxed{}$ $\boxed{} + 8 = 12$ $9 - 3 = \boxed{}$ $18 - 6 = \boxed{}$ $\boxed{} = 19 - 5$ $5 + 10 + 5 = \boxed{}$

From Year 2:

Once pupils can calculate mentally using their recalled number bonds, they should now apply this mental fluency to calculating with numbers above 20.

The following continuum encourages scaffolding the necessary skills:

- Adding 2 single digit numbers (bridging through ten) e.g. $8 + 7$
- A 2-digit number and ones (no bridging +/-) e.g. $24 + 5$, $38 - 6$
- A 2-digit number and ten (+ / -) e.g. $34 + 10$, $68 - 10$
- A 2-digit number and a multiple of ten (+/-) e.g. $18 + 30$, $56 - 40$
- A 2-digit number add a single digit – with bridging e.g. $18 + 7$, $35 + 7$
- A 2-digit number subtract a single digit number – with bridging e.g. $24 - 6$, $33 - 8$,
- A 2-digit number add a 2-digit number without bridging – e.g. $23 + 16$
- A 2-digit number subtract a 2-digit number without bridging – e.g. $47 - 25$
- A 2-digit number add a 2-digit number with bridging – e.g. $24 + 47$, $18 + 27$, $48 + 35$

Apply their increasing knowledge of mental and written methods (Year 2)

Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 (Year 2)

Add and subtract using concrete objects, pictorial representations **and mentally**, including:

- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers
- Adding three one-digit numbers (Year 2)

Recognise the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems (Year 2)

$$80 - 10 = \boxed{}$$

$$5 + 32 = \boxed{}$$

$$22 + 22 = \boxed{}$$

$$68 + 20 = \boxed{}$$

$$7 + 84 = \boxed{}$$

$$64 - 11 = \boxed{}$$

$$39 - 20 = \boxed{}$$

$$54 - 8 = \boxed{}$$

$$23 + 37 = \boxed{}$$

$$100 - \boxed{} = 52$$

$$62 - 54 = \boxed{}$$

<ul style="list-style-type: none"> A 2-digit number subtract a 2-digit number with bridging – e.g. $72 - 17$, $35 - 7$ 		
Multiplication and Division		
From Year 1:		
<p>Throughout Year 1, pupils learn to conceptually understand multiplication and division as grouping and sharing. They can solve problems by using concrete objects and pictorial representations.</p> <p>Solving multiplication problems as “repeated addition” will enable pupils to practise the use of number bonds and also doubling numbers.</p> <p>Learning doubles and “near doubles” of numbers to ten supports mental fluency within 20 (see NCETM Number Facts chart in appendix).</p>	<p>Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities (Year 1).</p>	

From Year 2:

Through their conceptual understanding of grouping and sharing, pupils can now solve problems involving multiplication and division.

They should now start to learn multiplication facts for the 2, 5 and 10 multiplication tables, and through their understanding of the relationship between the two operations, will derive and learn the related division facts. They should now recall and use these known facts to solve a range of problems. (see progression chart in Appendix)

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers (Year 2)

Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot (Year 2).

Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They begin to use multiplication tables and recall multiplication facts, including related division facts to perform written and mental calculations (Year 2 non-statutory guidance)

$10 \times 10 = \boxed{}$

$5 \times 6 = \boxed{}$

$14 \div 2 = \boxed{}$

$40 \div 10 = \boxed{}$

$5 \times 12 = \boxed{}$

$80 \div 10 = \boxed{}$

Appendix: NCETM Number Facts charts.

Adding 1 and 2		Bonds to 10		Adding 10		Bridging/compensating		Y1 facts	
Doubles		Adding 0		Near doubles					

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

x	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3		9	12	15	18	21	24	27	30	33	36
4			16	20	24	28	32	36	40	44	48
5				25	30	35	40	45	50	55	60
6					36	42	48	54	60	66	72
7						49	56	63	70	77	84
8							64	72	80	88	96
9								81	90	99	108
10									100	110	120
11										121	132
12											144

- 28 multiplication/division facts to learn in year 2 (x2, x5, x10)
- +21 multiplication/division facts to learn in year 3 (x3, x4, x8)
- +16 multiplication/division facts to learn in year 4 (x6, x7, x9, x11, x12)

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