# Thongsley Fields Primary \& Nursery School 

## Calculation Policy

Teaching \& Learning

Version: 2<br>Reviewed: March 2022<br>Approved: Curriculum \& Standards<br>Date: Spring 2022

## Thongsley Fields Primary \& Nursery School <br> Calculation Policy

## KEY STAGE 1

Children develop the core ideas that underpin all calculation. They begin by connecting calculation with counting on and counting back, but they should learn that understanding wholes and parts will enable them to calculate efficiently and accurately, and with greater flexibility. They learn how to use an understanding of 10 s and 1 s to develop their calculation strategies, especially in addition and subtraction.
Key language: whole, part, ones, ten, tens, number bond, add, addition, plus, total, altogether, subtract, subtraction, find the difference, take away, minus, less, more, group, share, equal, equals, is equal to, groups, equal groups, times, multiply, multiplied by, divide, share, shared equally, times-table

Addition and subtraction: Children first learn to connect addition and subtraction with counting, but they soon develop two very important skills: an understanding of parts and wholes, and an understanding of unitising 10 s , to develop efficient and effective calculation strategies based on known number bonds and an increasing awareness of place value. Addition and subtraction are taught in a way that is interlinked to highlight the link between the two operations.

A key idea is that children will select methods and approaches based on their number sense. For example, in Year 1, when faced with $15-3$ and $15-13$, they will adapt their ways of approaching the calculation appropriately. The teaching should always emphasise the importance of mathematical thinking to ensure accuracy and flexibility of approach, and the importance of using known number facts to harness their recall of bonds within 20 to support both addition and subtraction methods.

In Year 2, they will start to see calculations presented in a column format, although this is not expected to be formalised until KS2. We show the column method in Year 2 as an option; teachers may not wish to include it until Year 3.

Multiplication and division: Children develop an awareness of equal groups and link this with counting in equal steps, starting with $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s . In Year 2, they learn to connect the language of equal groups with the mathematical symbols for multiplication and division.

They learn how multiplication and division can be related to repeated addition and repeated subtraction to find the answer to the calculation.
In this key stage, it is vital that children explore and experience a variety of strong images and manipulative representations of equal groups, including concrete experiences as well as abstract calculations.

Children begin to recall some key multiplication facts, including doubles, and an understanding of the 2,5 and 10 times-tables and how they are related to counting.

Fractions: In Year 1, children encounter halves and quarters, and link this with their understanding of sharing. They experience key spatial representations of these fractions, and learn to recognise examples and non-examples, based on their awareness of equal parts of a whole.

In Year 2, they develop an awareness of unit fractions and experience non-unit fractions, and they learn to write them and read them in the common format of numerator and denominator.

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 1 |  |  |  |
| :---: | :---: | :---: | :---: |
|  | Concrete | Pictorial | Abstract |
| Year 1 <br> Addition | Counting and adding more Children add one more person or object to a group to find one more. | Counting and adding more Children add one more cube or counter to a group to represent one more. <br> One more than 4 is 5 . | Counting and adding more <br> Use a number line to understand how to link counting on with finding one more. <br> One more than 6 is 7. <br> 7 is one more than 6. <br> Learn to link counting on with adding more than one. $5+3=8$ |
|  | Understanding part-part-whole relationship Sort people and objects into parts and understand the relationship with the whole. <br> The parts are 2 and 4 . The whole is 6 . | Understanding part-part-whole relationship Children draw to represent the parts and understand the relationship with the whole. <br> The parts are 1 and 5 . The whole is 6 . | Understanding part-part-whole relationship Use a part-whole model to represent the numbers. $\begin{aligned} & 6+4=10 \\ & 6+4=10 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics
Knowing and finding number bonds within 10
Break apart a group and put back together to

find and form number bonds. | Knowing and finding number bonds within 10 |
| :--- |
| Use five and ten frames to represent key |
| number bonds. |

Adding by counting on
Children use knowledge of counting to 20 to
find a total by counting on using people or
objects.

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 1 |
| :--- | :--- | :--- | :--- |
| Subtraction |$\quad$| Counting back and taking away |
| :--- |
| Children arrange objects and remove to find |
| how many are left. |


|  | Finding the difference <br> Arrange two groups so that the difference between the groups can be worked out. <br> 8 is 2 more than 6. <br> 6 is 2 less than 8. <br> The difference between 8 and 6 is 2 . | Finding the difference <br> Represent objects using sketches or counters to support finding the difference. $5-4=1$ <br> The difference between 5 and 4 is 1 . | Finding the difference <br> Children understand 'find the difference' as subtraction. $10-4=6$ <br> The difference between 10 and 6 is 4 . |
| :---: | :---: | :---: | :---: |
|  | Subtraction within 20 <br> Understand when and how to subtract 1s efficiently. <br> Use a bead string to subtract 1s efficiently. $\begin{gathered} 5-3=2 \\ 15-3=12 \end{gathered}$ | Subtraction within 20 <br> Understand when and how to subtract 1s efficiently. $\begin{aligned} & 5-3=2 \\ & 15-3=12 \end{aligned}$ | Subtraction within 20 <br> Understand how to use knowledge of bonds within 10 to subtract efficiently. $\begin{aligned} & 5-3=2 \\ & 15-3=12 \end{aligned}$ |
|  | Subtracting 10s and 1s <br> For example: 18-12 <br> Subtract 12 by first subtracting the 10 , then the remaining 2. <br> First subtract the 10, then take away 2. | Subtracting 10 s and 1 s <br> For example: 18-12 <br> Use ten frames to represent the efficient method of subtracting 12. <br> First subtract the 10, then subtract 2. | Subtracting 10s and 1s <br> Use a part-whole model to support the calculation. $\begin{aligned} & 19-14 \\ & 19-10=9 \\ & 9-4=5 \end{aligned}$ <br> So, $19-14=5$ |

## Thongsley Fields Primary \& Nursery School

Calculation Policy for Mathematics

|  | Subtraction bridging 10 using number bonds <br> For example: 12-7 <br> Arrange objects into a 10 and some 1s, then decide on how to split the 7 into parts. <br> 7 is 2 and 5 , so I take away the 2 and then the 5 . | Subtraction bridging 10 using number bonds Represent the use of bonds using ten frames. <br> For 13 -5, I take away 3 to make 10, then take away 2 to make 8. | Subtraction bridging 10 using number bonds Use a number line and a part-whole model to support the method. |
| :---: | :---: | :---: | :---: |
| Year 1 <br> Multiplication | Recognising and making equal groups Children arrange objects in equal and unequal groups and understand how to recognise whether they are equal. <br> A <br> B <br> c | Recognising and making equal groups <br> Children draw and represent equal and unequal groups. | Describe equal groups using words <br> Three equal groups of 4 . <br> Four equal groups of 3 . |
|  | Finding the total of equal groups by counting in $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s <br> There are 5 pens in each pack ... 5...10...15...20...25...30...35...40... | Finding the total of equal groups by counting in $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s <br> 100 squares and ten frames support counting in 2 s , 5 s and 10 s . | Finding the total of equal groups by counting in $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s <br> Use a number line to support repeated addition through counting in $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s . |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Year 1 <br> Division | Grouping <br> Learn to make equal groups from a whole and find how many equal groups of a certain size can be made. <br> Sort a whole set people and objects into equal groups. <br> There are 10 children altogether. <br> There are 2 in each group. <br> There are 5 groups. | Grouping <br> Represent a whole and work out how many equal groups. <br> There are 10 in total. <br> There are 5 in each group. <br> There are 2 groups. | Grouping <br> Children may relate this to counting back in steps of 2,5 or 10 . |
| :---: | :---: | :---: | :---: |
|  | Sharing <br> Share a set of objects into equal parts and work out how many are in each part. | Sharing <br> Sketch or draw to represent sharing into equal parts. This may be related to fractions. | Sharing <br> 10 shared into 2 equal groups gives 5 in each group. |


| Year 2 |  |  |  |
| :---: | :---: | :---: | :---: |
|  | Concrete | Pictorial | Abstract |
| Year 2 <br> Addition |  |  |  |
| Understanding 10s and 1s | Group objects into 10s and 1s. <br> Bundle straws to understand unitising of 10s. | Understand 10s and 1s equipment, and link with visual representations on ten frames. | Represent numbers on a place value grid, using equipment or numerals. |
| Adding 10s | Use known bonds and unitising to add 10s. <br> (IIII) IIII <br> 1 know that $4+3=7$. <br> So, 1 know that 4 tens add 3 tens is 7 tens. | Use known bonds and unitising to add 10s. <br> I know that $4+3=7$. <br> So, 1 know that 4 tens add 3 tens is 7 tens. | Use known bonds and unitising to add 10s. $\begin{aligned} & 4+3=\square \\ & 4+3=7 \\ & 4 \text { tens }+3 \text { tens }=7 \text { tens } \\ & 40+30=70 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Adding a multiple of 10 to a 2-digit number using columns | Add the 10 s using a place value grid to support. <br> 16 is 1 ten and 6 ones. <br> 30 is 3 tens. <br> There are 4 tens and 6 ones in total. | Add the 10 s using a place value grid to support. <br> 16 is 1 ten and 6 ones. <br> 30 is 3 tens. <br> There are 4 tens and 6 ones in total. | Add the 10s represented vertically. Children must understand how the method relates to unitising of 10 s and place value. $\begin{aligned} & 1+3=4 \\ & 1 \text { ten }+3 \text { tens }=4 \text { tens } \\ & 16+30=46 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Adding two <br> 2-digit numbers | Add the 10 s and 1 s separately. $5+3=8$ <br> There are 8 ones in total. $3+2=5$ <br> There are 5 tens in total. $35+23=58$ | Add the 10s and 1s separately. Use a part-whole model to support. $\begin{aligned} & 11=10+1 \\ & 32+10=42 \\ & 42+1=43 \end{aligned}$ $32+11=43$ | Add the 10s and the 1s separately, bridging 10s where required. A number line can support the calculations. |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Adding two <br> 2-digit numbers using a place value grid | Add the 1s. Then add the 10s. |  | Add the 1s. Then add the 10s. |
| :---: | :---: | :---: | :---: |
| Adding two 2-digit numbers with exchange | Add the 1s. Exchange 10 ones for a ten. Then add the 10s. |  | Add the 1s. Exchange 10 ones for a ten. Then add the 10s. |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 2 <br> Subtraction |  |  |  |
| :---: | :---: | :---: | :---: |
| Subtracting multiples of 10 | Use known number bonds and unitising to subtract multiples of 10 . <br>  <br> 8 subtract 6 is 2 . <br> So, 8 tens subtract 6 tens is 2 tens. | Use known number bonds and unitising to subtract multiples of 10 . $10-3=7$ <br> So, 10 tens subtract 3 tens is 7 tens. | Use known number bonds and unitising to subtract multiples of 10 . <br> 7 tens subtract 5 tens is 2 tens. $70-50=20$ |
| Subtracting a single-digit number | Subtract the 1s. This may be done in or out of a place value grid. | Subtract the 1s. This may be done in or out of a place value grid. | Subtract the 1s. Understand the link between counting back and subtracting the 1 s using known bonds. $\begin{array}{r} 10 \\ \begin{array}{r} 10 \\ 3 \\ -\quad 3 \\ \hline 36 \\ \hline \end{array} \\ \hline \end{array}$ |
| Subtracting a single-digit number bridging 10 | Bridge 10 by using known bonds. $35-6$ <br> I took away 5 counters, then 1 more. | Bridge 10 by using known bonds. $35-6$ <br> First, I will subtract 5, then 1. | Bridge 10 by using known bonds. $\begin{aligned} & 24-6=? \\ & 24-4-2=? \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 2 <br> Multiplication |  |  |  |
| :---: | :---: | :---: | :---: |
| Equal groups and repeated addition | Recognise equal groups and write as repeated addition and as multiplication. <br> 3 groups of 5 chairs 15 chairs altogether | Recognise equal groups using standard objects such as counters and write as repeated addition and multiplication. | Use a number line and write as repeated addition and as multiplication. $\begin{aligned} & 5+5+5=15 \\ & 3 \times 5=15 \end{aligned}$ |
| Using arrays to represent multiplication and support understanding | Understand the relationship between arrays, multiplication and repeated addition. <br>  <br> 4 groups of 5 | Understand the relationship between arrays, multiplication and repeated addition. <br> 4 groups of 5 ... 5 groups of 5 | Understand the relationship between arrays, multiplication and repeated addition. |
| Understanding commutativity | Use arrays to visualise commutativity. <br> I can see 6 groups of 3 . <br> I can see 3 groups of 6 . | Form arrays using counters to visualise commutativity. Rotate the array to show that orientation does not change the multiplication. <br> This is 2 groups of 6 and also 6 groups of 2 . | Use arrays to visualise commutativity. $\begin{aligned} & 4+4+4+4+4=20 \\ & 5+5+5+5=20 \\ & 4 \times 5=20 \text { and } 5 \times 4=20 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Learning $\times 2, \times 5$ and $\times 10$ table facts | Develop an understanding of how to unitise groups of 2,5 and 10 and learn corresponding times-table facts. <br> 3 groups of 10 ... 10, 20, 30 <br> $3 \times 10=30$ | Understand how to relate counting in unitised groups and repeated addition with knowing key times-table facts. <br> ○○○○○○○○○○ <br> 0000000000 <br> ○○○○○○○○○○ $\begin{aligned} & 10+10+10=30 \\ & 3 \times 10=30 \end{aligned}$ | Understand how the times-tables increase and contain patterns. $\begin{aligned} & 5 \times 10=50 \\ & 6 \times 10=60 \end{aligned}$ |
| :---: | :---: | :---: | :---: |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Year 2 <br> Division |  |  |  |
| :---: | :---: | :---: | :---: |
| Sharing equally | Start with a whole and share into equal parts, one at a time. <br> 000000000000 <br> 12 shared equally between 2. <br> They get 6 each. <br> Start to understand how this also relates to grouping. To share equally between 3 people, take a group of 3 and give 1 to each person. Keep going until all the objects have been shared <br> They get 5 each. <br> 15 shared equally between 3 . <br> They get 5 each. | Represent the objects shared into equal parts using a bar model. <br> 20 shared into 5 equal parts. <br> There are 4 in each part. | Use a bar model to support understanding of the division. $18 \div 2=9$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics
Grouping
equally

## Thongsley Fields Primary \& Nursery School <br> Calculation Policy

## LOWER KEY STAGE 2

In Years 3 and 4, children develop the basis of written methods by building their skills alongside a deep understanding of place value. They should use known addition/subtraction and multiplication/division facts to calculate efficiently and accurately, rather than relying on counting. Children use place value equipment to support their understanding, but not as a substitute for thinking.

## Key language: partition, place value, tens, hundreds, thousands, column method, whole, part, equal groups, sharing, grouping, bar model

Addition and subtraction: In Year 3 especially, the column methods are built up gradually. Children will develop their understanding of how each stage of the calculation, including any exchanges, relates to place value. The example calculations chosen to introduce the stages of each method may often be more suited to a mental method. However, the examples and the progression of the steps have been chosen to help children develop their fluency in the process, alongside a deep understanding of the concepts and the numbers involved, so that they can apply these skills accurately and efficiently to later calculations. The class should be encouraged to compare mental and written methods for specific calculations, and children should be encouraged at every stage to make choices about which methods to apply.

In Year 4, the steps are shown without such fine detail, although children should continue to build their understanding with a secure basis in place value. In subtraction, children will need to develop their understanding of exchange as they may need to exchange across one or two columns.

By the end of Year 4, children should have developed fluency in column methods alongside a deep understanding, which will allow them to progress confidently in upper Key Stage 2.

Multiplication and division: Children build a solid grounding in times-tables, understanding the multiplication and division facts in tandem. As such, they should be as confident knowing that 35 divided by 7 is 5 as knowing that 5 times 7 is 35 .

Children develop key skills to support multiplication methods: unitising, commutativity, and how to use partitioning effectively.

Unitising allows children to use known facts to multiply and divide multiples of 10 and 100 efficiently. Commutativity gives children flexibility in applying known facts to calculations and problem solving. An understanding of partitioning allows children to extend their skills to multiplying and dividing 2-and 3digit numbers by a single digit.

Children develop column methods to support multiplications in these cases.

For successful division, children will need to make choices about how to partition. For example, to divide 423 by 3 , it is effective to partition 423 into 300,120 and 3 , as these can be divided by 3 using known facts. Children will also need to understand the concept of remainder, in terms of a given calculation and in terms of the context of the problem.

Fractions: Children develop the key concept of equivalent fractions, and link this with multiplying and dividing the numerators and denominators, as well as exploring the visual concept through fractions of shapes. Children learn how to find a fraction of an amount, and develop this with the aid of a bar model and other representations alongside.
in Year 3, children develop an understanding of how to add and subtract fractions with the same denominator and find complements to the whole. This is developed alongside an understanding of fractions as numbers, including fractions greater than 1. In Year 4, children begin to work with fractions greater than 1.

Decimals are introduced, as tenths in Year 3 and then as hundredths in Year 4. Children develop an understanding of decimals in terms of the relationship with fractions, with dividing by 10 and 100 , and also with place value.

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Adding 100s | Use known facts and unitising to add multiples of 100 . $3+2=5$ <br> 3 hundreds +2 hundreds $=5$ hundreds $300+200=500$ | Use known facts and unitising to add multiples of 100. $3+4=7$ <br> 3 hundreds +4 hundreds $=7$ hundreds $300+400=700$ | Use known facts and unitising to add multiples of 100 . <br> Represent the addition on a number line. <br> Use a part-whole model to support unitising. $\begin{aligned} & 3+2=5 \\ & 300+200=500 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 3-digit number + 1s, no exchange or bridging | Use number bonds to add the 1 s . <br> 10 LOLLIES $214+4=?$ <br> Now there are $4+4$ ones in total. $\begin{aligned} & 4+4=8 \\ & 214+4=218 \end{aligned}$ | Use number bonds to add the 1 s . <br> Use number bonds to odd the is. $5+4=9$ $\begin{aligned} & 245+4 \\ & 5+4=9 \\ & 245+4=249 \end{aligned}$ | Understand the link with counting on. $245+4$ <br> Use number bonds to add the 1 s and understand that this is more efficient and less prone to error. $245+4=?$ <br> I will add the 1s. $5+4=9$ <br> So, $245+4=249$ |

## Thongsley Fields Primary \＆Nursery School

## Calculation Policy for Mathematics

| 3－digit number＋ 1s with exchange | Understand that when the 1 s sum to 10 or more，this requires an exchange of 10 ones for 1 ten． <br> Children should explore this using unitised objects or physical apparatus． | Exchange 10 ones for 1 ten where needed．Use a place value grid to support the understanding． |  |  | Understand how to bridge by partitioning to the 1 s to make the next 10 ． |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | H | T | 0 |  |
|  |  |  |  | घロコロロ |  |
|  |  | H | T | 0 |  |
|  |  |  |  | $\begin{aligned} & \text { gagan } \\ & \text { gag } \end{aligned}$ |  |
|  |  |  |  |  | $\begin{aligned} & 135+7=? \\ & 135+5+2=142 \end{aligned}$ |
|  |  | H | T | 0 |  |
|  |  |  |  | $\begin{array}{\|l\|} \hline 80909 \\ 09090 \\ \hline 00 \end{array}$ | Ensure that children understand how to add 1s bridging a 100. |
|  |  | H | T | 0 | $198+5=?$ |
|  |  | $\square$ |  | $\square \square$ | $198+2+3=203$ |
|  |  | H | T | 0 |  |
|  |  |  |  | 40 |  |
|  |  | $135+7=1$ |  |  |  |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



## Thongsley Fields Primary \& Nursery School

Calculation Policy for Mathematics

| 3-digit number + <br> 2-digit number | Use place value equipment to make and combine groups to model addition. | Use a place value grid to organise thinking and adding of 1 s , then 10 s . | Use the vertical column method to represent the addition. Children must understand how this relates to place value at each stage of the calculation. |
| :---: | :---: | :---: | :---: |
| 3-digit number + 2-digit number, exchange required | Use place value equipment to model addition and understand where exchange is required. <br> Use place value counters to represent $154+72$. <br> Use this to decide if any exchange is required. <br> There are 5 tens and 7 tens. That is 12 tens so 1 will exchange. | Represent the required exchange on a place value grid using equipment. $275+16=?$ <br> $275+16=291$ <br> Note: In this example, a mental method may be more efficient. The numbers for the example calculation have been chosen to allow children to visualise the concept and see how the method relates to place value. <br> Children should be encouraged at every stage to select methods that are accurate and efficient. | Use a column method with exchange. Children must understand how the method relates to place value at each stage of the calculation. $275+16=291$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| 3-digit number + 3-digit number, no exchange | Use place value equipment to make a representation of a calculation. This may or may not be structured in a place value grid. <br> $326+541$ is represented as: | Represent the place value grid with equipment to model the stages of column addition. | Use a column method to solve efficiently, using known bonds. Children must understand how this relates to place value at every stage of the calculation. |
| :---: | :---: | :---: | :---: |
| 3-digit number + 3-digit number, exchange required | Use place value equipment to enact the exchange required. <br> There are 13 ones. <br> I will exchange 10 ones for 1 ten. | Model the stages of column addition using place value equipment on a place value grid. | Use column addition, ensuring understanding of place value at every stage of the calculation. $126+217=343$ <br> Note: Children should also study examples where exchange is required in more than one column, for example $185+318=$ ? |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


Thongsley Fields Primary \＆Nursery School
Calculation Policy for Mathematics

| 3－digit number－ 1 s ，no exchange | Use number bonds to subtract the 1 s ．$214-3=?$$\begin{aligned} & 4-3=1 \\ & 214-3=211 \end{aligned}$ | Use number bonds to subtract the 1s． |  |  | Understand the link with counting back using a number line． <br> Use known number bonds to calculate mentally． $476-4=?$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | H | T | 0 |  |
|  |  |  |  | $\begin{aligned} & \text { ag } \\ & \text { ga } \\ & \text { 品 } \end{aligned}$ |  |
|  |  | 3 | 1 | 9 |  |
|  |  | $319-4=$ |  |  | － |
|  |  | H | T | 0 | 00 70 6 |
|  |  |  |  | $\begin{aligned} & a x \\ & a x \\ & g x \\ & 0 x \end{aligned}$ | $6-4=2$ |
|  |  | 3 | 1 | 9 | $476-4=472$ |
|  |  | $\begin{aligned} & 9-4=5 \\ & 319-4= \end{aligned}$ |  |  |  |
| 3－digit number－ 1 s ，exchange or bridging required | Understand why an exchange is necessary by exploring why 1 ten must be exchanged． <br> Use place value equipment． | Represent the required exchange on a place value grid．$151-6=?$ |  |  | Calculate mentally by using known bonds． $151-6=?$ |
|  |  |  |  |  | $151-1-5=145$ |
|  |  | H | T | $0$ |  |
|  |  |  | 瞯 | $\square$ |  |
|  |  | H | T | 0 |  |
|  |  | \＃\＃\＃．．．．．． | 欗 | $\begin{aligned} & \text { gagag } \\ & \text { YXYY } \\ & \text { K } \end{aligned}$ |  |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


## Thongsley Fields Primary \& Nursery School

Calculation Policy for Mathematics

| Representing subtraction problems |  | Use bar models to represent subtractions. <br> 'Find the difference' is represented as two bars for comparison. <br> Bar models can also be used to show that a part must be taken away from the whole. | Children use alternative representations to check calculations and choose efficient methods. <br> Children use inverse operations to check additions and subtractions. <br> The part-whole model supports understanding. <br> I have completed this subtraction. $525-270=255$ <br> I will check using addition. $\begin{array}{r} H T O \\ \hline 270 \\ +255 \\ \hline 525 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: |
| Year 3 <br> Multiplication |  |  |  |
| Understanding equal grouping and repeated addition | Children continue to build understanding of equal groups and the relationship with repeated addition. <br> They recognise both examples and nonexamples using objects. | Children recognise that arrays demonstrate commutativity. <br> This is 3 groups of 4 . <br> This is 4 groups of 3 . | Children understand the link between repeated addition and multiplication. <br> 8 groups of 3 is 24 . $\begin{aligned} & 3+3+3+3+3+3+3+3=24 \\ & 8 \times 3=24 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Understanding and using $\times 3, \times 2$, $\times 4$ and $\times 8$ tables. | Children learn the times-tables as 'groups of', but apply their knowledge of commutativity. <br> I can use the $\times 3$ table to work out how many keys. <br> I can also use the $\times 3$ table to work out how many batteries. | Children understand how the $\times 2, \times 4$ and $\times 8$ tables are related through repeated doubling. | Children understand the relationship between related multiplication and division facts in known times-tables.  $\begin{aligned} & 2 \times 5=10 \\ & 5 \times 2=10 \\ & 10 \div 5=2 \\ & 10 \div 2=5 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Using known facts to multiply 10s, for example $3 \times 40$ | Explore the relationship between known timestables and multiples of 10 using place value equipment. <br> Make 4 groups of 3 ones. <br> Make 4 groups of 3 tens. <br> What is the same? <br> What is different? | Understand how unitising 10s supports multiplying by multiples of 10 . <br> 4 groups of 2 ones is 8 ones. 4 groups of 2 tens is 8 tens. $\begin{aligned} & 4 \times 2=8 \\ & 4 \times 20=80 \end{aligned}$ | Understand how to use known times-tables to multiply multiples of 10 . $\begin{aligned} & 4 \times 2=8 \\ & 4 \times 20=80 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Multiplying a 2-digit number by a 1-digit number | Understand how to link partitioning a 2-digit number with multiplying. <br> Each person has 23 flowers. <br> Each person has 2 tens and 3 ones. <br> There are 3 groups of 2 tens. <br> There are 3 groups of 3 ones. <br> Use place value equipment to model the multiplication context. <br> There are 3 groups of 3 ones. <br> There are 3 groups of 2 tens. | Use place value to linked with multip $3 \times 24=?$  <br> $3 \times 4=12$ $3 \times 20=60$ <br> $60+12=72$ <br> $3 \times 24=72$ | ort how partitioning is by a 2-digit number. | Use addition to complete multiplications of 2digit numbers by a 1-digit number. $\begin{aligned} & 4 \times 13=? \\ & 4 \times 3=12 \\ & 12+40=52 \\ & 4 \times 13=52 \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Multiplying a <br> 2-digit number <br> by a 1-digit <br> number, <br> expanded <br> column method | Use place value equipment to model how 10 ones are exchanged for a 10 in some multiplications. $\begin{aligned} & 3 \times 24=? \\ & 3 \times 20=60 \\ & 3 \times 4=12 \end{aligned}$ $\begin{aligned} & 3 \times 24=60+12 \\ & 3 \times 24=70+2 \\ & 3 \times 24=72 \end{aligned}$ | Understand that multiplications may require an exchange of 1 s for 10 s , and also 10s for 100s. $4 \times 23=?$   $4 \times 23=92$  $\begin{aligned} 5 \times 23 & =? \\ 5 \times 3 & =15 \\ 5 \times 20 & =100 \\ 5 \times 23 & =115 \end{aligned}$ | Children may write calculations in expanded column form, but must understand the link with place value and exchange. <br> Children are encouraged to write the expanded parts of the calculation separately. $\begin{array}{ll} 5 \times 28=? \\ T \quad 0 \\ \hline 28 & \\ \times \quad 5 & \\ \hline 40 & 5 \times 8 \\ \frac{100}{140} & 5 \times 20 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Understanding remainders | Use equipment to understand that a remainder occurs when a set of objects cannot be divided equally any further. <br> IIIIIIIIIIII $\square \square \square$ I <br> There are 13 sticks in total. <br> There are 3 groups of 4, with 1 remainder. | Use images to explain remainders. <br> $22 \div 5=4$ remainder 2 | Understand that the remainder is what cannot be shared equally from a set. $\begin{aligned} & 22 \div 5=? \\ & 3 \times 5=15 \\ & 4 \times 5=20 \\ & 5 \times 5=25 \ldots \text { this is larger than } 22 \\ & \text { So, } 22 \div 5=4 \text { remainder } 2 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Using known facts to divide multiples of 10 | Use place value equipment to understand how to divide by unitising. <br> Make 6 ones divided by 3. <br> Now make 6 tens divided by 3. <br> What is the same? What is different? | Divide multiples of 10 by unitising. <br> 12 tens shared into 3 equal groups. 4 tens in each group. | Divide multiples of 10 by a single digit using known times-tables. $180 \div 3=?$ <br> 180 is 18 tens. <br> 18 divided by 3 is 6 . <br> 18 tens divided by 3 is 6 tens. $\begin{aligned} & 18 \div 3=6 \\ & 180 \div 3=60 \end{aligned}$ |
| 2-digit number divided by 1-digit number, no remainders | Children explore dividing 2-digit numbers by using place value equipment. $\square$ <br> णा1ा11T <br> W1111T $48 \div 2=?$ | Children explore which partitions support particular divisions. | Children partition a number into 10 s and 1 s to divide where appropriate. $\begin{aligned} 60 \div 2 & =30 \\ 8 \div 2 & =4 \\ 30+4 & =34 \end{aligned}$ |

## Thongsley Fields Primary \＆Nursery School

## Calculation Policy for Mathematics

|  | First divide the 10s． <br> 41上4115 <br> Then divide the 1 s ． <br> 回日旦日 | I need to partition 42 differently to divide by 3. $\begin{aligned} & 42=30+12 \\ & 42 \div 3=14 \end{aligned}$ | $68 \div 2=34$ <br> Children partition flexibly to divide where appropriate． $\begin{aligned} & 42 \div 3=? \\ & 42=40+2 \end{aligned}$ <br> I need to partition 42 differently to divide by 3. $\begin{aligned} & 42=30+12 \\ & 30 \div 3=10 \\ & 12 \div 3=4 \\ & \\ & 10+4=14 \\ & 42 \div 3=14 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 2－digit number divided by 1－digit number， with remainders | Use place value equipment to understand the concept of remainder． <br> Make 29 from place value equipment． <br> Share it into 2 equal groups． <br> There are two groups of 14 and 1 remainder． | Use place value equipment to understand the concept of remainder in division． $29 \div 2=?$ $29 \div 2=14 \text { remainder } 1$ | Partition to divide，understanding the remainder in context． <br> 67 children try to make 5 equal lines． $\begin{aligned} & 67=50+17 \\ & 50 \div 5=10 \end{aligned}$ <br> $17 \div 5=3$ remainder 2 <br> $67 \div 5=13$ remainder 2 <br> There are 13 children in each line and 2 children left out． |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 4 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Concrete | Pictorial |  |  |  | Abstract |
| Year 4 <br> Addition |  |  |  |  |  |  |
| Understanding numbers to 10,000 | Use place value equipment to understand the place value of 4-digit numbers. <br> 4 thousands equal 4,000. <br> 1 thousand is 10 hundreds. | Represent numbers using place value counters once children understand the relationship between 1,000 s and 100 s.$2,000+500+40+2=2,542$ |  |  |  | Understand partitioning of 4-digit numbers, including numbers with digits of 0 . $5,000+60+8=5,068$ <br> Understand and read 4-digit numbers on a number line. |
| Choosing menta methods where appropriate | Use unitising and known facts to support mental calculations. <br> Make 1,405 from place value equipment. <br> Add 2,000. <br> Now add the 1,000s. <br> 1 thousand +2 thousands $=3$ thousands <br> $1,405+2,000=3,405$ | Use unit calculatio <br> I can add <br> $200+300$ <br> So, 4,25 | ng and kno s. <br> he 100s m $\begin{aligned} & =500 \\ & +300=4,5 \end{aligned}$ | facts to sup <br> tally. | port mental | Use unitising and known facts to support mental calculations. $4,256+300=?$ $2+3=5 \quad 200+300=500$ $4,256+300=4,556$ |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Column subtraction with exchange | Understand why exchange of a 1,000 for 100 s , a 100 for 10s, or a 10 for 1 s may be necessary. <br> $\rightarrow$ 㗊㗊 | Repres value g where | place value equipment on a place to subtract, including exchanges ded. | Use column subtraction, with understanding of the place value of any exchange required. |
| :---: | :---: | :---: | :---: | :---: |
| Column subtraction with exchange across more than one column | Understand why two exchanges may be necessary. $2,502-243=?$ : <br> I need to exchange a 10 for some 1 s , but there are not any 10s here. | Make ex where | hanges across more than one column re is a zero as a place holder. <br> 3 = ? | Make exchanges across more than one column where there is a zero as a place holder. $2,502-243=?$ |

## Thongsley Fields Primary \＆Nursery School

## Calculation Policy for Mathematics

|  | $\rightarrow \text { 部碞品 }$ |  |   $\begin{array}{r} \text { Th H T } \quad 0 \\ \hline 2489012 \\ -\quad 243 \\ \hline 22559 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: |
| Representing <br> subtractions and checking <br> strategies |  | Use bar models to represent subtractions where a part needs to be calculated． <br> I can work out the total number of Yes votes using 5，762－2，899． <br> Bar models can also represent＇find the difference＇as a subtraction problem． | Use inverse operations to check subtractions． <br> I calculated 1，225－799＝574． <br> I will check by adding the parts． <br> The parts do not add to make 1，225． I must have made a mistake． |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 4 <br> Multiplication |  |  |  |
| :---: | :---: | :---: | :---: |
| Multiplying by multiples of 10 and 100 | Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100. <br> 3 groups of 4 ones is 12 ones. <br> 3 groups of 4 tens is 12 tens. <br> 3 groups of 4 hundreds is 12 hundreds. | Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100. $3 \times 4=12$ $3 \times 40=120$ $3 \times 400=1,200$ | Use known facts and understanding of place value and commutativity to multiply mentally. $\begin{aligned} & 4 \times 7=28 \\ & 4 \times 70=280 \\ & 40 \times 7=280 \end{aligned}$ $\begin{aligned} & 4 \times 700=2,800 \\ & 400 \times 7=2,800 \end{aligned}$ |
| Understanding times-tables up to $12 \times 12$ | Understand the special cases of multiplying by 1 and 0. <br> $5 \times 1=5$ <br> $5 \times 0=0$ | Represent the relationship between the $\times 9$ table and the $\times 10$ table. <br> Represent the $\times 11$ table and $\times 12$ tables in relation to the $\times 10$ table. $\begin{aligned} & 2 \times 11=20+2 \\ & 3 \times 11=30+3 \\ & 4 \times 11=40+4 \end{aligned}$ $4 \times 12=40+8$ | Understand how times-tables relate to counting patterns. <br> Understand links between the $\times 3$ table, $\times 6$ table and $\times 9$ table <br> $5 \times 6$ is double $5 \times 3$ <br> $\times 5$ table and $\times 6$ table <br> 1 know that $7 \times 5=35$ <br> so 1 know that $7 \times 6=35+7$. <br> $\times 5$ table and $\times 7$ table $3 \times 7=3 \times 5+3 \times 2$ <br> $3 \times 7$ <br> $\times 9$ table and $\times 10$ table $\begin{aligned} & 6 \times 10=60 \\ & 6 \times 9=60-6 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Understanding and using partitioning in multiplication | Make multiplications by partitioning. <br> $4 \times 12$ is 4 groups of 10 and 4 groups of 2 . $4 \times 12=40+8$ | Understand how multiplication and partitioning are related through addition. $\begin{aligned} & 4 \times 3=12 \\ & 4 \times 5=20 \\ & 12+20=32 \\ & \\ & 4 \times 8=32 \end{aligned}$ | Use partitioning to multiply 2-digit numbers by a single digit. $18 \times 6=?$ $\begin{aligned} 18 \times 6 & =10 \times 6+8 \times 6 \\ & =60+48 \\ & =108 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Column multiplication for 2-and 3-digit numbers multiplied by a single digit | Use place value equipment to make multiplications. <br> Make $4 \times 136$ using equipment. <br> I can work out how many $1 \mathrm{~s}, 10$ s and 100s. <br> There are $4 \times 6$ ones... 24 ones <br> There are $4 \times 3$ tens ... 12 tens <br> There are $4 \times 1$ hundreds ... 4 hundreds $24+120+400=544$ | Use place value equipment alongside a column method for multiplication of up to 3-digit numbers by a single digit. $\begin{array}{r} 312 \\ \times \quad 3 \\ \hline 936 \\ \hline \end{array}$ | Use the formal column method for up to 3-digit numbers multiplied by a single digit. $\begin{array}{r} 312 \\ \times \quad 3 \\ \hline 936 \\ \hline \end{array}$ <br> Understand how the expanded column method is related to the formal column method and understand how any exchanges are related to place value at each stage of the calculation. |

## Thongsley Fields Primary \& Nursery School

Calculation Policy for Mathematics

| Multiplying more than two numbers | Represent situations by multiplying three numbers together. <br> Each sheet has $2 \times 5$ stickers. <br> There are 3 sheets. <br> There are $5 \times 2 \times 3$ stickers in total. $\underbrace{5 \times 2}_{10 \times 3} \times 3=30$ | Understand that commutativity can be used to multiply in different orders. $\begin{array}{r} 2 \times 6 \times 10=120 \\ 12 \times 10=120 \end{array}$ $\begin{array}{r} 10 \times 6 \times 2=120 \\ 60 \times 2=120 \end{array}$ | Use knowledge of factors to simplify some multiplications. $\begin{aligned} & 24 \times 5=12 \times 2 \times 5 \\ & 12 \times 2 \times 5= \\ & \underbrace{2 \times 5}_{12 \times 10}=120 \end{aligned}$ <br> So, $24 \times 5=120$ |
| :---: | :---: | :---: | :---: |
| Year 4 Division |  |  |  |
| Understanding the relationship between multiplication and division, including timestables | Use objects to explore families of multiplication and division facts. $4 \times 6=24$ <br> 24 is 6 groups of 4 . <br> 24 is 4 groups of 6 . <br> 24 divided by 6 is 4 . <br> 24 divided by 4 is 6 . | Represent divisions using an array. <br> 0000000 <br> 0000000 <br> 0000000 <br> $28 \div 7=4$ | Understand families of related multiplication and division facts. <br> I know that $5 \times 7=35$ <br> so I know all these facts: $\begin{aligned} & 5 \times 7=35 \\ & 7 \times 5=35 \\ & 35=5 \times 7 \\ & 35=7 \times 5 \\ & 35 \div 5=7 \\ & 35 \div 7=5 \\ & 7=35 \div 5 \\ & 5=35 \div 7 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Dividing multiples of 10 and 100 by a single digit | Use place value equipment to understand how to use unitising to divide. <br> 8 ones divided into 2 equal groups 4 ones in each group <br> 8 tens divided into 2 equal groups 4 tens in each group <br> 8 hundreds divided into 2 equal groups <br> 4 hundreds in each group | Represent divisions using place value equipment. $4 \div 3=\square$ <br> 1001000000 $90 \div 3=\square$  $900 \div 3=\square$ $9 \div 3=3$ <br> 9 tens divided by 3 is 3 tens. <br> 9 hundreds divided by 3 is 3 hundreds. | Use known facts to divide 10s and 100s by a single digit. $15 \div 3=5$ $150 \div 3=50$ $1500 \div 3=500$ |
| :---: | :---: | :---: | :---: |
| Dividing 2-digit and 3-digit numbers by a single digit by partitioning into $100 \mathrm{~s}, 10 \mathrm{~s}$ and 1 s | Partition into 10s and 1s to divide where appropriate. $39 \div 3=\text { ? }$ $39=30+9$ $\begin{gathered} 30 \div 3=10 \\ 9 \div 3=3 \\ 39 \div 3=13 \end{gathered}$ | Partition into 100s, 10s and 1s using Base 10 equipment to divide where appropriate. $39 \div 3=?$ <br> 3 groups of 1 ten <br> $39=30+9$ <br> $30 \div 3=10$ <br> $9 \div 3=3$ <br> $39 \div 3=13$ | Partition into $100 \mathrm{~s}, 10 \mathrm{~s}$ and 1 s using a partwhole model to divide where appropriate. $142 \div 2=?$ $\begin{aligned} 100 \div 2 & =50 \\ 40 \div 2 & =20 \\ 6 \div 2 & =3 \\ 50+20 & +3=73 \\ 142 & \div 2=73 \end{aligned}$ |

## Thongsley Fields Primary \& Nursery School

Calculation Policy for Mathematics

| Dividing 2-digit and 3-digit numbers by a single digit, using flexible partitioning | Use place value equipment to explore why different partitions are needed. $42 \div 3=?$ <br> I will split it into 30 and 12, so that I can divide by 3 more easily. $3 \square$ | Represent how to partition flexibly where needed. $84 \div 7=\text { ? }$ <br> I will partition into 70 and 14 because I am dividing by 7. | Make decisions about appropriate partitioning based on the division required. <br> Understand that different partitions can be used to complete the same division. |
| :---: | :---: | :---: | :---: |
| Understanding remainders | Use place value equipment to find remainders. <br> 85 shared into 4 equal groups <br> There are 24, and 1 that cannot be shared. $\square$ (1) <br> a | Represent the remainder as the part that cannot be shared equally. <br> $72 \div 5=14$ remainder 2 | Understand how partitioning can reveal remainders of divisions. $\begin{aligned} & 80 \div 4=20 \\ & 12 \div 4=3 \end{aligned}$ $95 \div 4=23 \text { remainder } 3$ |

## Thongsley Fields Primary \& Nursery School <br> Calculation Policy

## UPPER KEY STAGE 2

In upper Key Stage 2, children build on secure foundations in calculation, and develop fluency, accuracy and flexibility in their approach to the four operations. They work with whole numbers and adapt their skills to work with decimals, and they continue to develop their ability to select appropriate, accurate and efficient operations.

Key language: decimal, column methods, exchange, partition, mental method, ten thousand, hundred thousand, million, factor, multiple, prime number, square number, cube number

Addition and subtraction: Children build on their column methods to add and subtract numbers with up to seven digits, and they adapt the methods to calculate efficiently and effectively with decimals, ensuring understanding of place value at every stage.

Children compare and contrast methods, and they select mental methods or jottings where appropriate and where these are more likely to be efficient or accurate when compared with formal column methods.

Bar models are used to represent the calculations required to solve problems and may indicate where efficient methods can be chosen.

## Multiplication and division: Building on their

 understanding, children develop methods to multiply up to 4-digit numbers by single-digit and 2-digit numbers.Children develop column methods with an understanding of place value, and they continue to use the key skill of unitising to multiply and divide by 10,100 and 1,000 .

Written division methods are introduced and adapted for division by single-digit and 2-digit numbers and are understood alongside the area model and place value. In Year 6, children develop a secure understanding of how division is related to fractions.

Multiplication and division of decimals are also introduced and refined in Year 6.

Fractions: Children find fractions of amounts, multiply a fraction by a whole number and by another fraction, divide a fraction by a whole number, and add and subtract fractions with different denominators. Children become more confident working with improper fractions and mixed numbers and can calculate with them.

Understanding of decimals with up to 3 decimal places is built through place value and as fractions, and children calculate with decimals in the context of measure as well as in pure arithmetic.

Children develop an understanding of percentages in relation to hundredths, and they understand how to work with common percentages: 50\%, 25\%, 10\% and 1\%.

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 5 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Concrete |  |  | Pictorial | Abstract |
| Year 5 <br> Addition |  |  |  |  |  |
| Column addition with whole numbers | Use p additi <br> Add a to show | value equipment to $r$ <br> w of counters onto the $15,735+4,012$. | resent <br> ace value grid | Represent additions, using place value equipment on a place value grid alongside written methods. <br> I need to exchange 10 tens for a 100. | Use column addition, including exchanges. |
| Representing additions |  |  |  | Bar models represent addition of two or more numbers in the context of problem solving. | Use approximation to check whether answers are reasonable. <br> I will use $23,000+8,000$ to check. |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Adding tenths | Link measure with addition of decimals. <br> Two lengths of fencing are 0.6 m and 0.2 m. <br> How long are they when added together? <br> 0.6 m <br> 0.2 m <br>  | Use a bar model with a number line to add tenths. $0.6+0.2=0.8$ <br> 6 tenths +2 tenths $=8$ tenths | Understand the link with adding fractions. $\begin{aligned} & \frac{6}{10}+\frac{2}{10}=\frac{8}{10} \\ & 6 \text { tenths }+2 \text { tenths }=8 \text { tenths } \\ & 0.6+0.2=0.8 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Adding decimals using column addition | Use place value equipment to represent additions. <br> Show $0.23+0.45$ using place value counters. | Use place value equipment on a place value grid to represent additions. <br> Represent exchange where necessary. $$ <br> Include examples where the numbers of decimal places are different. | Add using a column method, ensuring that children understand the link with place value. $\begin{array}{r} 0 \cdot \text { Tth } \text { Hth } \\ \hline 0 \cdot 23 \\ +0 \cdot 4.5 \\ \hline 0 \cdot 6.8 \\ \hline \end{array}$ <br> Include exchange where required, alongside an understanding of place value. $\begin{array}{r} 0 \cdot \text { Tth Hth } \\ \hline 0.92 \\ +0.33 \\ \hline 1 \cdot 25 \\ \hline \end{array}$ <br> Include additions where the numbers of decimal places are different. $3.4+0.65=?$ $\begin{array}{r} 0 \cdot \text { Tth Hth } \\ \hline 3 \cdot 4 \frac{0}{4} \\ +0 \cdot 6 \quad 5 \end{array}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 5 <br> Subtraction |  |  |  |
| :---: | :---: | :---: | :---: |
| Column subtraction with whole numbers | Use place value equipment to understand where exchanges are required. $2,250-1,070$ | Represent the stages of the calculation using place value equipment on a grid alongside the calculation, including exchanges where required. $15,735-2,582=13,153$  $\begin{array}{r} T \mathrm{Th} H \\ \hline 157 \\ \hline 535 \\ -\quad 2582 \\ \hline \end{array}$ <br> Now subtract the los. Exchange I huindred for 10 tens. <br> Subtroct the 100 s , 1,000 s and $10,000 \mathrm{~s}$. | Use column subtraction methods with exchange where required. $62,097-18,534=43,563$ |
| Checking strategies and representing subtractions |  | Bar models represent subtractions in problem contexts, including 'find the difference'. | Children can explain the mistake made when the columns have not been ordered correctly. <br> Use approximation to check calculations. <br> I calculated 18,000 $+4,000$ mentally to check my subtraction. |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Choosing efficient methods |  |  | To subtract two large numbers that are close, children find the difference by counting on. $2,002-1,995=?$ <br> Use addition to check subtractions. I calculated 7,546-2,355 = 5,191. <br> I will check using the inverse. |
| :---: | :---: | :---: | :---: |
| Subtracting decimals | Explore complements to a whole number by working in the context of length.$\begin{aligned} & \frac{0.49 \mathrm{~m}}{1 \mathrm{~m}-\square \mathrm{m}=\square \mathrm{m}} \\ & 1-0.49=? \end{aligned}$ | Use a place value grid to represent the stages of column subtraction, including exchanges where required. $5 \cdot 74-2 \cdot 25=?$ | Use column subtraction, with an understanding of place value, including subtracting numbers with different numbers of decimal places. $3.921-3.75=?$ |
|  |  |  | 0 $\cdot$ Tth Hth <br> 3 Thth   <br> 3 9 2 1 <br> -3 $\cdot 7$ 5 0 |
|  |  | Exchange 1 tenth for 10 hundredths. | $\cdots$ |
|  |  | Now subtract the 5 hundredths. |  |
|  |  | Now subtract the 2 tenths. then the 2 ones. |  |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 5 <br> Multiplication |  |  |  |
| :---: | :---: | :---: | :---: |
| Understanding factors | Use cubes or counters to explore the meaning of 'square numbers'. <br> 25 is a square number because it is made from 5 rows of 5 . <br> Use cubes to explore cube numbers. <br> 8 is a cube number. | Use images to explore examples and nonexamples of square numbers. $\begin{aligned} & 8 \times 8=64 \\ & 8^{2}=64 \end{aligned}$ <br> 12 is not a square number, because you cannot multiply a whole number by itself to make 12. | Understand the pattern of square numbers in the multiplication tables. <br> Use a multiplication grid to circle each square number. Can children spot a pattern? |
| Multiplying by 10 , 100 and 1,000 | Use place value equipment to multiply by 10 , 100 and 1,000 by unitising. | Understand the effect of repeated multiplication by 10 . | Understand how exchange relates to the digits when multiplying by 10,100 and 1,000 . $\begin{aligned} & 17 \times 10=170 \\ & 17 \times 100=17 \times 10 \times 10=1,700 \\ & 17 \times 1,000=17 \times 10 \times 10 \times 10=17,000 \end{aligned}$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Multiplying 2-digit numbers by 2digit numbers | Partition one number into 10 s and 1 s , then add the parts. $23 \times 15=?$ $23 \times 15=345$ | Use $28 \times$ <br> 10 m <br> 5 m $28 \times$ | rea model and = ? $\qquad$ <br> $20 \times 10=200 \mathrm{~m}^{2}$ <br> $20 \times 5=100 \mathrm{~m}^{2}$ $=420$ | d the parts. | Use column multiplication, ensuring understanding of place value at each stage. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Multiplying up to 4-digits by 2-digits |  | Use <br> 10 <br> 2 <br> 143 <br> 143 | area model th <br> 0 40 <br> 1,716 <br> 1,716 boxes of cerea $=1,716$ | add the parts.$\square$Th $H$ T O <br> 1 0 0 0 <br>  4 0 0 <br>  2 0 0 <br>   8 0 <br>   3 0 <br> +   6 <br> 1 7 1 6 | Use column multiplication, ensuring understanding of place value at each stage. <br> Progress to include examples that require multiple exchanges as understanding, confidence and fluency build. <br> (e.g. next page...) |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

|  |  |  | $1,274 \times 32=?$ <br> First multiply 1,274 by 2. $\begin{array}{r} 1274 \\ \times \quad 32 \\ \times 25,48 \end{array} 1,274 \times 2$ $\qquad$ <br> Then multiply 1,274 by 30. <br> Finally, find the total. |
| :---: | :---: | :---: | :---: |
| Multiplying decimals by 10 , 100 and 1,000 | Use place value equipment to explore and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths. | Represent multiplication by 10 as exchange on a place value grid. $0.14 \times 10=1.4$ | Understand how this exchange is represented on a place value chart. |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 5 <br> Division |  |  |  |
| :---: | :---: | :---: | :---: |
| Understanding factors and prime numbers | Use equipment to explore the factors of a given number. $\begin{aligned} & 24 \div 3=8 \\ & 24 \div 8=3 \end{aligned}$ <br> 8 and 3 are factors of 24 because they divide 24 exactly. $24 \div 5=4 \text { remainder } 4 \text {. }$ <br> 5 is not a factor of 24 because there is a remainder. | Understand that prime numbers are numbers with exactly two factors. $\begin{aligned} & 13 \div 1=13 \\ & 13 \div 2=6 r 1 \\ & 13 \div 4=4 r 1 \end{aligned}$ <br> 1 and 13 are the only factors of 13 . <br> 13 is a prime number. | Understand how to recognise prime and composite numbers. <br> I know that 31 is a prime number because it can be divided by only 1 and itself without leaving a remainder. <br> I know that 33 is not a prime number as it can be divided by 1, 3, 11 and 33. <br> I know that 1 is not a prime number, as it has only 1 factor. |
| Understanding inverse operations and the link with multiplication, grouping and sharing | Use equipment to group and share and to explore the calculations that are present. <br> I have 28 counters. <br> I made 7 groups of 4 . There are 28 in total. <br> I have 28 in total. I shared them equally into 7 groups. There are 4 in each group. <br> I have 28 in total. I made groups of 4. There are 7 equal groups. | Represent multiplicative relationships and explore the families of division facts. $\begin{aligned} & 60 \div 4=15 \\ & 60 \div 15=4 \end{aligned}$ | Represent the different multiplicative relationships to solve problems requiring inverse operations. $\begin{aligned} & 12 \div 3=\square \\ & 12 \div \square=3 \end{aligned}$ $\square$ $\times 3=12$ $\square$ $\div 3=12$ <br> Understand missing number problems for division calculations and know how to solve them using inverse operations. $\begin{aligned} & 22 \div ?=2 \\ & 22 \div 2=? \\ & ? \div 2=22 \\ & ? \div 22=2 \end{aligned}$ |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

|  |  | 12 ones divided into groups of 4 . There are 3 groups. <br> 12 hundreds divided into groups of 4 hundreds. There are 3 groups. $1200 \div 400=3$ |  |
| :---: | :---: | :---: | :---: |
| Dividing up to four digits by a single digit using short division | Explore grouping using place value equipment. $268 \div 2=?$ <br> There is 1 group of 2 hundreds. <br> There are 3 groups of 2 tens. <br> There are 4 groups of 2 ones. $264 \div 2=134$ | Use place value equipment on a place value grid alongside short division. <br> The model uses grouping. <br> A sharing model can also be used, although the model would need adapting. <br> Lay out the problem as a short division. <br> There is 1 group of 4 in 4 tens. <br> There are 2 groups of 4 in 8 ones. | Use short division for up to 4-digit numbers divided by a single digit. <br> Use multiplication to check. $556 \times 7=?$ <br> $6 \times 7=42$ <br> $50 \times 7=350$ <br> $500 \times 7=3500$ $3,500+350+42=3,892$ |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics


## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Selecting mental methods for larger numbers where appropriate | Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods. $2,411,301+500,000=?$ <br> This would be 5 more counters in the HTh place. <br> So, the total is 2,911,301. $2,411,301+500,000=2,911,301$ | Use a bar model to support thinking in addition problems. $257,000+99,000=?$ <br> I added 100 thousands then subtracted 1 thousand. <br> 257 thousands +100 thousands $=357$ thousands $\begin{aligned} & 257,000+100,000=357,000 \\ & 357,000-1,000=356,000 \end{aligned}$ <br> So, $257,000+99,000=356,000$ | Use place value and unitising to support mental calculations with larger numbers. $\begin{aligned} & 195,000+6,000=? \\ & 195+5+1=201 \end{aligned}$ <br> 195 thousands +6 thousands $=201$ thousands <br> So, $195,000+6,000=201,000$ |
| :---: | :---: | :---: | :---: |
| Understanding order of operations in calculations | Use equipment to model different interpretations of a calculation with more than one operation. Explore different results. | Model calculations using a bar model to demonstrate the correct order of operations in multi-step calculations. <br> This can be written as: $16 \times 4+16 \times 6$ $\frac{16 \times 4}{64}+\frac{16 \times 6}{96}=160$ | Understand the correct order of operations in calculations without brackets. <br> Understand how brackets affect the order of operations in a calculation. $\begin{aligned} & 4+6 \times 16 \\ & 4+96=100 \\ & (4+6) \times 16 \\ & 10 \times 16=160 \end{aligned}$ |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Year 6 <br> Subtraction |  |  |  |
| :---: | :---: | :---: | :---: |
| Comparing and selecting efficient methods | Use counters on a place value grid to represent subtractions of larger numbers. | Compare subtraction methods alongside place value representations. <br> Use a bar model to represent calculations, including 'find the difference' with two bars as comparison. | Compare and select methods. <br> Use column subtraction when mental methods are not efficient. <br> Use two different methods for one calculation as a checking strategy. <br> Use column subtraction for decimal problems, including in the context of measure. |
| Subtracting mentally with larger numbers |  | Use a bar model to show how unitising can support mental calculations. $950,000-150,000$ <br> That is 950 thousands - 150 thousands <br> So, the difference is 800 thousands. $950,000-150,000=800,000$ | Subtract efficiently from powers of 10 . $10,000-500=?$ |

Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 6 <br> Multiplication |  |  |  |
| :---: | :---: | :---: | :---: |
| Multiplying up to a 4-digit number by a single digit number | Use equipment to explore multiplications. <br> 4 groups of 2,345 <br> This is a multiplication: $\begin{aligned} & 4 \times 2,345 \\ & 2,345 \times 4 \end{aligned}$ | Use place value equipment to compare methods. $\begin{aligned} & \text { Method। } \\ & 3 \\ & 3 \\ & 3 \end{aligned} \begin{array}{llll} 2 & 2 & 5 \\ 3 & 2 & 2 & 5 \\ 3 & 2 & 2 & 5 \\ \hline 1 & 2 & 9 & 0 \\ 1 & 1 & 1 & 2 \end{array}$ | Understand area model and short multiplication. <br> Compare and select appropriate methods for specific multiplications. <br> Method 3 <br> Method 4 |
| Multiplying up to a 4-digit number by a 2-digit number |  | Use an area model alongside written multiplication. <br> Method I | Use compact column multiplication with understanding of place value at all stages. |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Using knowledge of factors and partitions to compare methods for multiplications | Use equipment to understand square numbers and cube numbers. $\begin{aligned} & 5 \times 5=5^{2}=25 \\ & 5 \times 5 \times 5=5^{3}=25 \times 5=125 \end{aligned}$ | Compare methods visually using an area model. Understand that multiple approaches will produce the same answer if completed accurately. <br> Represent and compare methods using a bar model. | Use a known fact to generate families of related facts. <br> Use factors to calculate efficiently. $\begin{aligned} & 15 \times 16 \\ = & 3 \times 5 \times 2 \times 8 \\ = & 3 \times 8 \times 2 \times 5 \\ = & 24 \times 10 \\ = & 240 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Multiplying by 10, 100 and 1,000 | Use place value equipment to explore exchange in decimal multiplication. <br> Represent 0.3. <br> Multiply by 10 . <br> Exchange each group of ten tenths. $0.3 \times 10=?$ <br> 0.3 is 3 tenths. <br> $10 \times 3$ tenths are 30 tenths. <br> 30 tenths are equivalent to 3 ones. | Understand how the exchange affects decimal numbers on a place value grid. $0.3 \times 10=3$ | Use knowledge of multiplying by 10, 100 and 1,000 to multiply by multiples of 10,100 and 1,000. $\begin{aligned} 8 \times 100 & =800 \\ 8 \times 300 & =800 \times 3 \\ & =2,400 \\ 2.5 \times 10 & =25 \\ 2.5 \times 20 & =2.5 \times 10 \times 2 \\ & =50 \end{aligned}$ |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics



Thongsley Fields Primary \& Nursery School
Calculation Policy for Mathematics

| Year 6 <br> Division |  |  |  |
| :---: | :---: | :---: | :---: |
| Understanding factors | Use equipment to explore different factors of a number. <br> 4 is a factor of 24 but is not a factor of 30 . | Recognise prime numbers as numbers having exactly two factors. Understand the link with division and remainders. | Recognise and know primes up to 100. Understand that 2 is the only even prime, and that 1 is not a prime number. |
| Dividing by a single digit | Use equipment to make groups from a total. <br> - <br> -0.e日ereerer <br>  <br>  <br> - <br>  <br> There are 78 in total. <br> There are 6 groups of 13 . <br> There are 13 groups of 6 . | $H$ $T$ 0 <br>  $0 \odot$ 0 <br> $\begin{array}{l}\text { How many } \\ \text { groups of } 6 \\ \text { gre in } 13 \text { tens } 9\end{array}$ <br> $6 \sqrt{1 / 3 / 2}$ | Use short division to divide by a single digit. $\frac{0}{6 \longdiv { 1 / 3 2 }}$ $\begin{gathered} 0 \quad 2 \\ 6 \longdiv { 1 } 1 3 / 2 \end{gathered}$ $\begin{array}{rrrr} 0 & 2 & 2 \\ \hline 6 \lcm{1} & 3 & 2 \end{array}$ <br> Use an area model to link multiplication and division. <br> $132=120+12$ <br> $132 \div 6=20+2=22$ |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Dividing by a 2digit number using factors | Understand that division by factors can be used when dividing by a number that is not prime. | Use factors and repeated division. $1,260 \div 14=?$ <br> 1260 $\square$ $1,260 \div 2=630$ $\begin{aligned} & 630 \div 7=90 \\ & 1,260 \div 14=90 \end{aligned}$ | Use factors and repeated division where appropriate. $2,100 \div 12=?$ |
| :---: | :---: | :---: | :---: |
| Dividing by a 2digit number using long division | Use equipment to build numbers from groups. <br> 182 divided into groups of 13 . <br> There are 14 groups. | Use an area model alongside written division to model the process. $377 \div 13=?$ <br> 13 $\square$ <br> 13 $377 \div 13=29$ | Use long division where factors are not useful (for example, when dividing by a 2-digit prime number). <br> Write the required multiples to support the division process. $377 \div 13=?$ $\begin{array}{rrr} 13 & 3 & 7 \\ - & 7 \\ - & 3 & 0 \\ \hline 2 & 4 & 70 \\ \hline & 10 \\ \hline & 3 & 0 \\ \hline 1 & 1 & 7 \\ - & 10 \\ \hline & 1 & 7 \\ \hline & 0 & 9 \\ \hline \end{array}$ $377 \div 13=29$ |

## Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

|  |  |  | A slightly different layout may be used, with the division completed above rather than at the side. $\begin{array}{r} 3 \\ 21 \begin{array}{r} 798 \\ -630 \\ \hline 168 \end{array} \\ \hline 6 \end{array}$ <br> $\quad 38$ 21 798 <br> $-\begin{array}{r}630 \\ \hline 168\end{array}$ <br> $-168$ <br> Divisions with a remainder explored in problemsolving contexts. |
| :---: | :---: | :---: | :---: |
| Dividing by 10 , 100 and 1,000 | Use place value equipment to explore division as exchange. <br> $0 \cdot 2$ is 2 tenths. <br> 2 tenths is equivalent to 20 hundredths. 20 hundredths divided by 10 is 2 hundredths. | Represent division to show the relationship with multiplication. Understand the effect of dividing by 10,100 and 1,000 on the digits on a place value grid. <br> Understand how to divide using division by 10, 100 and 1,000. $12 \div 20=?$ | Use knowledge of factors to divide by multiples of 10, 100 and 1,000. $40 \div 50=$ $\square$ $40 \rightarrow \div 5 \rightarrow \div 10 \rightarrow ?$ $\begin{aligned} & 40 \div 5=8 \\ & 8 \div 10=0 \cdot 8 \end{aligned}$ <br> So, $40 \div 50=0.8$ |

Thongsley Fields Primary \& Nursery School

## Calculation Policy for Mathematics

| Dividing decimals | Use place value equipment to explore division of decimals. <br> 8 tenths divided into 4 groups. 2 tenths in each group. | Use a bar model to represent divisions. |  |  |  | Use short division to divide decimals with up to 2 decimal places. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 0.8 |  |  |  |  |
|  |  | ? | ? | ? | $?$ |  |
|  |  | $4 \times 2=$ |  | 8 |  |  |
|  |  | So. $4 \times$ | $=0.8$ |  | =0.2 |  |
|  |  |  |  |  |  |  |

