LDST
Liverpool Diocesan Schools Trust

Holy Trinity Church of England Primary School

To be the best we can be: for God, for others and for ourselves

Calculation Policy
Addition and Subtraction

<u>Subject leader</u>: H DANIELS

Agreed by Governors

Autumn 2020

Due for review

Summer 2023

Vision

<table>
<tr><td colspan="7">At Holy Trinity Church of England Primary School, every child is recognised as a unique individual. We celebrate and welcome differences within our diverse school community, encouraging all to grow and flourish as precious children of God. Learning is centred around experiencing the joy of discovery. The ability to learn is underpinned by the teaching of basic skills, knowledge, concepts and values, with a vision to prepare our children to be life-long learners, rooted in our school motto: To be the best we can be: For God, for others and for ourselves.</td></tr>
<tr><td colspan="7">**Christian Values**</td></tr>
<tr><td>**Love**</td><td>**Hope**</td><td>**Forgiveness**</td><td>**Trust**</td><td>**Peace**</td><td>**Reverence**</td><td>**Justice**</td></tr>
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At Holy Trinity Primary we believe that children should be introduced to the processes of calculation through practical, oral and mental activities. As pupils begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved.

Choosing the appropriate strategy, recording in mathematics and in calculation in particular is an important tool both for furthering the understanding of ideas and for communicating those ideas to others. A useful written method is one that helps children carry out a calculation and can be understood by others.

Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that pupils use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. It is important pupils acquire secure mental methods of calculation and one efficient written method of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

This document identifies progression in calculation strategies rather than specifying which method should be taught in a particular year group.

Children should not be made to go onto the next stage if:

1) they are not ready.

2) they are not confident.

By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

This policy contains the key pencil and paper procedures that will be taught within our school alongside practical resources. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

Holy Trinity Church of England Primary Calculation Policy

Addition and Subtraction

Mental Calculation						
EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
add and subtract two single digit numbers using quantities and objects. e.g. 4 + 2 The children will use counters to count out 4 and 2 and then count them all to find the answer. The children may count on or back to find the answer	add and subtract one digit and two-digit numbers to 20, including zero 7 – 3 Using a 10 frame to subtract - The children may subitise how many are remaining without having to count them all.	add and subtract 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 Special cases When subtracting 9 or 19 28 – 9 28 – 10 + 1	add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds Partitioning eg: 55 + 78 70 + 50 = 120 8 + 5 = 13 120 + 13 = 133 or 78 + 50 = 128 128 + 2 + 3 = 133 Special cases 66 + 79 80 + 66 – 1 = 145 Using doubles 76 + 78 Double 70 + double 6 + 2 Double 70 + double 8 – 2 Partitioning Adding ones and tens to a 3 digit number 356 + 8 356 + 4 + 4 = 364 356 + 70 350 + 70 + 6 = 420 356 + 600 300 + 600 + 56 = 956	using mental strategy where appropriate 460 + 499 460 + 500 – 1 = 959 560 + 570 1000 + 130 = 1130 Partitioning 5678 – 2342 = 5678 – 2000 = 3678 3678 – 300 = 3378 3378 – 40 = 3338 3338 – 2 = 3336 Difference 5003 – 1106 = 3897 5003-1003-103=3897	add and subtract numbers mentally with increasingly large numbers including decimals 1.5 + 1.5 Double 1 and double 0.5 1.6 + 1.7 1.7 + 0.3 + 1.3 = 3.3 Partitioning 45678 – 3500 = 42178 45678 – 3000 = 42678 42678 – 500 = 42178 5.78 – 2.45 =3.33 5.78 – 0.05 = 5.73 5.73 – 0.4 = 5.33 5.33 – 2 = 3.33	perform mental calculations, including with mixed operations and large numbers Partitioning 4.578 – 0.008 = 4.57 6.378 – 0.07 = 6.308 Difference using larger numbers and number facts £100 - £32.77 = £67.23 £100 – £32 = £68 £68 -77p = £67.23 Difference (use mixed decimals) 6.45 – 1.7 = 4.75 1.7 ⟶ 2 = 0.3 2 ⟶6.45 = 4.45
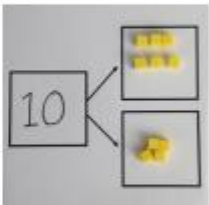
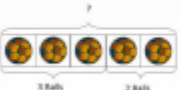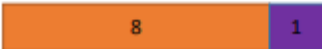|						
	read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot	using jottings: Partitioning Subtracting ones and tens from a 3 digit number 567 – 60 = 507 745 – 700 = 45 832 – 2 = 830 364 – 8 364 – 4 – 4 = 356 356 – 70 356 – 50 – 20 = 286 956 – 600 956 – 600 = 356 By counting back in tens and ones 91 – 35 91 – 30 – 1 – 4 Special cases 93 – 39 as 93 – 40 + 1 Difference 103 – 16 = 87 When numbers are close together, count on from the smallest number through the multiple of ten or count back from the largest to the smallest through the multiple of ten			use their knowledge of the order of operations to carry out calculations involving the four operations use their knowledge of the order of operations to carry out calculations involving the four operations

Number bonds

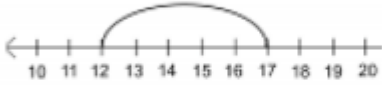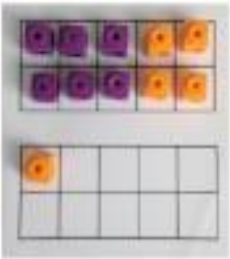| EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
children will separate a group of objects in different ways and know that the total remains the same.	represent and use number bonds and related subtraction facts within 20	recall and use addition and subtraction facts to 20 fluently, and				

| | | derive and use related facts up to 100 | | | | |

Written Methods

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
records using marks that they can interpret and explain.	read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)	add and subtract 2-digit numbers and ones. (appears also in Mental Calculation) Use partitioning methods to add and subtract 2-digit numbers and multiples of ten.	add and subtract 2 digit by 2 digit numbers bridging tens. Add and subtract numbers with up to 3 digits, using written methods of columnar addition and subtraction. Do not use formal columnar method except with children who can demonstrate they are ready. (See models and images part of policy for guidance of process using manipulatives.) See SLT first.	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and decomposition where appropriate	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and decomposition)	

Inverse operations, estimating and checking answers

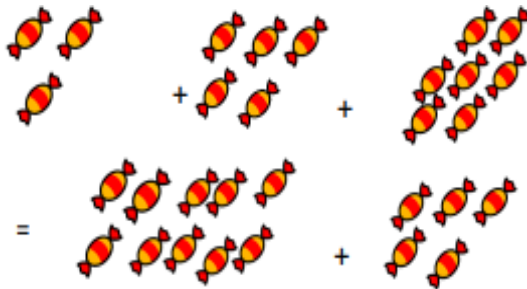| EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
estimate how many objects they can see and checks by counting them.		recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve	estimate the answer to a calculation and use inverse operations to check answers	estimate and use inverse operations to check answers to a calculation	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

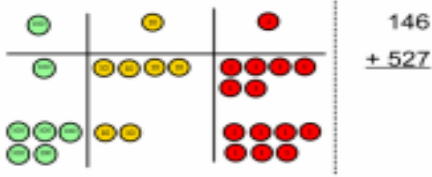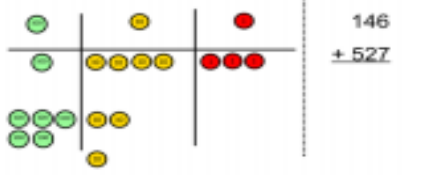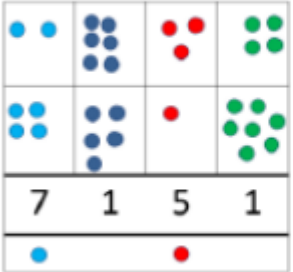|		missing number problems.				
Problem solving						
EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
solve practical problems, including doubling, halving and sharing.	solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = * - 9	solve problems with addition and subtraction: * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods *solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)*	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why *Solve problems involving addition, subtraction, multiplication and division*

Holy Trinity Church of England Primary Calculation Policy

Addition

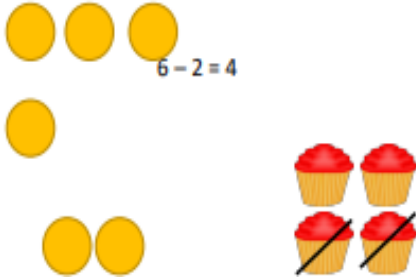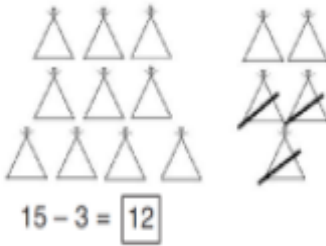| Objective and Strategies	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model	Use cubes to add two numbers together as a group or in a bar.	Use pictures to add two numbers together as a group or in a bar.	$4 + 3 = 7$ $10 = 6 + 4$ Use the part-part whole diagram as shown above to move into the abstract.

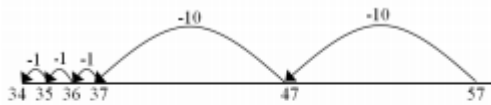| **Starting at the bigger number and counting on**	 Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	12 + 5 = 17 Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10	 6 + 5 = 11 Start with the bigger number and use the smaller number to make 10.	Use pictures or a number line. Regroup or partition the smaller number to make 10. 3 + 9 = 9 + 5 = 14 $\boxed{1}$ $\boxed{4}$ 	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?
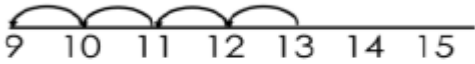
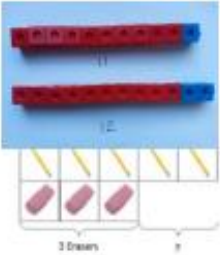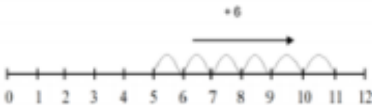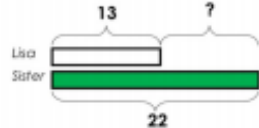|			
Adding three single digits	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7. Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	$4 + 7 + 6 = 10 + 7$ 10 $= 17$ Combine the two numbers that make 10 and then add on the remainder.
Column method- no regrouping	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters. 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	Calculations 21 + 42 = 21 + 42

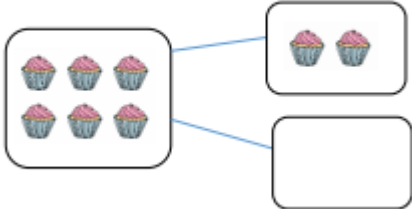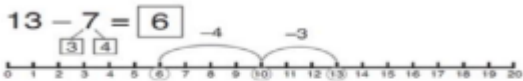|			

Column method-regrouping	Make both numbers on a place value grid.
	
	146
	+ 527
	
	Add up the units and exchange 10 ones for one 10.
	
	146
	+ 527
	
	Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.
	
	This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.
	
	As children move on to decimals, money and decimal place value counters can be used to support learning.
		Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.
		
		| 7
			1	5	1		Start by partitioning the numbers before moving on to clearly show the exchange below the addition.
							
							20 + 5
							40 + 8
							60 + 13 = 73
							
							536
							+ 85
							621
							1 1
							
							As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.
							
							72.8
							+ 54.6
							127.4
							1 1
							
							£ 2 3 . 5 9
							+ £ 7 . 5 5
							£ 3 1 . 1 4
							  1 1 . 1
							
							2 3 . 3 6 1
							  9 . 0 8 0
							5 9 . 7 7 0
							+ 1 . 3 0 0
							9 3 . 5 1 1
							2 1 2

Holy Trinity Church of England Primary Calculation Policy

Subtraction

Objectives and Strategies	Concrete	Pictorial	Abstract
Take away ones	Use physical objects, counters, cubes etc to show how objects can be taken away. $6 - 2 = 4$	Cross out drawn objects to show what has been taken away. $15 - 3 = \boxed{12}$	$18 - 3 = 15$ $8 - 2 = 6$

Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4 Use counters and move them away from the group as you take them away counting backwards as you go.	Count back on a number line or number track 9 10 11 12 13 14 15 Start at the bigger number and count back the smaller number showing the jumps on the number line. -10 -10 -1 -1 -1 34 35 36 37 47 57 This can progress all the way to counting back using two 2 digit numbers.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.
Find the difference	Compare amounts and objects to find the difference. Use cubes to build towers or make bars to find the difference 3 Erasers Use basic bar models with items to find the difference	+6 0 1 2 3 4 5 6 7 8 9 10 11 12 Count on to find the difference. Draw bars to find the difference between 2 numbers. **Comparison Bar Models** Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them. 13 ? Lisa Sister 22	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.

|			
Part Whole Model	Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? $10 - 6 =$	Use a pictorial representation of objects to show the part part whole model. 	 Move to using numbers within the part whole model.
Make 10	$14 - 9 =$ Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	$13 - 7 = \boxed{6}$ Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	$16 - 8=$ How many do we take off to reach the next 10? How many do we have left to take off?

| Column Method without regrouping | Use Base 10 to make the bigger number then take the smaller number away.
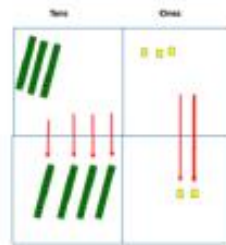
Show how you partition numbers to subtract. Again make the larger number first. | Draw the Base 10 or place value counters alongside the written calculation to help to show working.

$$\begin{array}{r} 54 \\ -22 \\ \hline 32 \end{array}$$
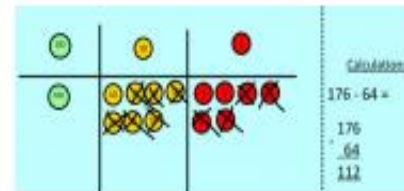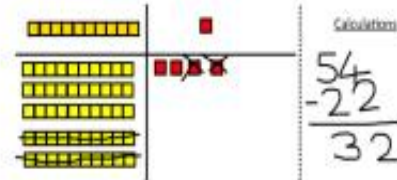
$176 - 64 =$
176
.64
112 | $47 - 24 = 23$

$$\begin{array}{r} 40+7 \\ -20+4 \\ \hline 20+3 \end{array}$$

This will lead to a clear written column subtraction.

$$\begin{array}{r} 32 \\ -12 \\ \hline 20 \end{array}$$ |

Column Method with regrouping

Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.

Make the larger number with the place value counters

Calculations
234
- 88

Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.

Calculations
234
- 88
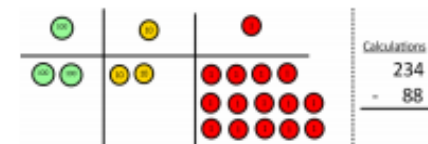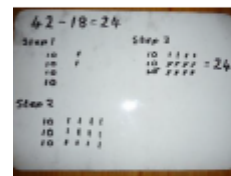
Now I can subtract my ones.

Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.


Calculations
234
- 88

Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.

When confident, children can find their own way to record the exchange/regrouping.

Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.
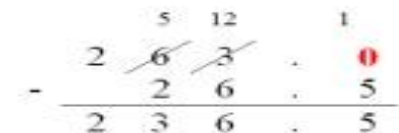

836 - 254 - 582
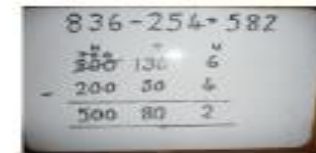
Children can start their formal written method by partitioning the number into clear place value columns.
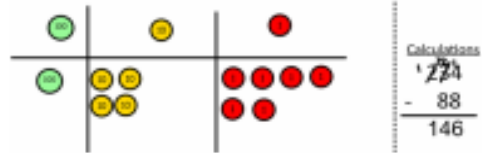

728 - 582 - 146

Moving forward the children use a more compact method.

This will lead to an understanding of subtracting any number including decimals.

Now I can take away eight tens and complete my subtraction

Calculations

$$\begin{array}{r} {}^{1}2\cancel{3}\cancel{4} \\ -\ \ 88 \\ \hline 146 \end{array}$$

Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.

Calculations

$$\begin{array}{r} 234 \\ -\ \ 88 \end{array}$$