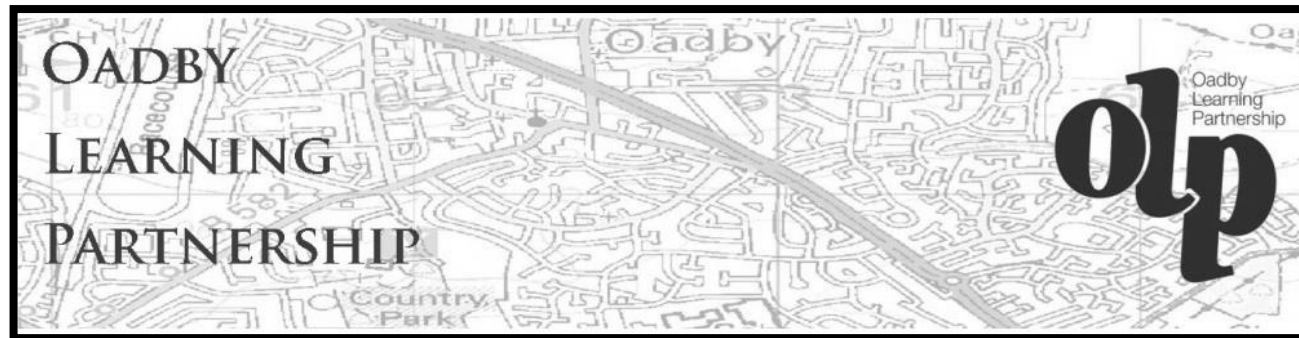




Oadby Learning Partnership

Maths Calculations Policy

2014



PROGRESSION MAP
Addition

This must be viewed alongside the subtraction map so that connections can be made.

YR	Y1	Y2	Y3	Y4	Y5	Y6
Understanding the operation and related vocabulary						
understand addition as: -combining two quantities - increasing one quantity	understand addition as: - combining two or more quantities - increasing one quantity	continue to understand addition as: - combining two or more quantities - increasing one quantity	continue to develop understanding of addition			
		show that addition of two numbers can be done in any order (the commutative law)	understand the principles of the commutative and associative law	continue to understand the principles of the commutative and associative laws		use their knowledge of the order of operations
		recognise the inverse relationship between addition and subtraction	understand the inverse relationship between addition and subtraction	continue to understand the inverse relationship between addition and subtraction		
record using marks that they can interpret and explain	read, write and interpret mathematical statements involving addition (+) and equals (=) signs solve missing number problems	solve missing number problems.	solve missing number problems	continue to solve missing number problems	continue to solve missing number problems begin to use brackets	continue to solve missing number problems explore the order of operations using brackets
begin to use the vocabulary involved in adding <i>add, altogether, total, , ..more than ..</i>	understand the vocabulary related to addition <i>plus, the sum of</i>	understand the vocabulary related to addition	understand, read and spell vocabulary related to addition correctly <i>increase</i>	understand, read and spell vocabulary related to addition correctly	read, spell and pronounce mathematical vocabulary related to multiplication correctly	read, spell and pronounce mathematical vocabulary related to multiplication correctly
Recalling number facts						
recall addition facts to 5	recall and use addition facts to 10 fluently	recall and use addition facts to 20 fluently, and derive and use related facts up to 100	continue to recall and use addition facts to 20 fluently, and derive and use related facts beyond 100 80+50	continue to use knowledge of addition facts and place value to derive related facts 800+500	continue to use knowledge of addition facts and place value to derive related facts with numbers to one decimal place 1.2 + 0.7	continue to use knowledge of addition facts and place value to derive related facts with numbers to two decimal places

know number pairs with a total of 10 $6 + ?$	know number pairs with a total of 20	know complements to the next multiple of 10 $52 + ? = 60$ know pairs of multiples of 10 with a total of 100	know pairs of two-digit numbers with a total of 100	know complements to the next multiple of 100 $568 + ? = 600$	know complements to 1 $0.83 + 0.17 = 1$ recall pairs of three-digit numbers with a total of 1000	know complements to the next whole number $7.632 + ? = 8$
Mental methods and mental methods with jottings						
find the total number of items in two groups by counting all of them add two single-digit numbers and count on to find the answer.	add one-digit and two-digit numbers to 20, including zero represent and use number bonds within 20	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	add numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds	continue to practise mental methods of addition with increasingly large numbers	add numbers mentally with increasingly large numbers add tenths, and one-digit whole numbers and tenths	perform mental calculations, including with mixed operations, large numbers and decimals add positive and negative integers (in contexts such as temperature)
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	practise addition for larger numbers, 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						
		check calculations by adding in a different order	estimate the answer to a calculation use inverse operations to check answers use equivalent calculations to check answers	estimate the answer to a calculation use inverse operations to check answers use equivalent calculations to check answers	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy continue to use appropriate strategies to check answers	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. continue to use appropriate strategies to check answers

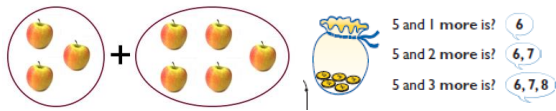
ADDITION: Y1

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.

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

Solve missing number problems

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

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



When introduced to the equals sign, children should see it as signifying equality. They should become used to seeing it in different positions.

Mental Calculations

Number facts

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

Mental methods and jottings

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

Represent and use number bonds within 20, experiencing the = sign in different positions.

Counting on (sequencing)

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

With Jottings:

Progress to crossing the tens boundary

$18 + 5$ (by partitioning 5 to bridge the tens boundary; + 2, + 3)

Partitioning

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

$$5 + 5 + 2$$

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

Children have opportunities to explore partitioning numbers in different ways.

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

Written Calculations

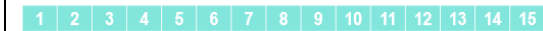
No formal written layout. Children record their maths using pictorial representations, number lines and mathematical statements.

Counting and Combining sets of Objects
 $5+7=12$

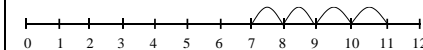


Add one-digit and two-digit numbers to 20, including zero

$$7 + 4$$



OR



Vocabulary

Understand the vocabulary related to addition:

Addition, add (+), forwards, put together, more than, total, altogether, distance between, difference between, equals = 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.

Some Key Questions

How many altogether? How many more to make...? I add ...more. What is the total? How many more is... than...?

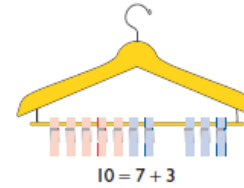
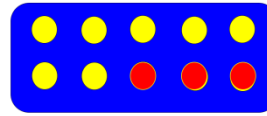
How much more is...? One more, two more, ten more...

What can you see here?

Is this true or false?

What is the same? What is different?

Children should experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10.

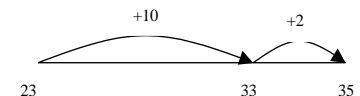
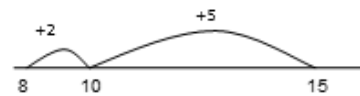
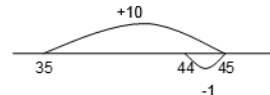


Using known facts and place value

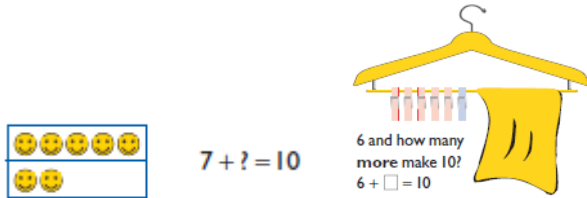
$$15 + 4$$

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

ADDITION: Y2

Understanding the operation and related vocabulary.	Mental Calculations	Written Calculations
<p>Understanding the operation Continue to understand addition as:</p> <ul style="list-style-type: none"> - Combining two or more quantities. - Increasing one quantity. <p>Show that addition of two numbers can be done in any order (commutative law) Recognise that $5 + 27$ is equal to $27 + 5$</p> <p>Continue to recognise the inverse relationship between addition and subtraction using numbers up to 20. Write the related number sentences $15+2=17$ $2+15=17$ $17=15+2$ $17=2+15$ $17-2=15$ $17-15=2$ $2=17-15$ $15=17-2$</p> <p>Solve missing number problems $17+\square=27$ $\square=21+4$ $10=\square+4$</p> <p>Vocabulary Understand the vocabulary related to addition</p> <p>+, add, addition, 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</p> <p>Near multiple of 10, tens boundary, More than, one more, two more... ten more... one hundred more</p> <p>Generalisation</p> <ul style="list-style-type: none"> • Noticing what happens when you count in tens (the digits in the ones column stay the same) • Odd + odd = even; odd + even = odd; etc • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot 	<p>Number facts Recall and use number 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</p> <p>Know complements to the next multiple of 10. $52+\square=60$ $76+\square=80$</p> <p>Know pairs of multiples of 10 with a total of 100. $60+\square=100$ $100=70+\square$</p> <p>Mental methods and jottings Add numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers <p>Counting on $37 + 20$ (by counting on in tens; 47, 57) <u>With Jottings</u> Begin by not crossing the tens boundary $42 + 23$ (by partitioning the second 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)</p> <p>Partitioning $23 + 12$ ($20 + 10 = 30$, $3 + 2 = 5$ then $30 + 5 = 35$) <u>With Jottings</u> Begin by not crossing the tens boundary $42 + 23$ ($40 + 20 = 60$; $3 + 2 = 5$ then $60 + 5$)</p>	<p>Continue to use number lines to develop understanding of:</p> <p>Counting on in tens and ones $23 + 12 = 23 + 10 + 2$ $= 33 + 2$ $= 35$</p>  <p>Partitioning and bridging through 10. The steps in addition often bridge through a multiple of 10 e.g. Children should be able to partition the 7 to relate adding the 2 and then the 5. $8 + 7 = 15$</p>  <p>Adding 9 or 11 by adding 10 and adjusting by 1 e.g. Add 9 by adding 10 and adjusting by 1 $35 + 9 = 44$</p> 

- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems. This understanding could be supported by images such as this.



Some Key Questions

How many altogether? How many more to make...? How many more is... than...? How much more is...?
 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).
 What do you notice? What patterns can you see?

Progress to crossing the tens boundary
 $47 + 15$ ($40 + 10 = 50$, $7 + 5 = 12$ then $50 + 12 = 62$)

Adjusting

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

With Jottings

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

Using known facts and place value:

$63 + 4$

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

Estimating:

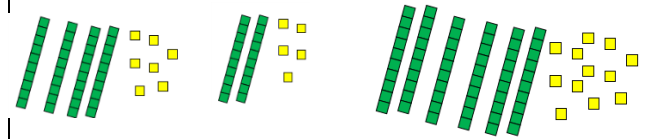
Check calculations by adding in a different order

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


Towards a Written Method

Partitioning in different ways and recombine

$47 + 25 = 72$



ADDITION: Y3

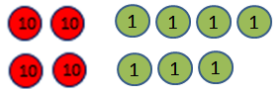
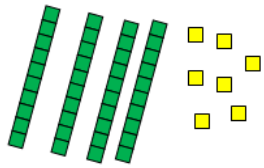
Understanding the operation and related vocabulary.	Mental Calculations	Written Calculations																				
<p>Understanding the operation Continue to develop understanding of addition.</p> <p>Understand the principles of the commutative and associative law: Recognise that $45 + 36$ is equal to $36 + 45$ Recognise that if calculating $13 + 14 + 9$ the numbers can be combined in any order</p> <p>Understand the inverse relationship between addition and subtraction $45+22=67$ $22+45=67$ $67=45+22$ $67=22+45$ $67-22=45$ $67-45=22$ $22=67-45$ $45=67-22$</p> <p>Solve missing number problems $62+\square=74$ $\square=45+32$ $\square+\square=50$ $100 - 3 = 67 + \square$ $45 < \square + 6$ $\square+\square > 54 + 9$</p> <p>Vocabulary Understand, read and spell vocabulary related to addition correctly</p> <p>Hundreds, tens, ones, estimate, partition, recombine, difference, decrease, near multiple of 10 and 100, inverse, rounding, column subtraction, exchange See also Y1 and Y2</p> <p>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.</p>	<p>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</p> <p>Know pairs of two-digit numbers with a total of 100 $74 + \square = 100$ $100 = 59 + \square$</p> <p>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</p> <p>Counting On (Sequencing) $137 + 50$ (by counting on in tens; $147, 157, 167, 177, 187$) <u>With Jottings:</u> $345 + 37$ (by partitioning the second number and counting on; $+30, +5, +2$)</p> <p>Partitioning: $236 + 33$ ($30+30=60, 6+3=9, 200+60+9=269$) <u>With Jottings:</u> $236 + 85$ ($80+30=110, 6+5=11, 200+110+11=321$)</p> <p>Adjusting: $234 + 99$ (by adding 100 and subtracting 1) <u>With Jottings:</u> $334 + 59$ (by adding 60 and subtracting 1)</p> <p>Using Known Facts And Place Value: $282 + 7$ $2+7=9$ so $282+7= 289$</p>	<p>Partition into tens and ones Partition both numbers and recombine. Count on by partitioning the second number only e.g. $247 + 125 = 247 + 100 + 20 + 5$ $= 347 + 20 + 5$ $= 367 + 5$ $= 372$</p> <p>Children need to be secure adding multiples of 100 and 10 to any three-digit number including those that are not multiples of 10.</p> <p>Towards a Written Method Introduce expanded column addition modelled with place value counters or Dienes.</p> <p><u>Add numbers with up to three digits, using formal written methods of columnar addition</u></p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center; margin-right: 20px;"> <tr> <td style="width: 30px; height: 30px; border: 1px solid black;">100</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> </tr> <tr> <td style="width: 30px; height: 30px; border: 1px solid black;">100</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> </tr> <tr> <td style="width: 30px; height: 30px; border: 1px solid black;">100</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> </tr> <tr> <td style="width: 30px; height: 30px; border: 1px solid black;">100</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">20</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> <td style="width: 30px; height: 30px; border: 1px solid black;">1</td> </tr> </table> <div style="margin-right: 20px;"> <p>leading to</p> $\begin{array}{r} 247 \\ +125 \\ \hline 12 \\ 60 \\ 300 \\ \hline 372 \end{array}$ </div> </div> 	100	20	20	1	1	100	20	20	1	1	100	20	20	1	1	100	20	20	1	1
100	20	20	1	1																		
100	20	20	1	1																		
100	20	20	1	1																		
100	20	20	1	1																		

Key Questions

What do you notice? What patterns can you see?

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?

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?



Estimating:

Estimate the answer to a calculation

$139 + 58$ is approximately $150 + 50$

Use inverse operations or equivalent calculations to
check answers

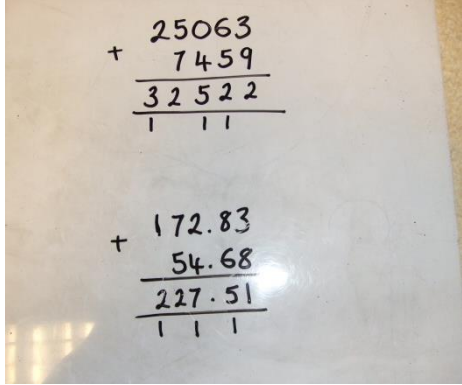
$236 + 85$ by adding in a different order e.g. $200 + 85 + 36$

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 $456+\square=673$ $\square=300+176$ $\square+\square=125$ $1000 - 103 = 450 + \square$ $450 < \square + 60$ $\square+\square > 345+199$</p> <p>Vocabulary Understand, read and spell vocabulary related to addition correctly</p> <p>See 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? ones boundary, tens boundary, hundreds boundary, thousands boundary, tenths boundary, hundredths boundary, inverse, how many more/fewer? Equals sign, is the same as.</p> <p>Generalisations Investigate when re-ordering works as a strategy for subtraction. Eg. $20 - 3 - 10 = 20 - 10 - 3$, but $3 - 20 - 10$ would give a different answer.</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 10 $568+\square = 600$ $749+\square = 800$</p> <p>Continue to practise mental methods of addition with increasingly large numbers.</p> <p>Mental methods and jottings Counting On (Sequencing): $534 + 150$ (by partitioning the second number and counting on; +100, +50) With Jottings: $675+28$ (by partitioning the second number and counting on; +25, +3)</p> <p>Partitioning: $87 + 46$ ($80+40=120$, $7+6=13$, $120+13=133$) With Jottings: $456 + 362$ ($400+300=700$, $50+60=110$, $6+2=8$, $700+110+8=818$)</p> <p>Adjusting: $1435 + 199$ (by adding 200 and subtracting 1) With Jottings: $1764+79$ (by adding 80 (+40, +40) and subtracting 1)</p> <p>Using Known Facts And Place Value: $6060 + 47$ $60+47= 107$ so $6060+47=6107$</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: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px; height: 20px;">100</td> <td style="width: 20px; height: 20px;">10</td> <td style="width: 20px; height: 20px;">1</td> </tr> <tr> <td style="width: 20px; height: 20px;">100</td> <td style="width: 20px; height: 20px;">10</td> <td style="width: 20px; height: 20px;">1</td> </tr> <tr> <td style="width: 20px; height: 20px;">100</td> <td style="width: 20px; height: 20px;">10</td> <td style="width: 20px; height: 20px;">1</td> </tr> <tr> <td style="width: 20px; height: 20px;">100</td> <td style="width: 20px; height: 20px;">10</td> <td style="width: 20px; height: 20px;">1</td> </tr> </table> <div style="margin-left: 20px;"> $\begin{array}{r} 247 \\ +125 \\ \hline 12 \\ 60 \\ 300 \\ \hline 372 \end{array}$ </div> </div> <p>Compact written method Extend to numbers with at least four digits.</p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px; height: 20px;">••</td> <td style="width: 20px; height: 20px;">••••</td> <td style="width: 20px; height: 20px;">••</td> <td style="width: 20px; height: 20px;">•••</td> </tr> <tr> <td style="width: 20px; height: 20px;">••••</td> <td style="width: 20px; height: 20px;">••••</td> <td style="width: 20px; height: 20px;">•</td> <td style="width: 20px; height: 20px;">••••</td> </tr> <tr> <td style="width: 20px; height: 20px;">7</td> <td style="width: 20px; height: 20px;">1</td> <td style="width: 20px; height: 20px;">5</td> <td style="width: 20px; height: 20px;">1</td> </tr> <tr> <td style="width: 20px; height: 20px;">•</td> <td style="width: 20px; height: 20px;">•</td> <td style="width: 20px; height: 20px;">•</td> <td style="width: 20px; height: 20px;">•</td> </tr> </table> <div style="margin-left: 20px;"> $\begin{array}{r} 2634 \\ +4517 \\ \hline 7151 \\ \hline 1 \quad 1 \end{array}$ </div> </div> <p>Children should be able to make the choice of reverting to expanded methods if experiencing any difficulty.</p>	100	10	1	100	10	1	100	10	1	100	10	1	••	••••	••	•••	••••	••••	•	••••	7	1	5	1	•	•	•	•
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<p><u>Some Key Questions</u> What do you notice? What's the same? What's different? Can you convince me? How do you know?</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>Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).</p> $\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ 1 \quad 1 \end{array}$
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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>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>Some Key Questions What do you notice? What's the same? What's different?</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: 20px 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

check $8.3 + 1.9$ 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>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 PEMDAS, 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. $657\,982 + 54\,976$ Continue calculating with decimals, including those with different numbers of decimal places $73.82 + 17.382$</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>

Some Key Questions

What do you notice?

What's the same? What's different?

Can you convince me?

How do you know?

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