

Highcliffe Primary School

Maths Calculations Policy
2014

PROGRESSION MAP

Addition

This must be viewed alongside the subtraction map so that connections can be made. Once a skill has been introduced it should continue to be practised in the subsequent years.

YR	Y1	Y2	Y3	Y4	Y5	Y6
Understanding the operation and related vocabulary						
understand addition as combining two quantities	understand addition as: - combining two or more quantities - increasing one quantity	show that addition of two numbers can be done in any order (the commutative law) recognise that $5 + 27$ is equal to $27 + 5$	understand the principles of the commutative and associative law recognise that $45 + 36 = 36 + 45$ and that numbers can be added in any order e.g. in $13 + 14 + 9$	Demonstrate understanding of the commutative law eg by re-ordering calculations $342 + 187 = 387 + 142$ and $46 + 39 + 14 = 46 + 14 + 39$	begin to use brackets $(10+3) \times 7 = \square$ $\square = 10 + (0.4 \times 8)$	explore the order of operations using brackets compare $14 - (3 + 5)$ with $(14 - 3) + 5$ use their knowledge of the order of operations Use BIDMAS
		recognise the inverse relationship between addition and subtraction write the related number sentences: $5+2=7$ $2+5=7$ $7=5+2$ $7=2+5$ $7-2=5$ $7-5=2$ $2=7-5$ $5=7-2$	understand the inverse relationship between addition and subtraction write related number sentences: eg $45+22=67$ $22+45=67$ $67=45+22$ $67=22+45$ $67-22=45$ $67-45=22$ $22=67-45$ $45=67-22$ Use the inverse operation to check work			
record using marks that they can interpret and explain	read, write and interpret mathematical statements involving addition (+) and equals (=) signs : $14+5=19$ $17=9+8$ solve missing number problems: $11+\square=18$ $\square=13+2$ $13=\square+\square$	Solve missing number problems : $17+\square=27$ $\square=21+4$ $30=\square+\square$	Use knowledge of inverse operation to solve missing number problems $62+\square=74$ $\square=45+32$ $\square+\square=50$ $100 - 3 = 67 + \square$ $45 < \square + 6$ $\square + \square > 54 + 9$	'work backwards' to solve two step missing number problems $456+\square=673$ is the same as $673 - 456 = \square$	Solve multi-step missing number problems I am thinking of a number. I double it and then subtract 6. My answer is 8. What was my number? $\square \times 2 - 6 = 8$ so $(8+6) \div 2 = \square$	Use algebraic methods to solve missing number problems $2n + 7 = 12$ so $12 - 7 \div 2 = n$
begin to use vocabulary involved in adding <i>add, altogether, total, , ..more than ...</i>	understand the vocabulary related to addition <i>plus, the sum of</i>		understand, read and spell vocabulary related to addition correctly <i>increase</i>			
Recalling number facts						
recall addition facts to 5	recall and use addition facts to 10 fluently the total of 6 and 3 6 plus 2 4 more than 5	recall and use addition facts to 20 fluently, and derive and use related facts up to 100 7 add 8 4 more than 9 50 plus 30 the sum of 40 and 50	continue to recall and use addition facts to 20 fluently, and derive and use related facts beyond 100 $80+50$, 7 add 9 , 80 plus 70 , the sum of 90 and 60 , 30 more than 110	continue to use knowledge of addition facts and place value to derive related facts $800+500$; 5000 add 3000 ; 700 plus 800 ; the sum of 700 and 600 ; 300 more than 1200	use knowledge of addition facts and place value to derive related facts with numbers to one decimal place. 1.2 plus 0.7 ; the total of 0.8 and 0.9 ; the sum of 0.2 and 1.3 ; 0.3 more than 1 .	use knowledge of addition facts and place value to derive related facts with numbers to two decimal places e.g. 0.09 plus 0.4 , the total of 0.09 and 0.08 , the sum of 0.06 and 0.12 , 0.04 more than 1.13
know number pairs with a total of 10 $6 + ?$	know number pairs with a total of 20 $16+\square = 20$ $20 = 3+\square$	know complements to the next multiple of 10 $52+\square = 60$ $76+\square = 80$ know pairs of multiples of 10 with a total of 100 $60+\square = 100$ $100 = 70+\square$	know pairs of two-digit numbers with a total of 100 $74+\square = 100$ $100 = 59 + \square$	know complements to the next multiple of 100 $568+? = 600$	know complements to 1 $0.78 + \square = 1$ $0.52 + \square = 1$ recall pairs of three-digit numbers with a total of 1000 $456 + \square = 1000$ $1000 = \square + 825$	know complements to the next whole number $4.83 + \square = 5$ $7.125 + \square = 8$

Mental methods and mental methods with jottings

<p>find the total number of items in two groups by counting all of them</p> <p>add two single-digit numbers and count on to find the answer.</p>	<p>add one-digit and two-digit numbers to 20, including zero $12 + 3$ (by <u>counting on</u> in ones; 13, 14, 15)</p> <p>Progress to crossing the tens boundary (with jottings): $18 + 5$ (<u>partition</u> 5 to bridge the tens boundary; + 2, + 3)</p> <p>represent and use number bonds within 20 $15 + 4$ ($5 + 4 = 9$ so $15 + 4 = 19$)</p>	<p>add numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> * a two-digit number and ones $34 + 9$ (<u>adjusting</u>; add 10 and subtract 1) $63 + 4$ (use known facts; $3+4=7$ so $63+4=67$) * a two-digit number and tens $37 + 20$ (by <u>counting on</u> in tens; 47, 57) * two two-digit numbers <i>Begin by not crossing the tens boundary:</i> $42 + 23$ (<u>partition</u> the second number and count on; + 20, + 3) <i>then crossing the tens boundary</i> $47 + 15$ (partition the second number and count on; + 10, +3, +2) $45 + 19$ (<u>adjusting</u>; add 20 and subtract 1) * adding three one-digit numbers By recombining and looking for number bonds 	<p>add numbers mentally, including:</p> <ul style="list-style-type: none"> * a three-digit number and ones * a three-digit number and tens $137 + 50$ (by <u>counting on</u> in tens; 147, 157, 167, 177, 187) WITH JOTTINGS: $345 + 37$ (by <u>partitioning the second number</u> and counting on; +30, +5, +2) $234 + 99$ (by <u>adjusting</u> - add 100 and subtract 1) WITH JOTTINGS: $334 + 59$ (by adding 60 and subtracting 1) * a three-digit number and hundreds using partitioning and adjusting as appropriate 	<p>continue to practise mental methods of addition with increasingly large numbers</p> <p>$534 + 150$ (by <u>partitioning the second number</u> and counting on; +100, +50) WITH JOTTINGS: $675 + 28$ (by partitioning the second number and counting on; +25, +3)</p> <p>$1435 + 199$ (<u>adjusting</u>: add 200 and subtract 1)</p> <p>WITH JOTTINGS: $1764 + 79$ (by adding 80 (+40, +40) and subtracting 1)</p> <p><u>Using known facts and place value:</u> $6060 + 47$ $60+47= 107$ so $6060+47=6107$</p>	<p>add numbers mentally with increasingly large numbers</p> <p>add tenths, and one-digit whole numbers and tenths</p> <p>$4.3 + 1.5$ (by <u>partitioning the second number</u> and counting on; +1, +0.5) WITH JOTTINGS: $19.7 + 2.6$ (by partitioning the second number and counting on; +2, +0.3, +0.3)</p> <p>$3.6 + 1.7$ (<u>partition whole and decimals</u> to $3+1=4$, $0.6+0.7=1.3$, $4+1.3=5.3$) WITH JOTTINGS: $18.7 + 14.8$ ($18+14=32$, $0.7+0.8=1.5$, $32+1.5=33.5$)</p> <p>$8.3 + 1.9$ (<u>adjusting</u> by adding 2 and subtracting 0.1) WITH JOTTINGS: $14.6 + 3.9$ (by adding 4 and subtracting 0.1)</p> <p><u>Using known facts and place value:</u> $7.5 + 2.6$ $7.5 + 2.5 = 10$ so $7.5 + 2.6 = 10.1$</p>	<p>perform mental calculations, including with mixed operations, large numbers and decimals</p> <p>add positive and negative integers (in contexts such as temperature)</p> <p>$6.46 + 2.03$ (by <u>partitioning the second number</u> and counting on; +2, +0.03) WITH JOTTINGS: $18.7 + 5.64$ (by partitioning the second number and counting on; +5, +0.3, +0.34)</p> <p>$3.4 + 2.77$ (by <u>partitioning</u>: $3+2=5$, $0.4+0.7=1.1$, $5+1.1+0.07=6.17$) WITH JOTTINGS: $27.34 + 5.78$ ($27+5=33$, $0.3+0.7=1$, $0.04+0.08=0.12$, $33+1+0.12=34.12$)</p> <p>$6.73 + 0.99$ (by <u>adjusting</u>: add 1 and subtract 0.01) WITH JOTTINGS: $17.4 + 5.09$ (by adjusting: add 5.1 and subtracting 0.01)</p> <p><u>Using known facts and place value:</u> $0.64 + 0.36$ $64 + 36 = 100$ so $0.64 + 0.36 = 1$</p>
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Formal written layout						
			add numbers with up to three digits, using formal written methods of columnar addition	add numbers with up to 4 digits using the formal written method of columnar addition where appropriate	add whole numbers with more than 4 digits, including using formal written methods	
				add decimals to 2 decimal places (in the context of money or measures)	add decimals, including a mix of whole numbers and decimals and decimals with different numbers of decimal places	continue to practice addition calculations with decimals (up to 3 decimal places)
Estimating and checking						
		<p>check calculations by adding in a different order</p> <p>check $27 + 15$ ($27 + 10 + 5$) with $15 + 20 + 7$</p>	<p>estimate the answer to a calculation</p> <p>$139 + 58$ is approximately $150 + 50$</p> <p>use inverse operations to check answers</p> <p>use equivalent calculations to check answers</p> <p>$236 + 85$ by adding in a different order e.g. $200 + 85 + 36$</p>	<p>estimate the answer to a calculation</p> <p>$2467 + 1729$ is approximately $2500 + 1500$</p> <p>use inverse operations to check answers</p> <p>use equivalent calculations to check answers</p>	<p>use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</p> <p>$25\ 063 + 7459$ is approximately $25\ 000 + 7500$</p> <p>continue to use appropriate strategies to check answers</p> <p>check $8.3 + 1.9$ by adding in a different way</p> <p>$8.3 + 2 - 0.1$ or $8.3 + 0.7 + 1.2$</p>	<p>use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.</p> <p>$73.82 + 17.382$ is approximately $74 + 17$</p> <p>continue to use appropriate strategies to check answers</p> <p>check $3.4 + 2.77$ by adding in a different order partition or add 3 and adjust</p>
Key questions :						
	<p>How many altogether? How many more to make...? I add ...more. What is the total? How many more is... than...? How much more is...? One more, two more, ten more...</p> <p>What can you see here?</p> <p>Is this true or false?</p> <p>What is the same? What is different?</p>	<p>How many altogether? How many more to make...? How many more is... than...? How much more is...?</p> <p>Is this true or false? If I know that $17 + 2 = 19$, what else do I know? (e.g. $2 + 17 = 19$; $19 - 17 = 2$; $19 - 2 = 17$; $190 - 20 = 170$ etc).</p> <p>What do you notice? What patterns can you see?</p>	<p>What do you notice? What patterns can you see?</p> <p>When comparing two methods alongside each other: What's the same? What's different? Look at this number in the formal method; can you see where it is in the expanded method / on the number line?</p>	<p>What do you notice? What's the same? What's different?</p> <p>Can you convince me? How do you know? What patterns can you see?</p>	<p>What do you notice? What's the same? What's different? Can you convince me? How do you know? Will it work for....? Why? Why not? What patterns can you see? What is the rule?</p>	<p>What do you notice? What's the same? What's different? Can you convince me? How do you know? Will it work for....? Why? Why not? What patterns can you see? What is the rule? What is the formula?</p>

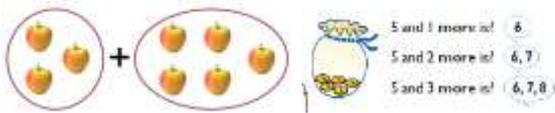
ADDITION: Y1

Understanding the operation and related vocabulary.

Understanding the operation

Understand addition as:

- Combining two or more quantities.
- Increasing one quantity.



Read, write and interpret mathematical statements involving addition (+) and equals (=) sign. Children should see = as signifying equality and become used to seeing it in different positions.

$$14+5=19 \quad 17=9+8$$

Solve missing number problems with missing number in all possible places

$$11+\square=18 \quad \square=13+2 \quad 13=\square+\square \quad \square+\square=13$$

$$\square+12=18 \quad 14+3=\square \quad 16=\square+12 \quad 12=9+\square$$

Understand addition and subtraction as related operations. E.g. $7 + 3 = 10$ is related to $10 - 3 = 7$

Vocabulary

Addition, add (+), forwards, put together, more than, more, total, altogether, distance between, difference between, equal, =, same as, most, pattern, odd, even, digit, counting on, plus, the sum of

Generalisations

- True or false? Addition makes numbers bigger.
- True or false? You can add numbers in any order and still get the same answer.

Mental Calculations

Number facts

Children should experience regular counting on and back from different numbers.

Recall and use addition facts to 10 fluently

the total of 6 and 3 6 plus 2 4 more than 5

Know number pairs with a total of 20 experiencing the = sign in different positions.

$$16+\square=20 \quad 20=3+\square$$

Know doubles to 10 and use near doubles to support addition

Double 3 is 6 so $3+4$ is one more

Mental methods supported by equipment

Add one-digit and two-digit numbers to 20, including zero using concrete objects, pictorial representation and mentally.

Counting on (sequencing)

$12 + 3$ (by counting on in ones; 13, 14, 15)

Partitioning

Children have opportunities to explore partitioning numbers in different ways.

e.g. $7 = 6 + 1$, $7 = 5 + 2$, $7 = 4 + 3$

Add $5 + 7$ (by partitioning 7 in to 5 and 2) $5 + 5 + 2$

With Jottings: *Progress to crossing the tens boundary*

$18 + 5$ (by partitioning 5; $+2, +3$)

Use bundles of straws and Dienes to model partitioning teen numbers into tens and ones and develop understanding of place value.



Using known facts and place value

$$15 + 4$$

$$5 + 4 = 9 \text{ so } 15 + 4 = 19$$

Recording Calculations

No formal written layout. Children record their maths using pictorial representations, number lines and mathematical statements.

Counting and Combining sets of Objects

$$5+7=12$$

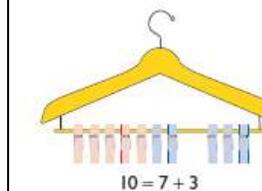
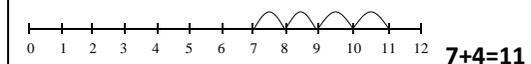


Add one-digit and two-digit numbers to 20, including zero

$$6 + 4 = 10$$



OR



Partition small numbers and bridge eg $18+5 = 18+2+3$ using a bead string or jottings

ADDITION: Y2

Understanding the operation and related vocabulary.

Understanding the operation

Continue to understand addition as:

- Combining two or more quantities.
- Increasing one quantity.

Know that addition of two numbers can be done in any order (commutative law)

Recognise that $5 + 27$ is equal to $27 + 5$

Continue to recognise the inverse relationship between addition and subtraction using numbers up to 20 and use to check.

Write the related number sentences

$15+2=17$ $2+15=17$ $17=15+2$ $17=2+15$

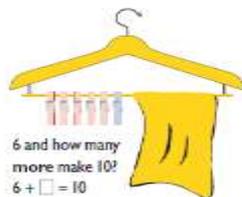
$17-2=15$ $17-15=2$ $2=17-15$ $15=17-2$

Solve missing number problems

$17+\square=27$ $\square=21+4$ $10=\square+\square$



$$7 + ? = 10$$



Vocabulary

+, add, addition, adjust, bridge, more, plus, make, sum, total, altogether, how many more to make...? how many more is... than...? how much more is...? =, equals, sign, is the same as, Tens, ones, partition

Near multiple of 10, tens boundary, More than, one more, two more... ten more... one hundred more

Mental Calculations

Number facts

Recall and use number facts to 20 fluently and derive and use related facts up to 100, using varied vocabulary.

7 add 8 4 more than 9 50 plus 30 the sum of 40 and 50

Know complements to the next multiple of 10.

$52+\square=60$ $76+\square=80$

Know pairs of multiples of 10 with a total of 100.

$60+\square=100$ $100=70+\square$

Mental methods and jottings

Add numbers 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

Counting on

$37 + 20$ (by counting on in tens; 47, 57)

Partitioning (with or without jottings)

$42 + 23$ (by partitioning the second/ smaller number and counting on; + 20, + 3)

Progress to crossing the tens boundary

$47 + 15$ (by partitioning the second number and counting on; + 10, +3, +2)

Adjusting (with or without jottings)

$34 + 9$ (adding 10 then subtracting 1)

$45 + 19$ (by adding 20 and subtracting 1)

Using known facts and place value:

$63 + 4$

$3+4=7$ so $63+4=67$

Recording Calculations

Continue to use concrete objects, blocks, counters, pictorial representations as appropriate to support recording and calculating.

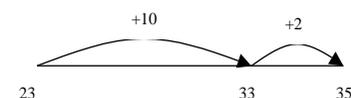
Use prepared and independently created number lines

Counting on in tens and ones

$23 + 12 = 23 + 10 + 2$

$= 33 + 2$

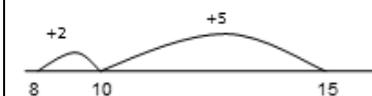
$= 35$



Partitioning and bridging through 10.

Children should be able to partition the 7 to relate adding the 2 and then the 5.

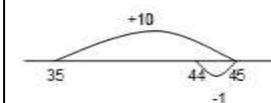
$8 + 7 = 15$



Adding 9 or 11 by adding 10 and adjusting by 1

e.g. Add 9 by adding 10 and adjusting by 1

$35 + 9 = 44$



Generalisation

- *Noticing what happens when you count in tens (the digits in the ones column stay the same)
- *Odd + odd = even; odd + even = odd; etc
- *addition can be done in any order (commutative) and subtraction of one number from another cannot

Estimating:

For 35+18, estimate that it is about 55 as 35+20=55

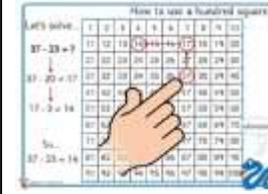
Using near doubles:

20 doubled is 40 so 21 +20 is one more than 40

Check calculations by adding in a different order

check 27 + 15 (27 + 10 + 5) with 15 + 20 + 7

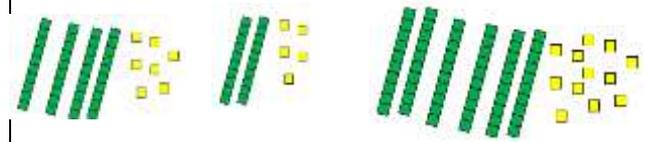
Use a number square to explore patterns in addition, including adding 10 and multiples of 10



Towards a Written Method

Partitioning in different ways and recombine

$$47 + 25 = 72$$



Using Dienes apparatus or place value counters



Record addition and subtraction in columns to support place value

$$\begin{array}{r} \text{T} \quad \text{U} \\ 40 \quad 7 \\ + 20 \quad 5 \\ \hline 60 \quad 12 = 72 \end{array}$$

Use bar method to support understanding of problems

ADDITION: Y3

Understanding the operation and related vocabulary.

Understanding the operation

Understand the principles of the commutative and associative law:

Recognise that $45 + 36$ is equal to $36 + 45$

Recognise that if calculating $13 + 14 + 9$ the numbers can be combined in any order

Understand the inverse relationship between addition and subtraction

$45+22=67$ $22+45=67$ $67=45+22$ $67=22+45$

$67-22=45$ $67-45=22$ $22=67-45$ $45=67-22$

Solve missing number problems

$62+\square=74$ $\square=45+32$ $\square+\square=50$

$100 - 3 = 67 + \square$ $45 < \square + 6$ $\square + \square > 54 + 9$

Vocabulary

Understand, read and spell vocabulary related to addition correctly

Hundreds, tens, ones, estimate, partition, recombine, difference, decrease, increase, near multiple of 10 and 100, inverse, rounding, column, exchange, complements, < and >

See also Y1 and Y2

Generalisations

Noticing what happens to the digits when you count in tens and hundreds.

Odd + odd = even etc (see Year 2)

Inverses and related facts – develop fluency in finding related addition and subtraction facts.

Develop the knowledge that the inverse relationship can be used as a checking method.

Mental Calculations

Number facts

Continue to recall and use addition facts to 20 fluently, and derive and use related facts beyond 100

7 add 9, 80 plus 70, the sum of 90 and 60, 30 more than 110

Know pairs of two-digit numbers with a total of 100

$74 + \square = 100$ $100 = 59 + \square$

Children need to be secure adding multiples of 100 and 10 to any three-digit number including those that are not multiples of 10.

Mental methods and jottings

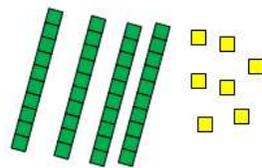
Add numbers mentally, including:

- * a three-digit number and ones
- * a three-digit number and tens
- * a three-digit number and hundreds

Continue to use number lines and number squares to support mental strategies

Manipulatives can be used to support mental imagery and conceptual understanding. Children need to be shown how these images are related eg.

What's the same? What's different?



Written Calculations

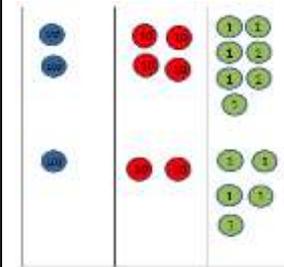
Partition into tens and ones

Partition both numbers and recombine.

Towards a Written Method

Introduce expanded column addition modelled with place value counters or Dienes.

Add numbers with up to three digits, using formal written methods of columnar addition



leading to:

H T U

200 40 7

+ 100 20 5

300 60 12 = 372

Using place value counters / Dienes, children should become aware that the 12 in the units column can be exchanged for one ten and 2 units, leading to a more compact method when they are ready.

What is the same? What is different?

Counting On (Sequencing)

137 + 50 (by counting on in tens; 147, 157, 167, 177, 187)

With Jottings:

345 + 37 (by partitioning the second number and counting on; +30, +5, +2)

Partitioning the second number:

236 + 33 (236 + 30 +3)

With Jottings and practical equipment:

247 + 125 = 247 + 100 + 20 + 5
= 347 + 20 + 5
= 367 + 5
= 372

Use manipulatives to support partitioning :

236 + 85 = 236 + 80 + 5
= 236 + 70 + 10 + 4 + 1

Adjusting:

234 + 99 (by adding 100 and subtracting 1)

With Jottings:

334 + 59 (by adding 60 and subtracting 1)

Using near doubles:

18 + 16 = double 18 - 2 or double 16 + 2

Using Known Facts And Place Value:

282 + 7
2 + 7 = 9 so 282 + 7 = 289

Estimating:

Estimate the answer to a calculation
139 + 58 is approximately 150 + 50

Checking:

Use inverse operations or equivalent calculations to check answers
236 + 85 by adding in a different order e.g. 200 + 85 + 36

Check answers by adding in a different order

H T U

200 40 7

+ 100 20 5

300 70 2 = 372
10

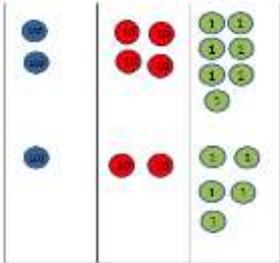
H T U

2 4 7

+ 1 2 5

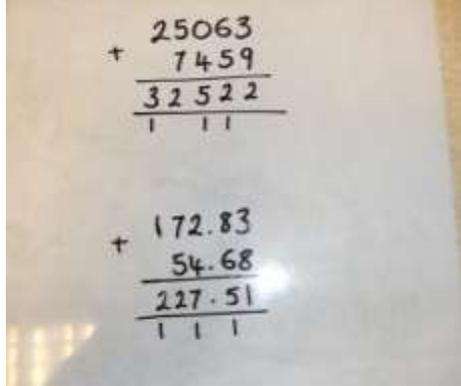
3 7 2
1

ADDITION: Y4

Understanding the operation and related vocabulary.	Mental Calculations	Written Calculations																																														
<p>Understanding the operation Continue to understand the principles of the commutative and associative laws Recognise that $342 + 187$ is equal to $187 + 342$ Recognise that if calculating $46 + 39 + 14$ the numbers can be combined in any order</p> <p>Continue to understand the inverse relationship between addition and subtraction $256+92=348$ $92+256=348$ $348=256+92$ $348=92+256$ $348-256=92$ $348-92=256$ $92=348-256$ $256=348-92$</p> <p>Continue to solve missing number problems and understand that these can often be solved by working backwards $456+\square=673$ $\square=300+176$ $\square+\square=125$ $1000 - 103 = 450 + \square$ $450 < \square + 60$ $\square+\square > 345+199$</p> <p>Vocabulary Understand, read and spell vocabulary related to addition correctly (See also years 1, 2 and 3)</p> <p>add, addition, sum, more, plus, increase, sum, total, altogether, double, near double, how many more to make..? how much more? units boundary, tens boundary, hundreds boundary, thousands boundary, tenths boundary, hundredths boundary, inverse, how many more/fewer? Equals sign, is the same as, exchange, bridge, adjust.</p>	<p>Number facts Continue to use knowledge of addition facts and place value to derive related facts 5000 add 3000, 700 plus 800, the sum of 700 and 600, 300 more than 1200</p> <p>Know complements to the next multiple of 100 $568+\square = 600$ $749+\square = 800$</p> <p>Continue to practise mental methods of addition with increasingly large numbers.</p> <p>Add multiples of 10, 100 and 1000, using manipulatives such as Dienes or place value counters to support. Begin to extend this to decimals</p> <p>Use number lines to reinforce decimals being between whole numbers</p> <p>Mental methods and jottings Counting On (Sequencing): $534 + 150$ (partitioning the second number and counting on; +100, +50) <u>With Jottings:</u> $675+28$ (by partitioning the second number and counting on; +25, +3)</p> <p>Partitioning: $87 + 46$ ($80+40=120$, $7+6=13$, $120+13=133$) <u>With Jottings:</u> $456 + 362$ ($400+300=700$, $50+60=110$, $6+2=8$, $700+110+8=818$)</p>	<p>Add decimals to 2 decimal places (in the context of money or measures)</p> <p>Written methods (progressing to 4-digits) Expanded column addition modelled with place value counters, progressing to calculations with 4-digit numbers using the formal written method of columnar addition where appropriate</p> <div style="display: flex; align-items: flex-start; gap: 20px;"> <div style="text-align: right;"> <table style="border-collapse: collapse;"> <tr><td>H</td><td>T</td><td>U</td></tr> <tr><td>2</td><td>4</td><td>7</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td>+ 1</td><td>2</td><td>5</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td>3</td><td>7</td><td>2</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td></td><td></td><td style="text-align: center;">1</td></tr> </table> </div> <div style="text-align: center;">  </div> </div> <p>See year 3 for progression in recording methods, leading to compact method</p> <p>Compact written method Extend to numbers with at least four digits.</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse; width: 100px; height: 100px;"> <tr><td style="text-align: center;">●</td><td style="text-align: center;">●●</td><td style="text-align: center;">●●</td><td style="text-align: center;">●●●</td></tr> <tr><td style="text-align: center;">●●</td><td style="text-align: center;">●●</td><td style="text-align: center;">●</td><td style="text-align: center;">●●●</td></tr> <tr><td style="text-align: center;">7</td><td style="text-align: center;">1</td><td style="text-align: center;">5</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">●</td><td></td><td style="text-align: center;">●</td><td></td></tr> </table> </div> <div style="text-align: right;"> <table style="border-collapse: collapse;"> <tr><td style="text-align: right;">2634</td></tr> <tr><td style="text-align: right;">+4517</td></tr> <tr><td style="text-align: right;"><hr/></td></tr> <tr><td style="text-align: right;">7151</td></tr> <tr><td style="text-align: right;"><hr/></td></tr> <tr><td style="text-align: right;">1 1</td></tr> </table> </div> </div>	H	T	U	2	4	7	<hr/>			+ 1	2	5	<hr/>			3	7	2	<hr/>					1	●	●●	●●	●●●	●●	●●	●	●●●	7	1	5	1	●		●		2634	+4517	<hr/>	7151	<hr/>	1 1
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	<p><u>Adjusting:</u> 1435 + 199 (by adding 200 and subtracting 1) <u>With Jottings:</u> 1764+79 (by adding 80 (+40, +40) and subtracting 1)</p> <p><u>Using near doubles:</u> 36+35= one more than 70</p> <p><u>Using Known Facts And Place Value:</u> 6060 + 47 60+47= 107 so 6060+47=6107 14+15 = 29 so 140 +150 = 290</p> <p><u>Re-ordering calculations:</u> Investigate when re-ordering works as a strategy e.g. 46+39+14 = 46+14+39</p> <p><u>Estimating:</u> Estimate the answer to a calculation 2467 + 1729 is approximately 2500 + 1500</p> <p>Use inverse operation or an equivalent calculations to check answers 1764+79 by adding 80 and adjusting or by using partitioning</p>	<p>Children should be able to make the choice of reverting to expanded methods if experiencing any difficulty. Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).</p> $\begin{array}{r} 72.8 \\ +54.6 \\ \hline 127.4 \\ 11 \end{array}$
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ADDITION: Y5

Understanding the operation and related vocabulary.	Mental Calculations	Written Calculations
<p>Understanding the operation Continue to solve missing number problems $6.5 + \square = 10.7$ $\square = 8.4 + 3.7$ $\square + \square = 4.2$ $7.3 + 2.9 = 9.9 + \square$ $5.2 < \square - 0.9$ $\square - \square > 7.2 - 1.9$</p> <p>Begin to use brackets $(10+3) \times 7 = \square$ $\square = 10 + (0.4 \times 8)$</p> <p>Use inverse operations in word problems I am thinking of a number. I double it and then subtract 6. My answer is 8. What was my number?</p> <p>Vocabulary Read, spell and pronounce mathematical vocabulary related to addition correctly</p> <p>tens of thousands boundary, Also see previous years</p> <p>Generalisation Sometimes, always or never true? The difference between a number and its reverse will be a multiple of 9. What do you notice about the differences between consecutive square numbers? Investigate $a - b = (a-1) - (b-1)$ represented visually.</p>	<p>Number facts Continue to use knowledge of addition facts and place value to derive related facts with numbers to one decimal place 1.2 plus 0.7, the total of 0.8 and 0.9, the sum of 0.2 and 1.3, 0.3 more than 1.7</p> <p>Know complements to 1 $0.78 + \square = 1$ $0.52 + \square = 1$</p> <p>Recall pairs of three-digit numbers with a total of 1000 $456 + \square = 1000$ $1000 = \square + 825$</p> <p>Mental methods and jottings Add numbers mentally with increasingly large numbers. Add tenths, and one-digit whole numbers and tenths.</p> <p>Counting on (sequencing): $4.3 + 1.5$ (by partitioning the second number and counting on; +1, +0.5) With jottings: $19.7 + 2.6$ (by partitioning the second number and counting on; +2, +0.3, +0.3)</p> <p>Partitioning: $3.6 + 1.7$ ($3+1=4$, $0.6+0.7=1.3$, $4+1.3=5.3$) With jottings: $18.7 + 14.8$ ($18+14=32$, $0.7+0.8=1.5$, $32+1.5=33.5$)</p> <p>Adjusting: $8.3 + 1.9$ (by adding 2 and subtracting 0.1) With jottings: $14.6 + 3.9$ (by adding 4 and subtracting 0.1)</p>	<p>Add whole numbers with more than 4 digits, including using formal written methods</p> <p>Written methods (progressing to more than 4-digits) As year 4, progressing when understanding of the expanded method is secure, children will move on to the formal columnar method for whole numbers and decimal numbers as an efficient written algorithm.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers.</p>

Using known facts and place value:

$$7.5 + 2.6$$

$$7.5 + 2.5 = 10 \text{ so } 7.5 + 2.6 = 10.1$$

Estimating

Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

$$25\,063 + 7459 \text{ is approximately } 25\,000 + 7500$$

Continue to use appropriate strategies to check answers

$$\text{check } 8.3 + 1.9 \text{ by adding in a different order}$$

$$8.3 + 2 - 0.1 \text{ or } 8.3 + 0.7 + 1.2$$

ADDITION: Y6		
Understanding the operation and related vocabulary.	Mental Calculations	Written Calculations
<p>Understanding the operation Use their knowledge of the order of operations.</p> <p>Understand that when there are no brackets in an expression, do multiplication or division before addition or subtraction.</p> <p>Understand that if the operations are at the same level of priority, work out the example from left to right.</p> <p>Continue to solve missing number problems $0.63 + \square = 0.85$ $\square = 0.5 + 0.33$ $\square + \square = 0.71$ $0.89 + 0.3 = 0.6 + \square$ $0.75 < \square + 0.06$ $\square + \square > 0.74 + 0.07$</p> <p>Explore the order of operations using brackets compare $14 - (3 + 5)$ with $(14 - 3) + 5$</p> <p>Use algebraic methods to solve missing number problems $2n + 7 = 12$ so $12 - 7 : 2 = n$</p> <p>Vocabulary See previous years Read, spell and pronounce mathematical vocabulary related to addition correctly</p> <p>Generalisations Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as BOMDAS, or could be encouraged to design their own ways of remembering. Sometimes, always or never true? Subtracting numbers makes them smaller.</p>	<p>Number facts Continue to use knowledge of addition facts and place value to derive related facts with numbers to two decimal places 0.09 plus 0.04, the total of 0.09 and 0.08, the sum of 0.06 and 0.12, 0.04 more than 1.13</p> <p>Know complements to the next whole number $4.83 + \square = 5$ $7.125 + \square = 8$</p> <p>Mental methods and jottings Perform mental calculations, including with mixed operations, large numbers and decimals</p> <p>Add positive and negative integers (in contexts such as temperature) a 6°C temperature rise from -4°C</p> <p>Counting On (Sequencing): $6.46 + 2.03$ (by partitioning the second number and counting on; +2, +0.03) <u>With Jottings:</u> $18.7 + 5.64$ (by partitioning the second number and counting on; +5, +0.3, +0.34)</p> <p>Partitioning: $3.4 + 2.77$ ($3+2=5$, $0.4+0.7=1.1$, $5+1.1+0.07=6.17$) <u>With Jottings:</u> $27.34 + 5.78$ ($27+5=33$, $0.3+0.7=1$, $0.04+0.08=0.12$, $33+1+0.12=34.12$)</p> <p>Adjusting: $6.73 + 0.99$ (by adding 1 and subtracting 0.01) <u>With Jottings:</u> $17.4 + 5.09$ (by adding 5.1 and subtracting 0.01)</p>	<p>Written methods As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. $657\,982 + 54\,976$</p> <p>Continue calculating with decimals, including those with different numbers of decimal places $73.82 + 17.382$</p> <p>Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places. $13.86 + 9.481 = 23.341$</p> $\begin{array}{r} 13.860 \\ + 9.481 \\ \hline 23.341 \\ 1\ 1\ 1 \end{array}$ <p>Revert to expanded methods if the children experience any difficulty.</p> <p>Problem Solving Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding</p>

Using Known Facts And Place Value:

$$0.64 + 0.36$$

$$64 + 36 = 100 \text{ so } 0.64 + 0.36 = 1$$

Estimating:

Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

$$73.82 + 17.382 \text{ is approximately } 74 + 17$$

Continue to use appropriate strategies to check answers
check $3.4 + 2.77$ by adding in a different order
partition or add 3 and adjust