Mathematics Policy

Agreed by Governors

Autumn 2020

Due for review

Summer 2023

Policy to be reviewed as necessary within 3 years

Subject leader: H DANIELS

Liverpool Diocesan Schools Trust

'for wisdom is more precious than rubies, and nothing you desire can compare with her.' **Proverbs 8:13**

Holy Trinity Church of England Primary School, Southport

Vision

Holy Trinity's curriculum is rooted in our Christian vision. Every subject in our curriculum has a vital part to play in making our vision a reality. Our curriculum vision or intent statement was devised in consultation with parents, children, staff and governors, with support from Liverpool Diocese. This policy aims to show how our curriculum intent is promoted through our teaching of Mathematics.

Curriculum Intent Statement

Our curriculum intent statement below forms the basis of all our curriculum planning so that our children flourish academically, personally and spiritually.

Curriculum Intent Statement

'for wisdom is more precious than rubies, and nothing you desire can compare with her.' **Proverbs 8:13**

<table>
<tr><th colspan="7">Vision Statement</th></tr>
<tr><td colspan="7">At Holy Trinity our vision is to be the best we can be: for God, for others and for ourselves. Through our hard work we want our children to acquire the very best in wisdom, knowledge and skills to raise their aspirations, enabling them to grow and flourish as unique and precious children of God. We want to provide a safe and welcoming space where our children learn from our Christian values, live well together and experience 'life in all its fullness' (John 10:10).</td></tr>
<tr><th colspan="7">Christian Values</th></tr>
<tr><td>Love</td><td>Hope</td><td>Forgiveness</td><td>Trust</td><td>Peace</td><td>Reverence</td><td>Justice</td></tr>
<tr><td colspan="7">Strand 1 In educating to develop wisdom, knowledge and skills we intend to:
a) meet the academic needs of all of our pupils through our curriculum by
i) having a strongly agreed consensus of the knowledge and skills our pupils need in order to take advantage of opportunities later in later life and through this powerfully address social disadvantage
ii) teach our children to read, write and use mathematical knowledge confidently by the end of key stage 1 so they are able to access a broad and balanced curriculum at key stage 2
iii) ensuring all our pupils are encouraged to develop a love of reading across the curriculum and read confidently, including aloud, at an age appropriate level
iv) being clear what end points the curriculum is building towards and what pupils need to know to be able to reach those end points
v) developing a curriculum that is carefully planned and sequenced logically so that new knowledge and skills build on what has been taught before and towards clearly defined end points
vi) ensuring our curriculum meets the specific needs of our community, particularly widening vocabulary and broadening children's experiences and horizons through systematically extending their knowledge of the wider world
vii) maintaining a healthy breadth and balance in our curriculum in all year groups
viii) committing our time and resources to developing teachers and teaching assistants with a highly competent subject knowledge of the areas of the curriculum they teach
ix) committing time and resources to high quality teaching materials that coherently support our ambitious intentions
x) using assessment well to help pupils embed and use knowledge fluently, check understanding and inform teaching to address any gaps;
b) identify and support those who are more vulnerable and who may have additional learning and personal needs by
i) having high expectations and ambition for all our pupils across the range of subjects</td></tr>
</table>

ii) developing a curriculum that is successfully adapted to meet the needs of all our pupils, including those with special educational needs or disabilities and those whose first language is not English. This will enable them to develop their knowledge, skills and abilities to apply what they know and can do with increasing fluency and independence;

c) support all pupils in their spiritual development, enabling all to flourish by

i) equipping our pupils with the knowledge and cultural capital they need to succeed in life, introducing them to the best that has been thought and said to engender an appreciation of human creativity and achievement

ii) enabling pupils to reflect and explore the spiritual and ethical dimensions of all subjects.

Strand 2 In educating for character development, including hope, aspiration and courageous advocacy we intend to:

a) support the character and moral development of all pupils, giving them aspiration and hope by

i) building meaningful opportunities to enable pupils to make positive choices, developing ambition through perseverance to be the best they can be and embrace 'life in all its fullness'

ii) developing curriculum opportunities that promote resilience to cope well when things are difficult

b) develop a curriculum that encourages pupils to engage in social action and be courageous advocates for change in our local, national and global communities including

i) ensuring all pupils have curriculum opportunities to look beyond themselves, ask 'big questions' and think globally about life

ii) developing an understanding of disadvantage, deprivation and the exploitation of the natural world

iii) engaging in global world links

iv) promoting ethical and charitable activities through our curriculum, engaging in social action and challenging injustice.

Strand 3 In educating for community and living well together we intend to:

a) promote social and cultural development through a curriculum that encourages forgiveness and reconciliation, encouraging good mental health and enabling all to flourish and live well together. We will do this by

i) ensuring our Christian values are woven through the curriculum and underpin teaching

ii) planning curriculum opportunities that explore different points of view, enabling pupils to disagree well and practice forgiveness and reconciliation

iii) building a curriculum that fosters a sense of belonging, embracing and celebrating difference.

Strand 4 In educating for dignity and respect we intend to:

a) plan curriculum opportunities that embrace difference and promote a culture of dignity and respect, thus enabling all pupils to flourish. We aim to do this by

i) ensuring that our curriculum upholds dignity and values all God's children so that we are successful in preventing rather than just reacting to stereotyping and prejudice

ii) making sure that the people, events and issues we study enable pupils to understand, respect and celebrate difference and diversity

iii) ensuring our curriculum enables children to cherish themselves as uniquely and wonderfully made, enabling then to form healthy relationships where they respect and offer dignity to others.

Curriculum Vision and Mathematics

Holy Trinity Church of England Primary School, Southport

All of the elements of our curriculum intent statement underpin our teaching of Mathematics. At Holy Trinity Primary School, our aim is for children to leave as confident, skilled and resilient mathematicians; who understand that mathematics is a fundamental part of everyday life and the world we live in. Mathematics provides particular opportunities for teaching the following aspects of our intent statement.

Strand 1: In educating to develop wisdom, knowledge and skills we intend to:

a) meet the academic needs of all of our pupils through our curriculum by

i) having a strongly agreed consensus of the knowledge and skills our pupils need in order to take advantage of opportunities later in later life and through this powerfully address social disadvantage

ii) teach our children to read, write and use mathematical knowledge confidently by the end of key stage 1 so they are able to access a broad and balanced curriculum at key stage 2

iv) being clear what end points the curriculum is building towards and what pupils need to know to be able to reach those end points

v) developing a curriculum that is carefully planned and sequenced logically so that new knowledge and skills build on what has been taught before and towards clearly defined end points

vi) ensuring our curriculum meets the specific needs of our community, particularly widening vocabulary and broadening children's experiences and horizons through systematically extending their knowledge of the wider world

vii) maintaining a healthy breadth and balance in our curriculum in all year groups

viii) committing our time and resources to developing teachers and teaching assistants with a highly competent subject knowledge of the areas of the curriculum they teach

ix) committing time and resources to high quality teaching materials that coherently support our ambitious intentions

x) using assessment well to help pupils embed and use knowledge fluently, check understanding and inform teaching to address any gaps;

b) identify and support those who are more vulnerable and who may have additional learning and personal needs by

i) having high expectations and ambition for **all** our pupils across the range of subjects

ii) developing a curriculum that is successfully adapted to meet the needs of all our pupils, including those with special educational needs or disabilities and those whose first language is not English. This will enable them to develop their knowledge, skills and abilities to apply what they know and can do with increasing fluency and independence

Strand 2: In educating for character development, including hope, aspiration and courageous advocacy we intend to:

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iii) ensuring our curriculum enables children to cherish themselves as uniquely and wonderfully made, enabling then to form healthy relationships where they respect and offer dignity to others.

Holy Trinity Church of England Primary School, Southport

Purpose and Aims of Mathematics

Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. (National Curriculum 2014)

In line with the National Curriculum (2014), our overall intent focuses on all pupils being able to:

- Develop positive attitudes towards this subject
- Develop competence and confidence in mathematical knowledge, concepts and skills
- Establish an ability to solve problems, to reason, to think logically and to work systematically and accurately
- Reason mathematically by following a line of enquiry and developing an argument, justification or proof using mathematical language
- Create initiative and motivation to work both independently and in cooperation with others
- Expand an ability to communicate mathematics effectively
- Promote an ability to use and apply mathematics across the curriculum and in real life

Organisation of Teaching

The Mathematics curriculum is carefully and coherently sequenced to enable our children to develop a growing knowledge of the themes outlined above. Pupils' knowledge builds towards clearly defined end points so everyone knows what we expect our pupils to achieve by the end of each mathematical topic, each year and each key stage.

The organisation of our mastery approach of teaching for mathematics should be in three stages:

- Long term: A yearly overview of coverage in relation to the statutory requirement of the National Curriculum (2014)
- Medium term: Provides termly mathematical objectives and coverage within a unit of work
- Short term: Teachers are responsible for planning weekly progressive objectives to meet the needs of their pupils

At Holy Trinity Primary School, we take our objectives and content from the statutory National Curriculum for England. To support high quality knowledge rich lessons and consistency we follow the White Rose Maths scheme. In conjunction with the aims of this document and of our school, teachers plan and deliver motivating and comprehensive mathematical activities to facilitate pupils understanding of concepts at greater depth and to solve a variety of complex problems.

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Planning is based upon the objectives for each year group and our school's expectation is that pupils will progress through the objectives at broadly the same pace. Teachers, where necessary, will adapt the curriculum and encourage the use of resources and equipment to support pupils with SEND and those with significant gaps in their learning. Furthermore, teachers will implement opportunities to explore learning at even greater depth for pupils who are very able mathematicians. It is not, our school expectation to rush these children into learning content from year groups above, but to develop a mastery approach to reasoning in this subject.

Throughout our planning we provide children with a range of opportunities to apply and develop their mathematical knowledge through non-routine activities. For example, using real-life contexts or by expanding and enriching knowledge through finding solutions, reasoning and exploration.

Teachers will ensure that problem solving is an integral part of weekly plans. Pupils will be explicitly taught the skills needed to independently tackle the five areas of problem solving over the course of an academic year, such as word problems, finding possibilities, logic, describing rules and patterns and visual puzzles and diagrams.

Every mathematics lesson should include a form of counting. Teachers are responsible for developing pupils use of mental methods of calculation. As pupils develop their knowledge and understanding of mathematics, they should become confident in choosing a written or mental method of calculation where appropriate.

Our school's Calculation Policy provides clear progression for the teaching of written calculations. It is our school expectation that children have a clear understanding of the calculations that they are performing and are not simply taught to follow a set of rules. By implementing this approach, we strive to ensure all children are given the opportunity to develop a greater understanding of the calculations being taught.

In Early Years Foundation Stage (EYFS) teachers plan for Mathematics using the statutory framework and Early Learning Goals. Teachers support pupils in developing their understanding of Mathematics in a broad range of contexts in which they can explore, learn, enjoy, practice and talk about their developing understanding. This area of development includes, making connections, seeking patterns, working with numbers, recognising mathematical relationships, shapes and measures, and counting, sort and matching. It is imperative that pupils in EYFS use their knowledge of and skills in these areas to solve problems, generate new questions and make connections across other areas of learning and development.

Pupils in EYFS enjoy their mathematical learning by playing and exploring, being active, and through creative and critical thinking which takes place both indoors and outside. We recognise that children learn through routine, continuous provision and incidental learning opportunities, as well as planned sessions and activities. Mathematical understanding can be developed through stories, songs, games, questioning, child-initiated leaning, routine, imaginative play and structured teaching.

Teaching Time

Mathematics is allocated the following time on our weekly timetables. Mathematics medium term plans are published on our website.

Early Years Foundation Stage: 45 minutes to 1 hour daily

Key Stage 1: 1 hour daily

Key Stage 2: 1 hour daily

The Teaching of Mathematics (Implementation)

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Teachers use a range of teaching strategies that best support the objectives of the lesson. The following list shows the most common methods of effective teaching related to Mathematics.

- teacher instruction, explanation and modelling using resources such as the interactive whiteboard, online programmes and texts
- use of quality text books and other sources of information, including books in our school library
- pupil discussion, investigation and problem solving
- regular review of previous learning or linked topics to enable pupils to remember key concepts. This may involve quizzes or other games to help embed knowledge and vocabulary
- analysing information, making and testing out predictions
- recording learning in written form in exercise books

At Holy Trinity Primary School, we recognise the importance of developing pupils 'number sense.' Children should have a deep understanding of the quantity value of numbers, which enables them to approximate, check answers and establish knowledge of number. In order to achieve this, we understand that mathematical concepts should be introduced to children using concrete materials before moving onto pictorial representations and finally considering the use of mathematical symbols.

By manipulating numbers and using concrete resources in a variety of ways children gain experience of representing the quantity, size and value of numbers, expanding their understanding of number sense. Mathematics lessons at Holy Trinity Primary, encourage the use of a wide variety of practical equipment, including Base 10, Numicon, Coins and counters, as well as other resources. In addition, teachers model good vocabulary and spoken language to develop successful teaching and understanding for pupils.

The teaching of mathematics provides opportunities for:

- Group work
- Paired work
- Whole class teaching
- Individual work
- Guided group work

Pupils engage in:

- The development of mental strategies
- Written methods
- Practical work
- Investigational work
- Problem- solving

- Reasoning
- Using and applying of skills
- Mathematical discussion
- Consolidation of basic skills and routines

Lessons are made as active as possible. Children are encouraged to question and explain their thinking. Focus is also provided by sharing the learning objective with the children. The teacher uses a range of questioning and modelling of techniques to introduce new concepts and develop the children's understanding and thinking. Children are made aware of what they need to do to improve and how to achieve their targets.

If the lesson is to be developed through the use of group activities, then the planning allows for this to take place at different levels to support the achievement of all individuals regardless of age or ability. This enables all children to access mathematics at their own level. The teacher uses their professional expertise to group the children, and these groupings remain flexible to allow for progress and reinforcement to be met. By delivering a mastery approach to mathematics teachers consistently demonstrate high expectations for all children.

With regard to cross curricular teaching, Mathematics is taught mainly as a separate subject but as a school we encourage the transference of skills from one subject to another. We try and identify the mathematical possibilities, particularly opportunities for using and applying and reasoning, when planning Medium Term Topic webs. We also draw children's attention to the links between maths and other curricular work so children see that mathematics is not an isolated subject.

Recording Learning

In Mathematics, pupils record their learning in the following ways

- Exercise books
- 4-a day books
- CGP books
- Maths files
- Online platforms such as My Maths, Times-tables Rockstars
- Personal journals (EYFS)

Teachers should emphasise the importance of presentation when carrying out written methods and highlight the mistakes that can be made when there is poor presentation. 1 digit should be in each square and written sentences) should flow across the horizontal lines disregarding the squares (not 1 letter in each box).

Meeting The Needs of All Pupils

All pupils are entitled to a broad and balanced curriculum that meets their needs. Mathematics taught in class groups with all pupils included. All our teachers know the pupils in their class and their differing needs very well. They plan and adapt lessons to help all pupils know and remember more so they make very good progress.

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Some pupils, including those with special educational needs or disabilities, or those with English an as additional language, may need extra support to access, understand and remember key concepts. For these pupils, teachers use a range of effective strategies, whilst promoting independent learning as far as possible. These may include

- adapting and scaffolding pupil activities and resources
- use of additional manipulatives and resources
- focussed additional support from an adult in class
- extra pre learning or overlearning of key knowledge before or after the lesson
- differentiated questioning
- identifying and addressing misconceptions through immediate formative assessment
- providing rapid intervention, commonly though individual or group support later the same day
- using a range of inclusion strategies

Where required, pupils' IEPs incorporate suitable objectives from the National Curriculum for Mathematics or Development Matters and teachers keep these in mind when planning work using BSquared. These targets may be worked upon within the lesson as well as on a 1:1 basis outside the mathematics lesson. Mathematics focused intervention in schools helps pupils with gaps in their learning and mathematical understanding. These are delivered by trained support staff and overseen by the SENCO, Maths Lead and/or the class teacher.
Within the daily mathematics lesson, teachers have a responsibility to not only provide differentiated activities to support pupils with SEND but also activities that provide sufficient challenge for pupils who are high achievers. It is the teachers' responsibility to ensure that all pupils are challenged at a level appropriate to their ability.

Some pupils very quickly grasp the main concepts being taught and are able to think more deeply to extend their learning. To ensure they reach their full potential, teachers may:

- set more complex activities that require thinking at greater depth
- ask pupils to apply their knowledge to a different situation
- go further by asking them to explain their thinking to others or present their findings to a group
- to use precise mathematical vocabulary and symbols to show justification
- describe any patterns they discover
- Give examples

Homework

Sometimes homework is given to extend or consolidate pupils' knowledge. For example:

Year 1: Mathematics homework will commence after their first term. Pupils will receive an activity fortnightly alternating with Literacy homework.

Year 2: Mathematics homework is set weekly using CGP Revision books.

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Year 3 and 4: Pupils are set a weekly mathematical activity linked to the work they have done in the class this should last for 20 minutes. They are also set times tables revision. Teachers and pupils have access to 'My Maths' to set homework tasks.

Year 5: Pupils are set weekly mathematical homework lasting 30 minutes and frequent times table revision. Teachers and pupils have access to 'My Maths' to set homework tasks.

Year 6: Pupils are set Mathematics homework once a week lasting for 30-45 minutes from CGP revision books and 'My Maths' activity tasks.

High Quality Teaching and Subject Knowledge

To ensure the highest quality teaching and make sure teachers have the subject knowledge they need to meet the requirements of teaching Mathematics in their class, teachers (and teaching assistants) receive a range of guidance and support, including:

- face to face and online training
- latest research and guidance in the best ways of teaching Mathematics
- mutual support and discussion with colleagues, including joint planning, team teaching and paired marking
- *(mention anything else in relation to your subject)*

In addition, the subject leader for Mathematics stays up to date with developments in the subject through leadership training, affiliation to Maths Hub and support from other subject leaders locally and within the LDST.

Assessment (Evaluating The Impact of Teaching)

Teachers constantly assess how far their pupils understand key concepts throughout lessons, mainly through questioning and observation. Quizzes, 4 a-day and other games are regularly used to assess how far pupils have remembered learning from the lessons before. Teachers then adapt their teaching to ensure misconceptions or gaps in knowledge are addressed. In addition, they may need to introduce opportunities for more challenge or deeper thinking.

Marking

Teachers always mark pupils' individual written work before the next lesson. This is so they can assess how far each pupil has achieved the objective of the lesson. This means they can adapt the next lesson if they need to and target support or challenge to the right children. When completing written work, the lesson's objectives are clearly set out at the beginning. When marking work, teachers tick the lesson objective as follows to assess how far a pupil's work shows they have understood the lesson.

To help teachers and others understand the context of the work completed, teachers use the following marking codes in books.

✓ working towards understanding the objective

✓✓ understood the lesson objective

✓✓✓ understood the lesson objective at greater depth.

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Please see our school's marking policy for additional marking codes.

Teachers may add a comment for the child to read or ask them to think again about an aspect of the lesson. Marking is always positive and helpful.

Pupils learn a lot from reviewing their own and each other's work. Pupils sometimes mark their own or each other's work (peer marking) or evaluate their own or their classmate's thinking. They do this in the context of mutual support and trust.

End of Unit Assessments

At the end of every topic teachers assess how far each pupil has understood the knowledge and skills involved. Pupils are assessed overall as either working towards the topic's objectives, meeting the topic's objectives or meeting the topic's objectives at greater depth. This is recorded in the following way.

End of Term Assessments

At the end of every term summative assessments will take place using NFER assessments in Y1, Y3, Y4, Y5 and past SATS papers in Y2 and Y6. Teachers evaluate the achievement of each child in their class in Mathematics. They record this on a school data base. This helps teachers plan and adapt future lessons. The subject leader collates and analyses assessment data across the school. They pick out trends, strengths and weaknesses across the school and for different classes and groups. This information is shared with senior leaders and governors. All subjects have an action plan and a budget. Analysing pupil achievement helps the subject leader plan for improvements in the subject. This may take the form of targeted training, staff discussion and problem solving to improve an aspect of the curriculum. If analysis shows a particular group of children are underachieving, for example disadvantaged children, further measures are agreed and put in place to address this gap.

End of Year Assessments and Reporting To Parents

End of term assessments are pulled together at the end of each academic year to evaluate each pupils' overall attainment in Mathematics. A child's attainment in Mathematics is reported to parents through the end of year reports. For pupils in Y1 to Y6 a child's attainment is reported in the following way.

- wts working towards end of year expectations
- exs meeting end of year expectations
- gds meeting end of year expectations at greater depth.

In Reception class Mathematics comes under two strands Number and Shape, Space and Measure. Each child in Reception is assessed as emerging, expected or exceeding the early learning goals in that area.

An INSET day is allocated towards the beginning of July where class teachers 'handover' their class to the next teacher. They discuss pupil achievement across the curriculum and ways future teaching should be adapted to meet the differing needs of the class.

Monitoring and Evaluation

The subject leader for Mathematics monitors the quality of education regularly in accordance with the school's monitoring timetable. This may take the form of :

- learning walks and drop ins and sometimes with a governor.

- book looks. The subject leader looks at a range of books or other evidence across the school, sometimes with senior leaders or an adviser / officer from the LDST or a governor.
- scrutiny of planning, particularly to evaluate coverage and progression within the curriculum as well as the extent to which planning is catering for the range of needs of pupils
- pupil conferencing
- surveys for pupils and/ or staff
- more formal lesson observations

The subject leader for Mathematics is part of the senior leadership team and will monitor and discuss aspects of the subject policy and action plan.

Following all these activities, strengths and areas for development are reported and discussed with staff. Resulting actions are recorded on the subject action plan and reported to governors. At the end of each year the action plan for Mathematics is fully evaluated and published. In addition, the subject leader evaluates how far Mathematics is meeting our curriculum intent statement. This evaluation feeds into the action plan for the following year. Evaluated action plans and evaluations are reported to the senior leadership team and governors. If, following school self-evaluation, it is agreed that Mathematics should be prioritised to significantly strengthen the quality of education, it becomes part of the School Improvement Plan. If this is the case, senior leaders and governors play a far more active role in supporting and monitoring the development of the subject. Additional resources may be targeted as necessary.

Role of Governors (from September 2020)

Every aspect within the School Improvement Plan has an allocated pair of governors. This pair of governors evaluates the activities within this aspect and the impact on the quality of education and pupil outcomes. They meet with subject leaders on a termly basis and review aspects of the subject, including seeing lessons in practice and talking to children. Their findings are reported to the Local Governing Board. In this way, leaders are held accountable for the aspects they are responsible for and subject leaders are able to access the appropriate support and resources to achieve their aims. If Mathematics is not part of the School Improvement Plan for the year, lighter touch monitoring includes governors reviewing the progress of objectives in the action plan.

Holy Trinity Church of England Primary School, Southport

Appendix 1: Curriculum Map for Mathematics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Reception	• Getting to know you • Just like me	• It's me 123 • Light and Dark	• Alive in 5 • Growing 6,7,8	• Building 9 and 10 • Number facts consolidation	• To 20 and beyond • First, then, now	• Find my pattern • On the move
Year 1	• Place Value (within 10) • Addition • Subtraction	• Addition • Subtraction • Geometry: Shape • Place Value (within 20)	• Addition • Subtraction • Place Value (within 50)	• Length • Height • Weight • Volume	• Multiplication • Division • Fractions •Geometry:Position and Direction	• Place Value (within 100) • Money • Time
Year 2	• Place Value • Addition • Subtraction	• Addition • Subtraction • Money • Multiplication • Division	• Multiplication • Division • Statistics	• Geometry: Properties of shape • Fractions	• Length • Height • Geometry: Position and Direction • Problem Solving	• Time • Mass • Capacity • Temperature
Year 3	• Place Value • Addition • Subtraction	• Addition • Subtraction • Multiplication • Division	• Multiplication • Division • Money • Statistics	• Length • Perimeter • Fractions	• Fractions • Time	• Geometry: Properties of Shape • Mass • Capacity
Year 4	• Place Value • Addition • Subtraction	• Length • Perimeter • Multiplication • Division	• Multiplication • Division • Area • Fractions	• Fractions • Decimals	• Decimals • Money • Time • Statistics	• Geometry: Properties of shape • Geometry: Position and Direction
Year 5	• Place value • Addition • Subtraction	• Multiplication • Division	• Multiplication • Division • Fractions	• Fractions • Decimals • Percentages	• Addition • Subtraction • Decimals • Perimeter • Area	• Statistics • Geometry: Position and Direction • Coverting Units

Year 6	• Place Value • Addition • Subtraction • Multiplication • Division	• Fractions • Geometry: Position and Direction	• Decimals • Percentages • Algebra • Converting units	• Measurement • Perimeter • Area • Volume • Ratio	• Statistics • Geometry: Properties of Shape	• Consolidation and themed projects

Holy Trinity Church of England Primary School, Southport

Agreed by Governors

Autumn 2020

Due for review

Summer 2023

'for wisdom is more precious than rubies, and nothing you desire can compare with her.' **Proverbs 8:13**

Calculation Policy

Addition and Subtraction

Subject leader: H DANIELS

Holy Trinity Church of England Primary School, Southport

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	show that addition of two numbers can be done in any order (commutative) and subtraction of one	using jottings: Partitioning Subtracting ones and tens from a 3 digit number			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

	equals (=) signs (appears also in Written Methods)	number from another cannot	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			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 (+),	add and subtract 2-digit numbers and ones. (appears also in Mental Calculation) Use partitioning	add and subtract 2 digit by 2 digit numbers bridging tens. Add and subtract numbers	add and subtract numbers with up to 4 digits using the formal written methods of columnar	add and subtract whole numbers with more than 4 digits, including using formal written	

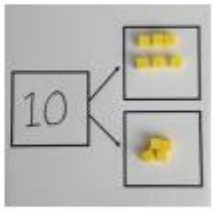
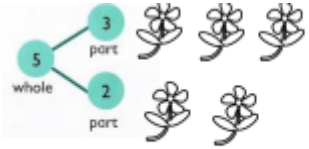
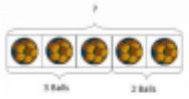
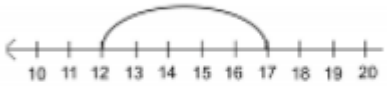
	subtraction (-) and equals (=) signs (appears also in Mental Calculation)	methods to add and subtract 2-digit numbers and multiples of ten.	with up to 3 digits, using written methods of columnar addition and subtraction. Do not use formal columnar method except with children who can demonstrate they are ready. (See models and images part of policy for guidance of process using manipulatives.) See SLT first.	addition and decomposition where appropriate	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 missing number problems.	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.
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	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*

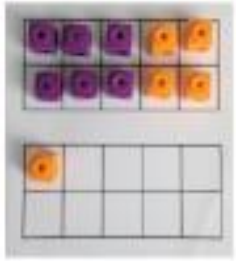
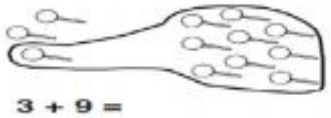
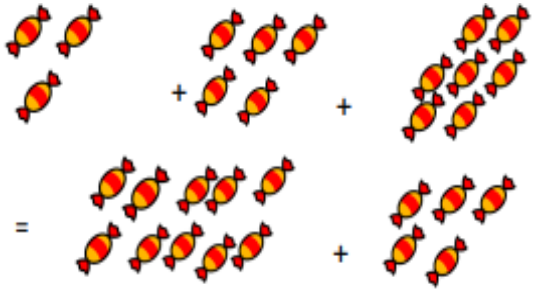
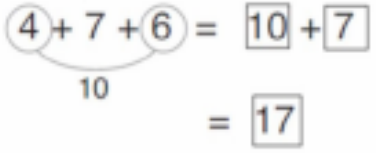
		of mental and written methods *solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)*				

Holy Trinity Church of England Primary Calculation Policy

Addition

Objective and Strategies	Concrete	Pictorial	Abstract

<table>
<tr>
<td>Combining two parts to make a whole: part-whole model</td>
<td>  
Use cubes to add two numbers together as a group or in a bar.
 
  </td>
<td> 
 
Use pictures to add two numbers together as a group or in a bar.
  </td>
<td>4 + 3 = 7
10= 6 + 4
 
Use the part-part whole diagram as shown above to move into the abstract.</td>
</tr>
<tr>
<td>Starting at the bigger number and counting on</td>
<td> 
Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.</td>
<td>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.</td>
<td>5 + 12 = 17
Place the larger number in your head and count on the smaller number to find your answer.</td>
</tr>
</table>

<table>
<tr>
<td>Regrouping to make 10</td>
<td> 
6 + 5 = 11
 
Start with the bigger number and use the smaller number to make 10.</td>
<td> 
3 + 9 =
Use pictures or a number line. Regroup or partition the smaller number to make 10.
9 + 5 = 14
1 4
+1 +4
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</td>
<td>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?</td>
</tr>
<tr>
<td>Adding three single digits</td>
<td>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.</td>
<td> 
Add together three groups of objects. Draw a picture to recombine the groups to make 10.</td>
<td> 
Combine the two numbers that make 10 and then add on the remainder.</td>
</tr>
</table>

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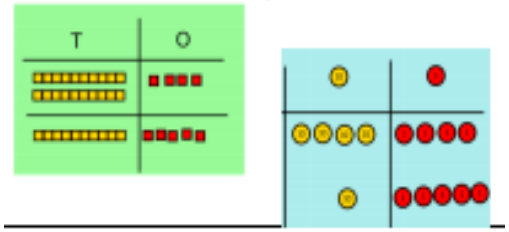
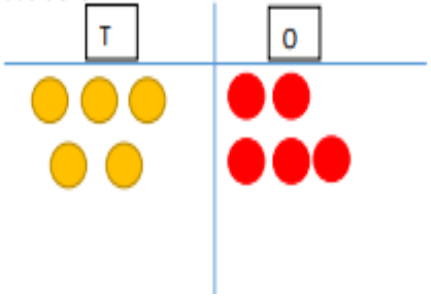
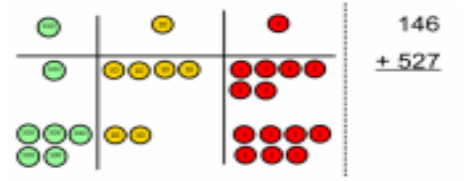
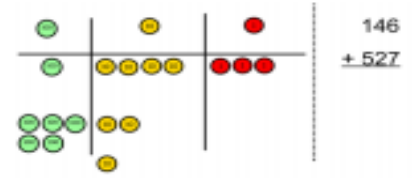
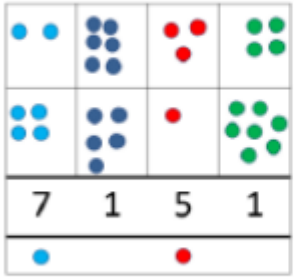
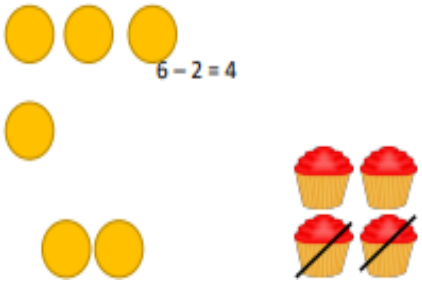
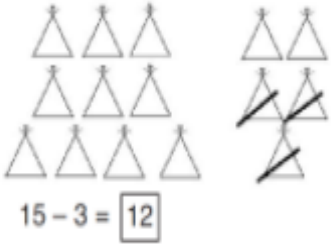
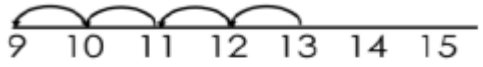
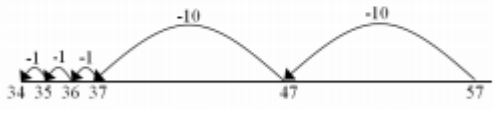
Column method- no regrouping	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters. 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	Calculations 21 + 42 = 21 + 42

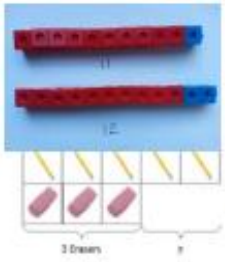
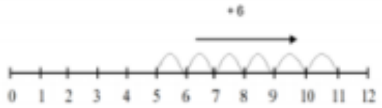
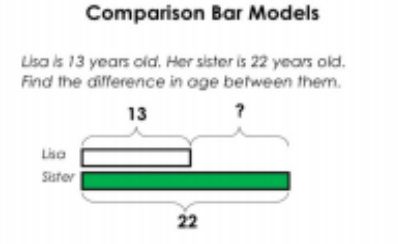
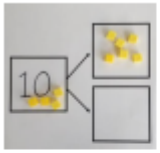
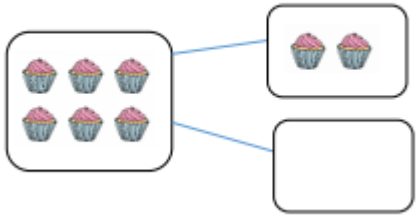
Column method- regrouping	Make both numbers on a place value grid.  Add up the units and exchange 10 ones for one 10.  Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help 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.  	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

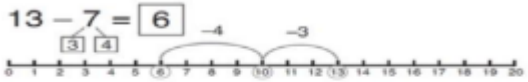
Holy Trinity Church of England Primary Calculation Policy

Holy Trinity Church of England Primary School, Southport

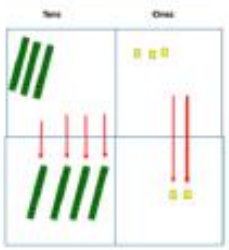
Subtraction

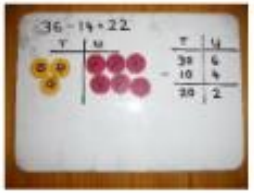
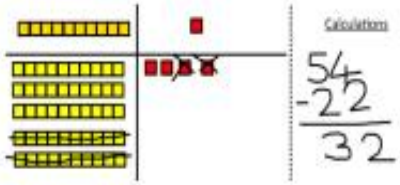
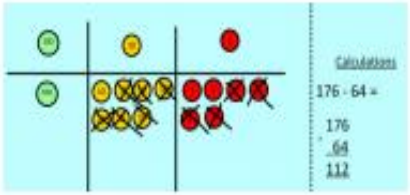
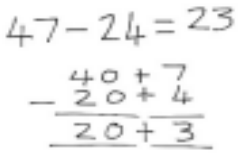
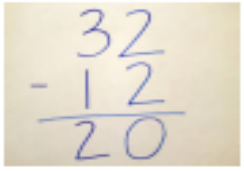
Objectives and Strategies	Concrete	Pictorial	Abstract
Take away ones	Use physical objects, counters, cubes etc to show how objects can be taken away. 	Cross out drawn objects to show what has been taken away. 	18 -3= 15 8 – 2 = 6
Counting back	Make the larger number in your subtraction. Move the beads 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  Start at the bigger number and count back the smaller number showing the jumps on the number line.  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 Use basic bar models with items to find the difference	 Count on to find the difference. Draw bars to find the difference between 2 numbers.  	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.

<table>
<tr>
<td>Make 10</td>
<td>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.</td>
<td> 
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.</td>
<td>16 – 8=

How many do we take off to reach the next 10?

How many do we have left to take off?</td>
</tr>
<tr>
<td>Column Method without regrouping</td>
<td> 
Use Base 10 to make the bigger number then take the smaller number away.

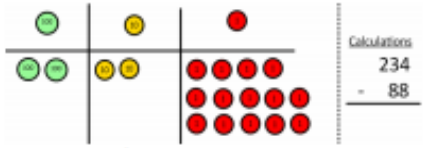
Show how you partition numbers to subtract. Again make the larger number first.
  </td>
<td>Draw the Base 10 or place value counters alongside the written calculation to help to show working.
 
  </td>
<td> 
This will lead to a clear written column subtraction.
  </td>
</tr>
</table>

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.

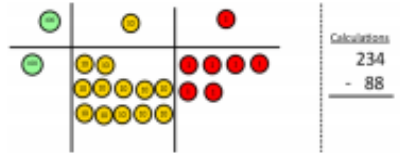
Make the larger number with the place value counters

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

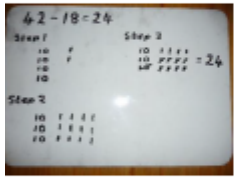


Now I can subtract my ones.

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

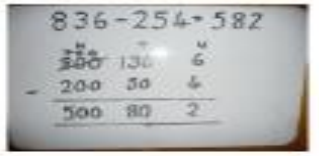


Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.



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.

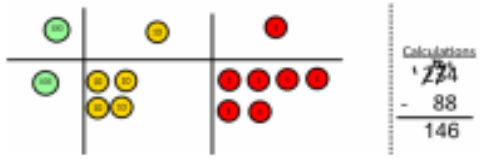
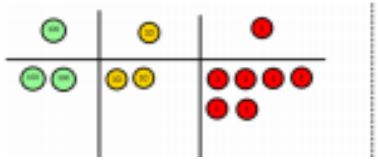
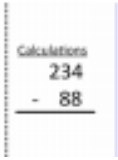


Children can start their formal written method by partitioning the number into clear place value columns.

Moving forward the children use a more compact method.

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

$$\begin{array}{r} \ \ 5\ \ 12\ \ \ \ 1 \\ \ 2\ \not{6}\ \not{3}\ .\ 0 \\ -\ \ \ 2\ \ 6\ .\ 5 \\ \hline 2\ \ 3\ \ 6\ .\ 5 \end{array}$$

	Now I can take away eight tens and complete my subtraction  Calculations 234 - 88 146 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 234 - 88		

Holy Trinity Church of England Primary School, Southport

Agreed by Governors

Autumn 2020

Due for review

Summer 2023

'for wisdom is more precious than rubies, and nothing you desire can compare with her.' **Proverbs 8:13**

Calculation Policy

Multiplication and Division

Subject leader: H DANIELS

Holy Trinity Church of England Primary School, Southport

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.

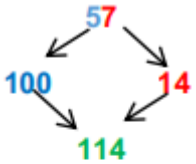
This policy contains the key pencil and paper procedures that will be taught within our school alongside practical resources. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

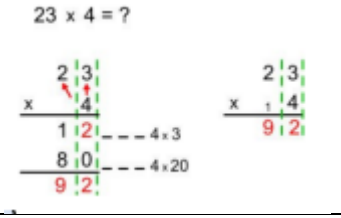
Holy Trinity Church of England Primary Calculation Policy

Multiplication and Division

Multiplication and Division Facts						
EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
	count in multiples of twos, fives and tens (copied from Number and Place Value)	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward (copied from Number and Place Value)	count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value)	count in multiples of 6, 7, 9, 25 and 1000 (copied from Number and Place Value)	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 (copied from Number and Place Value)	
		recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	recall multiplication and division facts for multiplication tables up to 12 × 12		
Mental Calculation						
EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
			write and calculate mathematical statements for multiplication and division	use place value, known and derived facts to multiply and divide	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed

			using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (grid method) (appears also in Written Methods)	mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers Multiplying by 10 and 100 e.g. 24 x 100 Th H T U 2 4 2 4 0 0	Partitioning 407 × 4 407 × 2 400 × 4 = 1600 0 × 4 = 0 7 × 4 = 28 1600 + 28 = 1628 Rounding and adjusting £3.99 × 6 £4 × 6 = £24 £24.00 – £0.06 = £23.94 28 × 19 28 × 10 × 2 = 560 560 – 28 = 532 Division as grouping drawing on known facts 196 ÷ 6 = 32r4 325 ÷ 3= 108r1 180 16 (6 x 30) (6 × 2 + 4)	operations and large numbers Partitioning 5.7 × 6 5 × 6 = 30 0.7 × 6 = 4.2 30 + 4.2 = 34.2 5.3 × 19 5.3 × 10 × 2 = 106 106 – 5.3 = 100.7
		show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot Introduce the	4 × 6 = 24 Use arrays and number lines to count in multiples Use empty number lines to demonstrate the idea of counting on in multiples of the divisor Develop the idea of chunking by grouping (repeated subtraction) and not just sharing Using	recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 h t o 1/10 1/100 2 7 2 7	associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3 /8) (copied from Fractions)

		idea of chunking by grouping (repeated subtraction) and not just sharing	partitioning to multiply and divide 57 × 2 = 114 50 × 2 7 × 2 100 + 14 =114  **Scaling** Making a 5cm line 4 times longer *5cm × 4 = 20cm* 			
Written Calculation						
EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
		calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×),division (÷) and equals (=) signs	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing toformal written methods (appears also in Mental Methods)	multiply two-digit and three-digit numbers by a one-digit number using formal written layout (grid method moving to short multiplication) Stepping stone to formal written method	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for twodigit numbers	multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

			<table><tr><td>X</td><td>40</td><td>8</td></tr><tr><td>3</td><td>120</td><td>24</td></tr></table> 120 ÷ 24= 144 48 x 3 = 144			
			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.		divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context Division leading to formal division 578 ÷ 7 8 2 r 4 7 | 5 7 8 5 6 0 1 8 1 4 4 Formal (short) division **638 ÷ 8** 7 9 r 4	divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context use written division methods in cases where the answer has up to two decimal places (copied from

					8 6 6 3 7 8 6725 ÷ 7 0 9 6 0 r5 7 6 6 7 4 2 5	Fractions (including decimals)
Properties of a number: Multiples, Factors, Primes, Square and Cube Numbers						
EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
				recognise and use factor pairs and commutativity in mental calculations (repeated)	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers	identify common factors, common multiples and prime numbers use common factors to simplify fractions; use common multiples to express fractions in the same denomination (copied from Fractions)

					establish whether a number up to 100 is prime and recall prime numbers up to 19 recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)	calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm3) and cubic metres (m3), and extending to other units such as mm3 and km3 (copied from Measures)
Order of operations						
EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
						BODMAS use their knowledge of the order of operations to carry out calculations involving the four operations

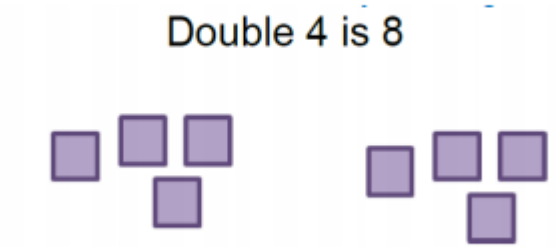
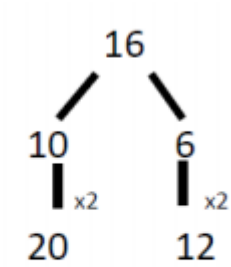
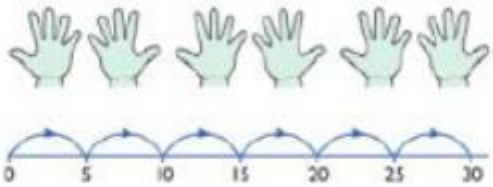
Inverse operations, estimating and checking answers						
EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**

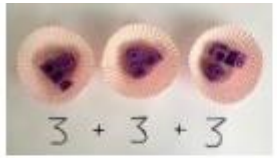
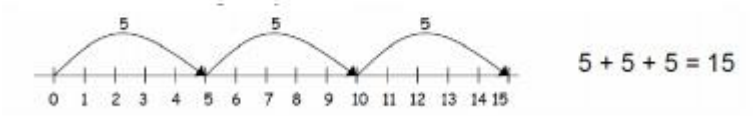
			estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)	estimate and use inverse operations to check answers to a calculation (copied from Addition and Subtraction)		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
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 involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes	solve problems involving addition, subtraction, multiplication and division
Solve practical problems that involve combining groups of 2, 5 or 10, or sharing into equal groups.					solve problems involving addition, subtraction, multiplication and division and a combination of these, including	

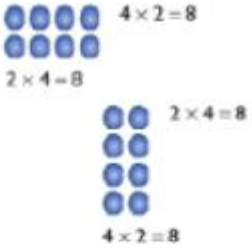
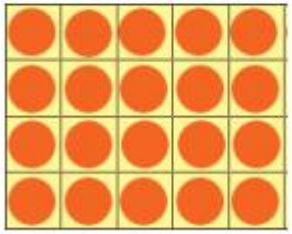
					understanding the meaning of the equals sign	
					solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	solve problems involving similar shapes where the scale factor is known or can be found (copied from Ratio and Proportion)

Holy Trinity Church of England Primary Calculation Policy

Multiplication

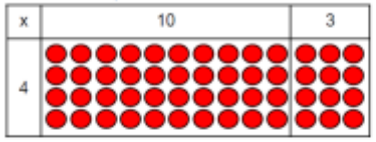
Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  double 4 is 8 4 × 2 = 8	Draw pictures to show how to double a number. 	 Partition a number and then double each part before recombining it back together.
Counting in multiples	 	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30

	Count in multiples supported by concrete objects in equal groups.		
Repeated addition	   Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6 	Write addition sentences to describe objects and pictures.  2 + 2 + 2 + 2 + 2 = 10

Arrays showing communitive multiplication	Create arrays using counters/cubes to show multiplication sentences 	Draw arrays in different rotations to find **commutative** multiplication sentences.   Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Grid Method

Show the link with arrays to first introduce the grid method.

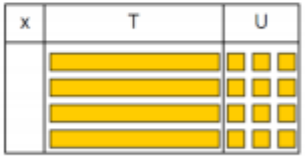


4 rows of 10

4 rows of 3

Move on to using Base 10 to move towards a more compact method.

4 rows of 13

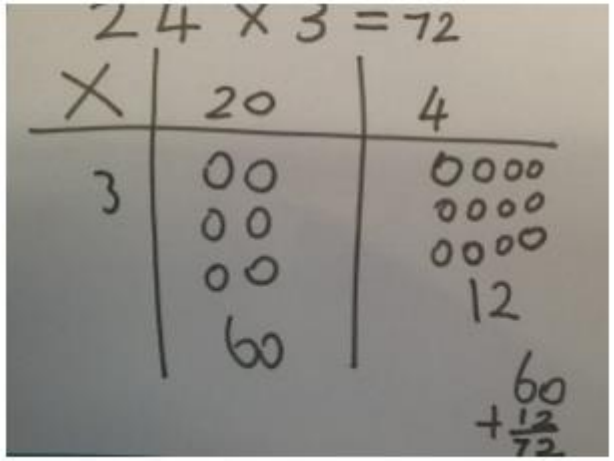


Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.

Fill each row with 126.

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



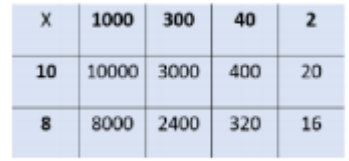
Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

×	30	5
7	210	35

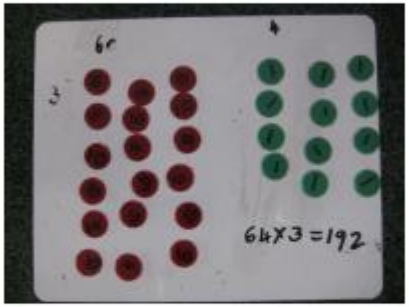
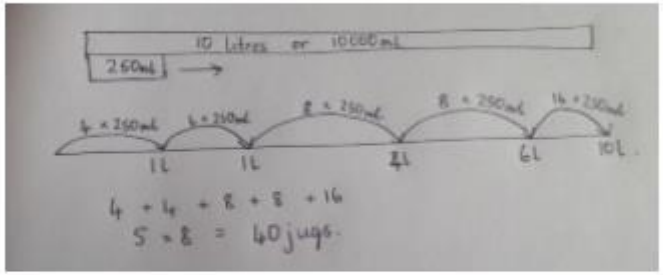
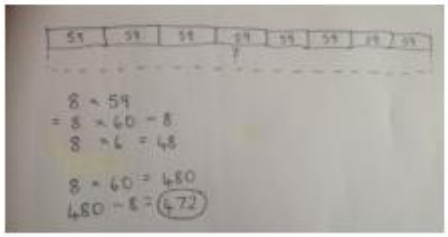
210 + 35 = 245

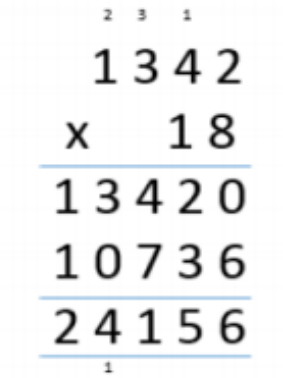
Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

	10	8
10	100	80
3	30	24

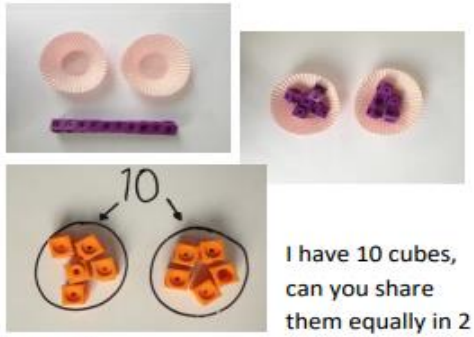
X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

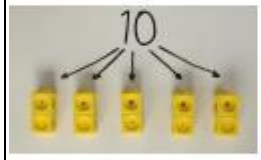
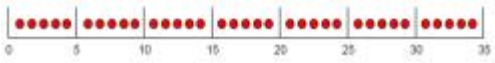
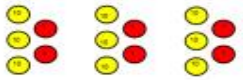
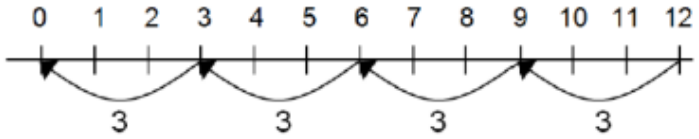
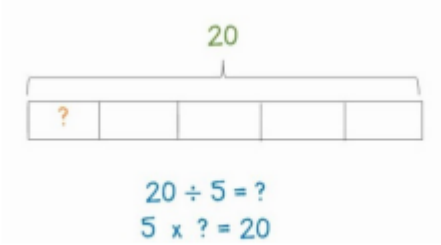
Column Multiplication	Children can continue to be supported by place value counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.   	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768 74 × 63 12 210 240 + 4200 4662

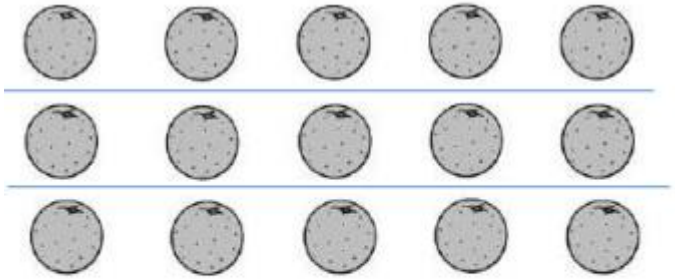
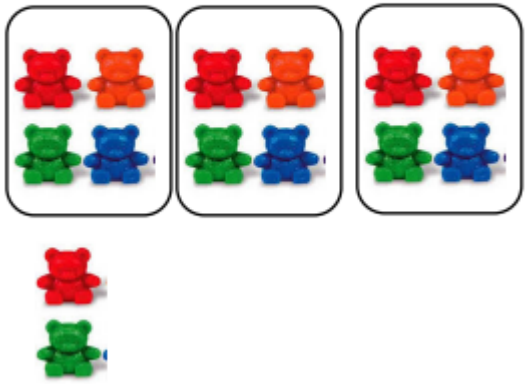
			This moves to the more compact method. 

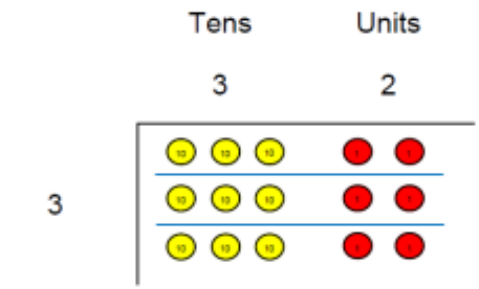
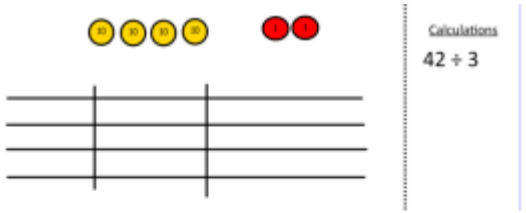
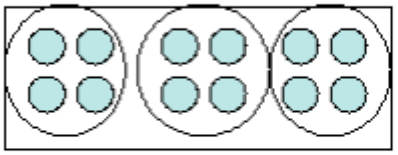
Holy Trinity Church of England Primary Calculation Policy

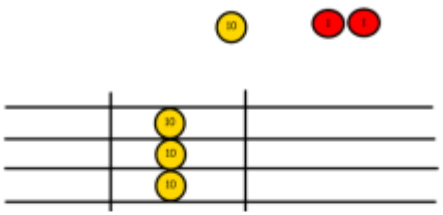
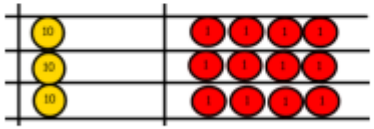
Division

Objectives and Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	 I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities.  8 ÷ 2 = 4	Share 9 buns between three people. 9 ÷ 3 = 3

Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.    96 ÷ 3 = 32 	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

Division within an array	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over? 	Jump forward in equal jumps on a number line then see how  many more you need to jump to find a remainder. Draw dots and group them to divide an amount and clearly show a remainder. 	Complete written divisions and show the remainder using r. 

Short Division	 96 ÷ 3 = 32 Use place value counters to divide using the bus stop method alongside  42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.  Encourage them to move towards counting in multiples to divide more efficiently.	Begin with divisions that divide equally with no remainder. 2 1 8 3 4 8 7 2 Move onto divisions with a remainder. 8 6 r 2 3 5 4 3 2 Finally move into decimal places to divide the total 1 4 . 6 16 21 3 5 5 1 1 . 0 accurately.

	 Then exchange the ten into ones and share the ones equally among the groups. We look how much in 1 group so the answer is 14.  We look how much is in one group across so the answer is 14		

Agreed by Governors

Autumn 2020

Due for review

Summer 2023

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Calculation Policy

Fractions

Subject leader: H DANIELS

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

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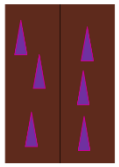
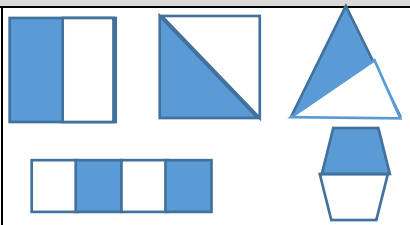
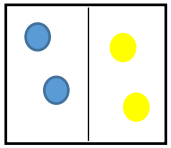
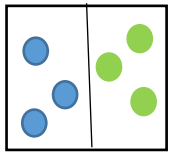
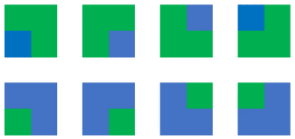
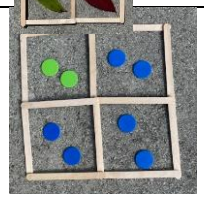
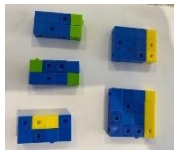
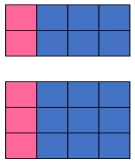
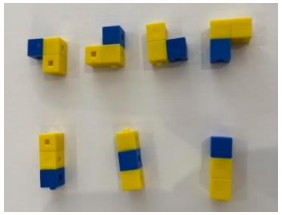
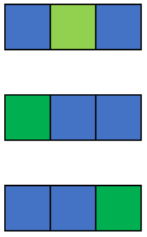
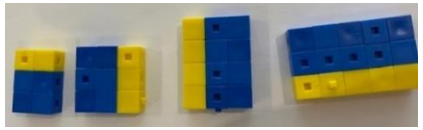
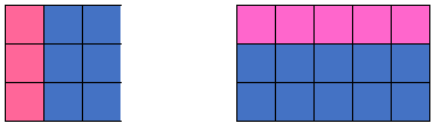
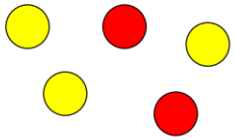
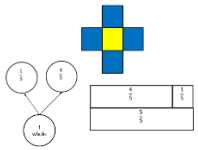
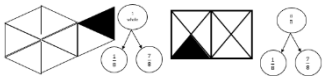
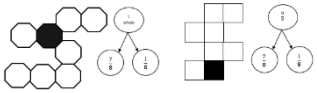
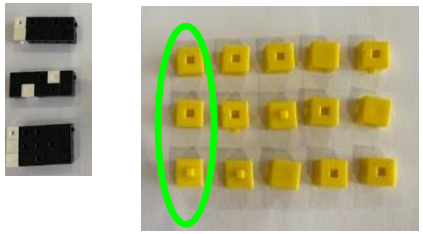
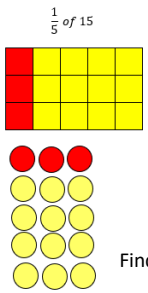
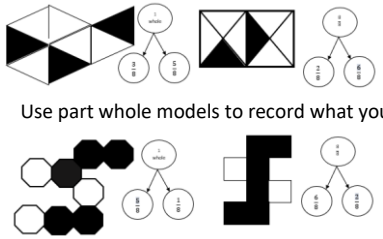
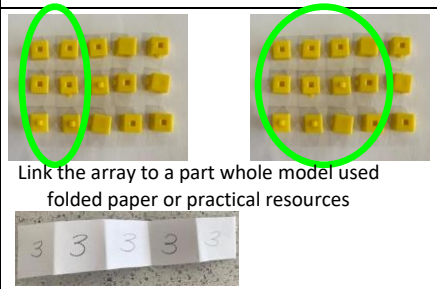
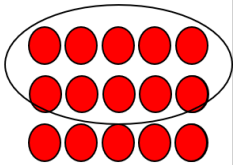
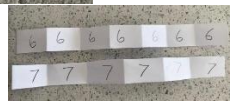
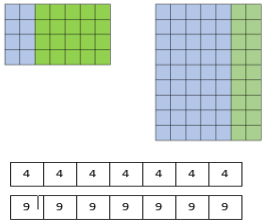
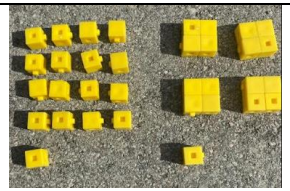
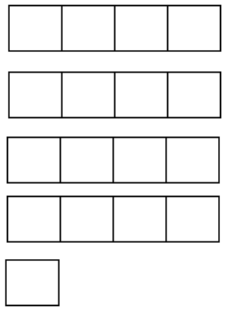
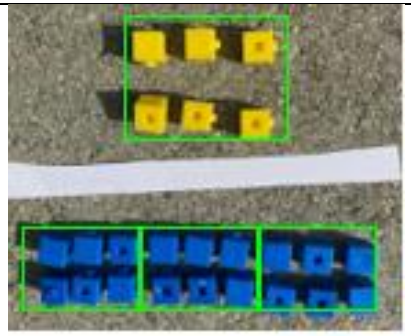
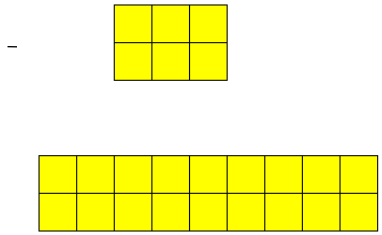
	Concrete	Pictorial	Abstract
EYFS			
To solve problems including halves	 Halves of fruit or drinks and other common items 	  Half and share images E.g. put half of the purple spikes on the Gruffalo	
Key Stage 1			
To find $\frac{1}{2}$ of a shape	   Find half using cubes or everyday items		

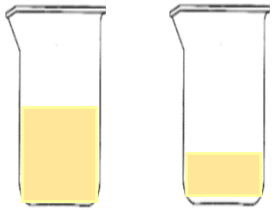
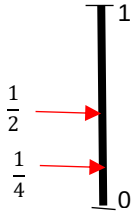
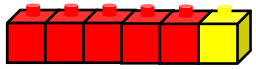
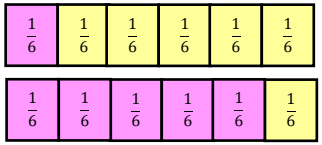
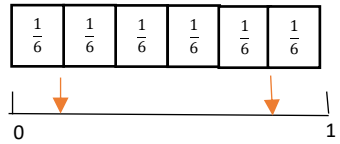
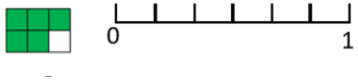
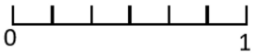
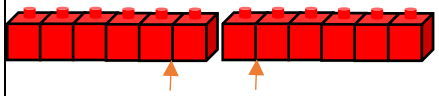
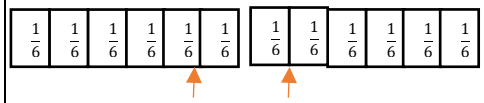
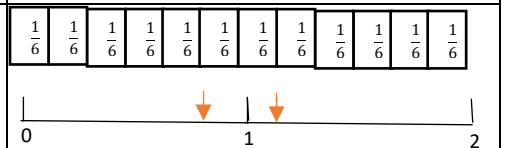
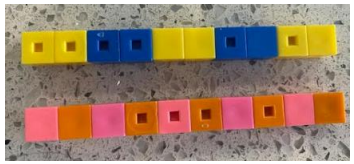
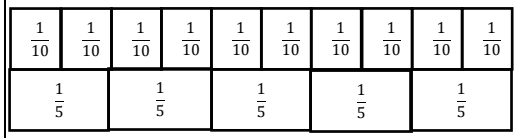
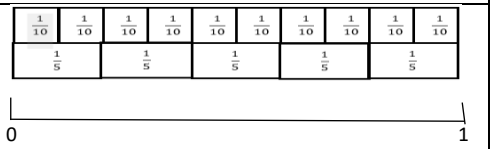
Find half of variety shapes in different ways

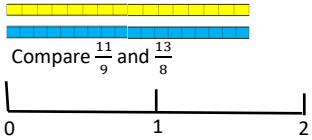
To find $\frac{1}{2}$ of a number	  Find half using cubes or counters	 Find half using cubes or counters	$\frac{1}{2}$ of 8 = 4 $\frac{1}{2}$ of 10 = 5
To find $\frac{1}{4}$ of a shape **To find $\frac{3}{4}$ of a shape**	   Find quarter using cubes or everyday items and show in different ways	 Find quarter using pictures and show in different ways	
To find $\frac{1}{4}$ of a number **To find $\frac{3}{4}$ of a number**	  Find quarter using cubes or everyday items and show in different ways	 Find quarter using pictures and show in different ways	$\frac{1}{4}$ of 8 = 2 $\frac{1}{4}$ of 12 = 3 Find quarter using abstract form
To find $\frac{1}{3}$ of a shape	 Find third using cubes or everyday items and show in different ways	 Find third using pictures and show in different ways	

To find $\frac{1}{3}$ of a number	 Find third using cubes and show in different ways	 Find third using pictures and show in different ways	$\frac{1}{3}$ of 9 = 3 $\frac{1}{3}$ *of* 15 = 5
Key Stage 2			
Recognise, find, and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators	 What fraction are apples? Pears? Limes?	What fraction is red?  What fraction are square? Circles? 	What fraction are multiples of 3? 27 13 23 9 21
Find unitary fractions of shapes	 Find unitary fractions using cubes or everyday items and show in different 	  Find unitary fractions using pictures and show in different way	

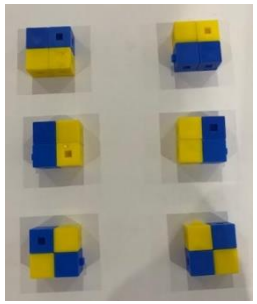
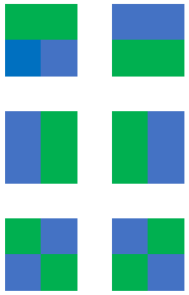
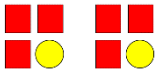
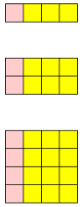
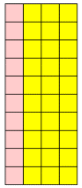
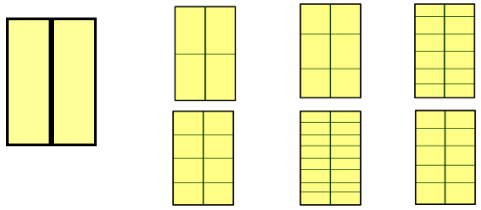
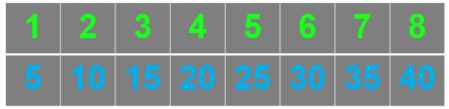
Find unitary fractions of numbers	 Find unitary fractions using cubes	 Find unitary fractions using pictures	$\frac{1}{5}$ of 25 $\frac{1}{9}$ *of* 27 $\frac{1}{6}$ of 18
Find Non-unitary fractions of shapes	 Use part whole models to record what you see	 Use part whole models to record what you see	
Find Non-unitary fractions of numbers	 Link the array to a part whole model used folded paper or practical resources	 $\frac{2}{3}$ of 15 Link the array to a part whole model 5 5 5	$\frac{2}{3}$ of 15 $\frac{3}{5}$ of 25
Find increasingly difficult non unitary fractions	Find 3/7 OF 42 and 5/6 of 42 Comapre fraction of same number  	Find 2/7 of 28 and 5/7 of 63 Compare fractions using same denominator	Compare fractions

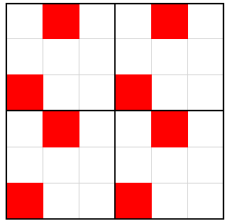
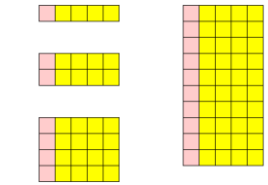
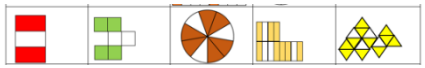
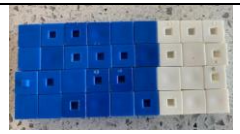
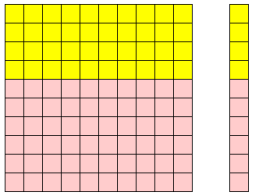
			$\frac{3}{7}$ of 49 ◯ $\frac{8}{28}$ × 21 $\frac{2}{5}$ of 45 ◯ $\frac{3}{5}$ × 30 $\frac{3}{8}$ of 72 ◯ $\frac{18}{24}$ × 32 $\frac{1}{6}$ of 24 ◯ $\frac{12}{18}$ × 36
Recognise mixed numbers and improper fractions	  $\frac{17}{4}$		$\frac{17}{4} = 4\frac{1}{4}$
Use common factors to simplify fractions			$\frac{6}{18}$ Find largest common factor of 6 and simplify to $\frac{1}{3}$
Compare and Order fractions			

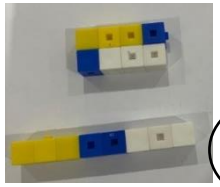
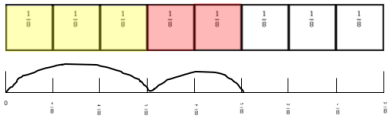
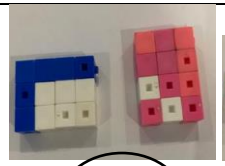
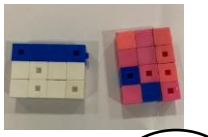
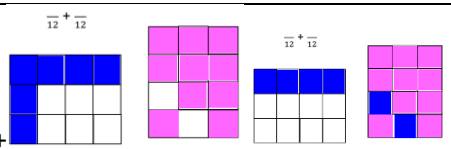
Compare and order unit fractions			
Compare and order fractions of the same denominator	Compare $\frac{1}{6}$ and $\frac{5}{6}$ 	Compare $\frac{1}{6}$ and $\frac{5}{6}$ 	Compare $\frac{1}{6}$ and $\frac{5}{6}$ 
		 Show both fractions ($\frac{1}{6}$ and $\frac{5}{6}$) on the number line	
Compare and order fractions of the same denominator	 Compare $\frac{5}{6}$ and $\frac{7}{6}$	 Compare $\frac{5}{6}$ and $\frac{7}{6}$	
Compare and order fractions of the whose denominators are all multiples of the same number			

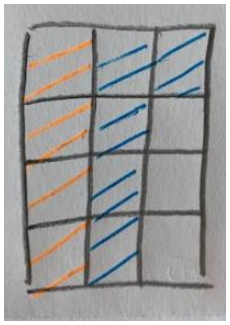
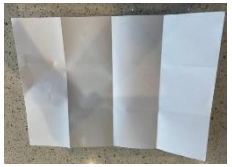
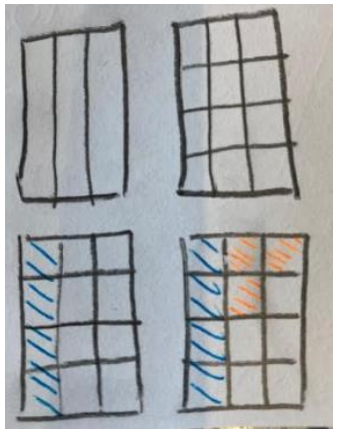
Compare and order fractions including fractions > 1		Compare $\frac{6}{8}$ and $\frac{7}{9}$ 	

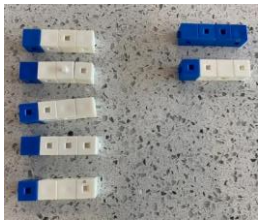
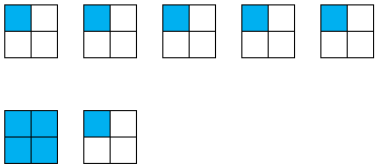
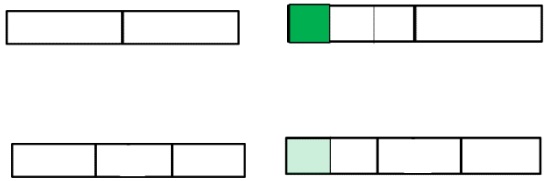
Equivalent Fractions

Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$			$\frac{2}{4}$ and $\frac{1}{2}$
Recognise and show, using diagrams, families of common equivalent fractions with small denominators	 	 	
	  Family of $\frac{1}{4}$ and $\frac{3}{4}$	 Find a fraction of a shape and cut into equal groups in different ways	 Use double number line

Recognise and show, using diagrams, families of common equivalent fractions	 $\frac{2}{9} = \frac{4}{18} = \frac{6}{27} = \frac{8}{36}$	 Family of $\frac{1}{5}$ and $\frac{4}{5}$  Family of $\frac{2}{3}$ and $\frac{1}{3}$	 Use multiplication table
Identify name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	  $\frac{12}{36} = \frac{1}{3}$ $\frac{24}{36} = \frac{2}{3}$	 $\frac{40}{100} = \frac{4}{10} = \frac{2}{5}$	Write fractions that are equivalent to $\frac{3}{5}$ $\frac{30}{50}$ $\frac{60}{100}$ $\frac{120}{200}$ $\frac{15}{25}$ $\frac{21}{35}$ $\frac{27}{45}$

Calculation **Addition and Subtraction of fractions**			
Add and subtract fractions with the same denominator within one whole	 $\frac{5}{8}$ $\frac{2}{8}$ $\frac{3}{8}$	 $\frac{2}{8}+\frac{3}{8}=\frac{5}{8}$ 	$\frac{2}{8}+\frac{3}{8}=\frac{5}{8}$ $\frac{2}{8}+\frac{3}{8}+\frac{3}{8}=\frac{8}{8}$
Add and subtract fractions with the same denominator	  ? $\frac{6}{12}$ $\frac{10}{12}$ $1\frac{4}{12}$ $\frac{12}{12}$ $\frac{4}{12}$	.36+  ? $\frac{6}{12}$ $\frac{10}{12}$ $1\frac{4}{12}$ $\frac{4}{12}$ $\frac{12}{12}$	$\frac{6}{12}+\frac{10}{12}=1\frac{4}{12}$ $1\frac{4}{12}=1\frac{1}{3}$

Add and subtract fractions with denominators that are multiples of the same number	$\frac{5}{12} + \frac{1}{3}$   (This a remodel to show $\frac{3}{4}$)	$\frac{5}{12} + \frac{1}{3}$ 	$\frac{5}{12} + \frac{1}{3} = \frac{3}{4}$
Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	$\frac{1}{3} + \frac{1}{4}$  Find $\frac{1}{3}$  Find $\frac{1}{4}$ by turning paper  Show $\frac{1}{3}$  Show $\frac{1}{4}$		$\frac{1}{3} + \frac{1}{4}$ $\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

	Answer = $\frac{7}{12}$		
Calculation **Multiplication and division**			
Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	$\frac{1}{4}$ x 5 	$\frac{1}{4}$ x 5 	$\frac{1}{4}$ x 5 $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{5}{4}$ $\frac{5}{4}=1\frac{1}{4}$
Multiply pairs of proper fractions, writing the answer its simplest form	$\frac{1}{3}\times\frac{1}{2}=\frac{1}{6}$ $\frac{1}{3}$ of $\frac{1}{2}$ $\frac{1}{2}$ of $\frac{1}{3}$ 	$\frac{1}{3}\times\frac{1}{2}=\frac{1}{6}$ 	$\frac{1}{3}\times\frac{1}{2}=\frac{1}{6}$
Divide proper fractions by whole numbers	$\frac{1}{3}\div 2$  $\frac{1}{2}\div 3$ 	$\frac{1}{3}\div 2$  $\frac{1}{2}\div 3$	$\frac{1}{3}\div 2$ $\frac{1}{3}\div\frac{2}{1}$ $\frac{1}{3}\times\frac{1}{2}=\frac{1}{6}$ $\frac{1}{2}\div 3$ $\frac{1}{2}\div\frac{3}{1}$ $\frac{1}{2}\times\frac{1}{3}=\frac{1}{6}$

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

Agreed by Governors

Autumn 2020

Due for review

Summer 2023

'for wisdom is more precious than rubies, and nothing you desire can compare with her.' **Proverbs 8:13**

Calculation Policy

Number Facts and Fluency

Subject leader: H DANIELS

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

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.

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Count in 2s, 5s and 10s	Learn 2s, 5s and 10s. Multiplication and division facts.	Learn 3s, 4s and 8s. Multiplication and division facts.	Learn 6s, 7s, 9s, 11s, 12s. Multiplication and division facts.	Develop speed and accuracy across all times tables. Introduce square numbers. Use multiplication and division facts to develop scaling.	Develop speed and accuracy. Introduce decimal scaling using division and multiplication facts.

Daily and varied teaching activities.

Skip Counting:
- Chanting and songs
- Show and use visuals whilst chanting for each multiplication.

Develop learning and relationships between multiples as well as distributive law:
- Number Dial (ITP) and counting stick – use out of order.
  7 x 6 =
  5 x 6 + 2 x 6

Variation:
Show all multiplication facts in a variety of ways such as arrays, pictures, diagrams, dienes and calculation. Make connections throughout teaching with fractions, measurement and geometry. 'The answer is only the beginning' – Understand *why* an answer is correct or incorrect.

Use the diagram above to find multiples e.g. Dogs' legs = 4 x 3 = 12 Money = 5 x 4 = 20

Time for investigating patterns and to find relationships between multiples of all times tables. Use of investigative questioning and requirement of 'proof' in the answers

e.g. Do all multiples of 5 end in 5?

If I double and double again, is it the same as x4?

3	6	7	8	9

Pick two of the above numbers and find the product. I think that there will be more odd answers than even answers, am I right or wrong?

-Investigate relationships of numbers between calculations.

Example:

"Why is the answer the same for both of these calculations?"

6 x 8 = 48

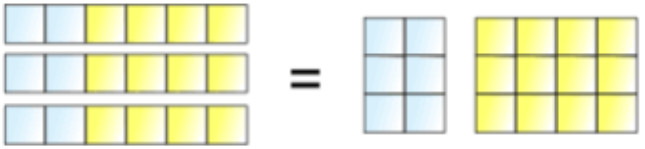
12 x 4 = 48

double half

Mathematical vocabulary (distributive and commutative law) taught explicitly and used regularly with children.

Teach **distributive law** within all times tables using arrays. The distributive law describes how two operators may be used together when linked in a particular way. The distributive law of arithmetic says that multiplication is distributed over addition as in $a \times (b + c) = a \times b + a \times c$

3 x 6 =



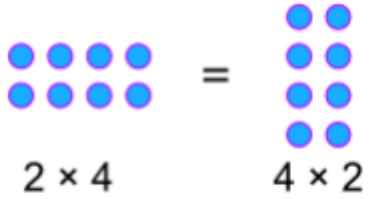
3 x (2+4)

=

3x2 + 3x4

Teach the **commutative law**. A commutative operation is one in which the order of combining the two objects does not matter. (This can be taught within multiplication and addition).

a x b = b x a



Tara Loughran multiplication games to practise *fluency*.

- Race Track Game
- Bump Multiply
- Choose Your Points
- Circle Targets
- Find the Calculation
- Inverse Circles
- Four in a Row – mixed
- Box My Counter