Park Hill Primary School

Mathematics and Calculation Policy

Approval Level	Head Teacher
Date Reviewed	September 2024
Approved On	31.10.22
Category	Non-Statutory
Next Review Date	Advised annually – September 2025
Policy Availability	School website
Written By	Mr G. Dingle

Policy Version Control

Date of Change	Details of Change
Dec 2021	Altered grammatical errors
Dec 2021	Altered details regarding arithmetic sessions
Dec 2021	Added new Calculation Policy
October 2022	Added “reasonable adjustments” and revised information about Maths in EYFS
February 2023	Altered error in Year 4 multiplication methods of the calculation policy
September 2024	Changes to Key Personnel relating to the policy

Contents

Statement of Intent

Mathematics is a creative and highly inter-connected 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 in most forms of employment. A high-quality Mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, and a sense of enjoyment and curiosity about the subject.

At Park Hill Primary School, we aim to help all children:

- Develop enjoyment and enthusiasm for learning through practical activity, exploration and discussion;
- Promote confidence and competence with numbers and the number system;
- Develop the ability to solve problems through decision-making and reasoning in a range of contexts;
- Develop a practical understanding of the ways in which information is gathered and presented;
- Explore features of shape and space, and develop measuring skills in a range of contexts;
- Understand the importance of Mathematics in everyday life.

Purpose

This policy has been written to:

- To provide a framework to enable teachers to meet their statutory obligations with regards to the teaching of Mathematics.
- To provide a consistent teaching for mastery in Mathematics approach throughout the school.
- To foster effective learning by suggesting appropriate ways of organising Mathematics experiences in the classroom.
- To provide procedures for planning and record keeping ensuring continuity and progression throughout the school
- To meet the National Curriculum requirements

Key Personnel in Relation to this Policy

Name	Role(s)
Mr L. Gorle	Mathematics Link Governor
Mr G. Dingle	Maths Coordinator
Vacancy	Early Years Foundation Stage Lead
Mrs C. Watson	Special Educational Needs and Disabilities Coordinator (SENDCo)

Early Years Foundation Stage

In Nursery and Reception, children taught Mathematics every day. They are supported to develop a strong understanding of number, which is essential for them to develop the necessary building blocks in order to excel mathematically.

By the end of Reception, children are taught to count confidently beyond 20 and automatically recall number bonds. They develop a deep understanding of the numbers to 10, including the relationships between them and the patterns within those numbers. Examples of numerical patterns include comparing quantities and identifying odd and even amounts. We provide frequent and varied opportunities for children to build and apply this understanding using manipulatives, such as pebbles and tens frames to help children organise their counting. Equipment is readily available within the EYFS.

Additionally, children develop vocabulary to help them understand shape, space and measures. Mathematical songs are sung regularly to reinforce concepts.

We believe it is important that children develop positive attitudes and interests in Mathematics, look for patterns and relationships, spot connections, "have a go," talk to adults and peers about what they notice and be confident to make mistakes.

The National Curriculum

At Park Hill Primary School, we meet the objectives set out in the National Curriculum and aim for children to:

- Become fluent in the fundamentals of Mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- Solve problems by applying their Mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The programmes of study are organised in a distinct sequence and structured into separate domains. Pupils should make connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

Key Stage 1

Year 1 will begin the year with EYFS profiles and progress towards the National Curriculum objectives over the first term.

In Key Stage 1, children have at least one daily Mathematics lesson, working on all the areas of Mathematics - number and place value, the 4 operations and links between them, measures, properties of shapes, position, direction, motion and data.

A variety of learning styles are catered for and teaching strategies used.

Practical resources and apparatus are used prominently to help Key Stage 1 children grasp place value concepts.

Mathematics should cover investigations, arithmetic and times tables work and assessments.

By Year 1, children are beginning to use concrete and pictorial prompts to help partition, count, find factors and identify multiples.

Where possible, any Mathematics work that relates to topics is also taught outside of normal Mathematics lessons.

Key Stage 2

In Key Stage 2, children have at least one daily Mathematics lesson, working on all the areas of Mathematics - number and place value, addition, subtraction, multiplication and division, fractions (including decimals and percentages), ratio/proportion, algebra, measurement, properties of shapes, position, direction and statistics.

A variety of learning styles are catered for and teaching strategies used.

Practical resources and apparatus are still used to help Key Stage 2 children grasp concepts as they move from concrete and pictorial representations to more abstract mathematical methods.

Arithmetic

Every two weeks, classes in KS1 and 2 will have an arithmetic lesson, where arithmetic learning and assessments take place. Each week, children will participate in regular times tables assessments.

Spoken Language

The National Curriculum for Mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

Teaching for Mastery

We understand that a variety of teaching and learning styles must be used in Mathematics lessons. Our principal aim is to develop children's knowledge, skills and understanding in Mathematics. We do this through a daily Mathematics 'mastery' lesson that has a combination of whole-class teaching and paired tasks, with 'success criteria' for the pupils to self-assess their own learning.

The phrase 'teaching for mastery' describes the elements of classroom practice and school organisation that combine to give pupils the best chances of mastering Mathematics. Achieving mastery means acquiring a solid enough understanding of the Mathematics that has been taught to enable pupils to move on to more advanced material.

During these lessons, we encourage children to ask as well as answer mathematical questions. They have the opportunity to use a wide range of practical resources and apparatus to support and extend their work. We encourage the children to use and apply their learning in everyday situations to put their learning into context.

More exposure to reasoning questions and looking at mathematical concepts in different ways for the children to solve will promote mastery of the Mathematics curriculum, challenging the children. This means that the children are able to use their knowledge appropriately, flexibly and creatively and then apply it in new and unfamiliar situations.

Reasonable Adjustments

In all classes, there are children of differing mathematical ability. We recognise this and provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this through a range of strategies – in some lessons, through structured / scaffolded support for some children, practising simple Mathematics fluency using context clues or using concrete/ pictorial resources. In others lessons, this is achieved by organising the children to work in pairs on open-ended problems or games.

Wherever possible, the children in class should be working on the same objective, but at different levels of understanding or support.

Mathematics forms part of the school curriculum policy to provide a broad and balanced education to all children. Through our Mathematics teaching, we provide learning opportunities that enable all pupils to make progress. We do this by setting suitable learning challenges and responding to each child's different needs. Assessment against the National Curriculum allows us to consider each child's attainment and progress against end of year expectations.

Special Educational Needs and Disabilities

When progress falls significantly outside the expected range, a child may have special educational needs. Our assessment process looks at a range of factors – classroom organisation, teaching materials, teaching style or reasonable adjustments – so that we can take some additional or different actions to enable the child to learn more effectively. This ensures that our teaching is matched to the child's needs.

Some children will have more explicit learning difficulties and this may lead to the creation of an individual One Page Profile (OPP) – agreeing progressive targets with parents for children with educational needs. The OPP may include specific targets relating to Mathematics.

Children who have an Education Health Care Plan (EHCP) may need additional interventions, as defined through the objectives on their plan.

Planning

Planning needs to identify key vocabulary, relevant areas of the National Curriculum to be covered and resources required. It also needs to indicate where and how children will be supported.

When monitoring planning, these key areas are looked at:

- Reasonable adjustments, evident through independent tasks
- Specific, relevant objectives for daily lessons
- Success criteria identified
- Evidence of a clear teaching sequence
- Variety of activities used / different learning styles considered
- Planned opportunities for AfL (assessment for learning)
- Investigations / problem solving
- Teacher and additional adult roles clearly identified
- Reasoning questions and challenge set for every lesson
- Reflection time to look back and apply learnt skills

Monitoring and Assessment

Planning Mathematics planning is monitored regularly, with advice and feedback given in order to help the delivery of lessons.

Work scrutinies are undertaken every term by the school SLT – looking at books, achievement and planning in Mathematics. Feedback is given back to staff along with development points.

Lesson observations will have a Mathematics focus at some point over the academic year.

Learning walks to be undertaken by Mathematics lead within each term, to look at learning environments and children's response to teaching.

Pupil progress meeting each term address groups of children who require more support and looks at strategies/ interventions to accelerate their learning.

Children are continually assessed during Mathematics sessions and teachers annotate planning where appropriate to show where children have experienced difficulties and extra support/ help is made available to ensure that the children access the curriculum.

Each term, the children are assessed in their Maths work using a variety of assessment materials, looking at learning that should have taken place over that time – this includes progress test papers and previous KS2 SAT paper questions using an online resource.

Commented [CL1]: is it termly?

Weekly times tables assessments will take place, with 2-minute tests – these results will be recorded and children's progress will be monitored on a classroom display. (Order of learning times tables = 10, 5, 2, 3, 4, 8, 6, 7, 9, 11, 12)

Arithmetic tests / lessons – these are set within the age-related expectations of each year group and are analysed to identify areas to develop and improve. These can also be an aid to intervention work.

As a core subject, Mathematics forms part of the statutory data collection at the end of Key Stage 1 and 2. The end of Key Stage 2 results are reported on.

Appendix 1 – Mathematics Calculation Policy

This calculation policy is a guide for staff, pupils and parents or guardians and is set out into year groups as a progression of calculation methods, skills and vocabulary. Teachers should use this alongside teaching resources.

At the centre of the mastery approach to the teaching of Mathematics is the belief that **all** children have the potential to succeed. They should have access to the same curriculum content and **deepen their conceptual understanding by tackling differentiated, challenging and varied problems.** Similarly, with calculation strategies, children must not simply rote learn procedures, but demonstrate their understanding of these procedures, through the use of **concrete, pictorial** and **abstract** (CPA) as appropriate, and in reasoning and problem solving activities.

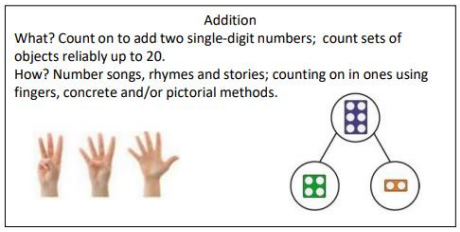
This policy outlines the different calculation methods which should be used as outcomes in the EYFS curriculum and the national curriculum in Y1 to 6.

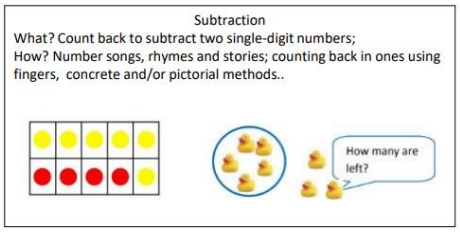
To ensure consistency throughout the school, this policy outlines the following whole school and year group expectations:

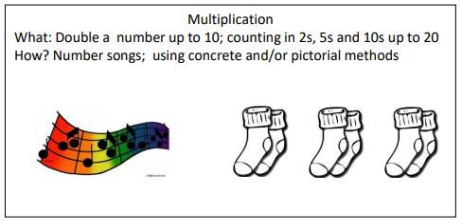
- A consistent approach to teaching and learning
- Agreed calculation strategies
- Methods for written and mental calculations
- Precise mathematical vocabulary
- Consistency in the approach for setting out calculations
- Clear outcomes for every year group and key stage.

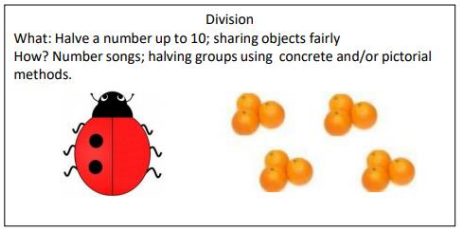
EYFS OUTCOMES

Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. Automatically recall number bonds for numbers 0–5 and some to 10.









YEAR 1 OUTCOMES

Addition

What do they need to be able to do?
Add one-digit and two-digit numbers to 20, including 0
Represent and use number bonds within 20

How should they do it?
Use a numbered number line, beginning with the larger number and counting on in ones.
Tens frames
Part-whole models

Subtraction

What do they need to be able to do?
Subtract one-digit from a two-digit number, up to 20, including 0
Represent and use number bonds and related subtraction facts within 20

How should they do it?
Use a numbered number line, beginning with the larger number and counting back in ones.
Tens frames
Part-whole models

Multiplication

What do they need to be able to do?
Solve one step problems involving multiplication
Double numbers
Counting in 2s, 5s and 10s.

What do they need to be able to do?
Draw and count arrays; use concrete and/or pictorial methods to double.
Bead strings

Division

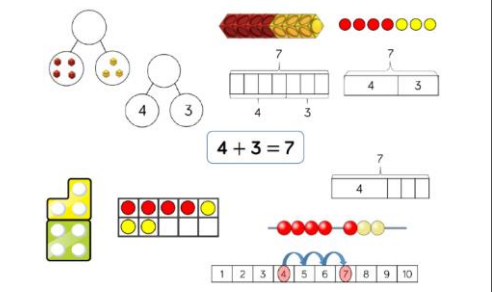
What do they need to be able to do?
Solve one step problems involving division
Halve numbers

What do they need to be able to do?
Use pictorial representation; use concrete and/or pictorial methods to halve.

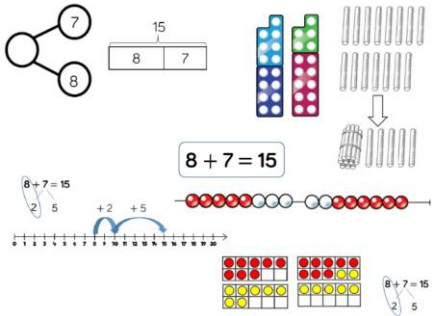
YEAR 1 METHODS

Addition

To 10

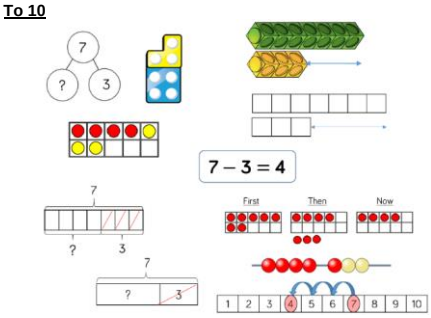


To 20

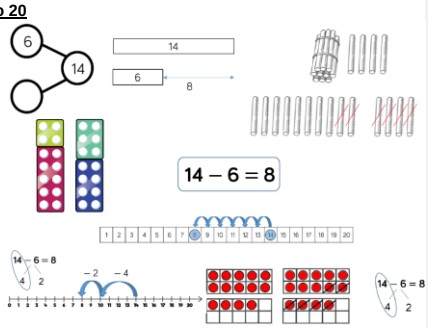


Subtraction

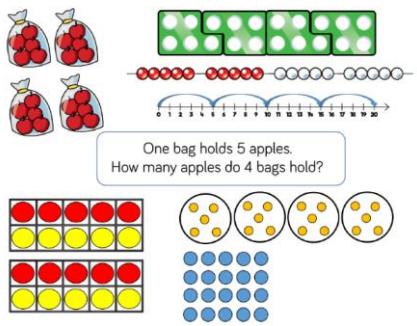
To 10



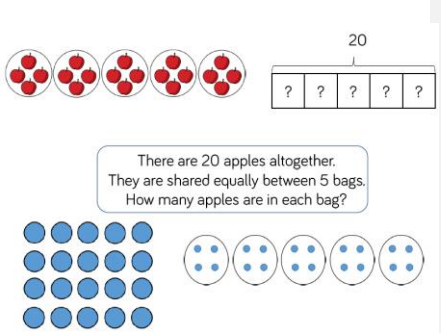
To 20



Multiplication



Division



YEAR 2 OUTCOMES

Addition

What do they need to be able to do?
Add 3 one-digit numbers
Add 2 two-digit numbers
Use the inverse to check a calculation

How should they do it?
Use the partitioning method
Introduce the column method as appropriate (introduction of regrouping)

Subtraction

What do they need to be able to do?
Subtract 2,two digit numbers.
Use the inverse to check a calculation
Facts to 100

How should they do it?
Use an empty number line, starting at the right
Introduce the column method as appropriate (introduction of regrouping)

Multiplication

What do they need to be able to do?
Use multiplication facts to solve problems
Recognise odd and even numbers

How should they do it?
Use repeated addition
Write a fact family
Use knowledge of multiplication facts to write a number sentence

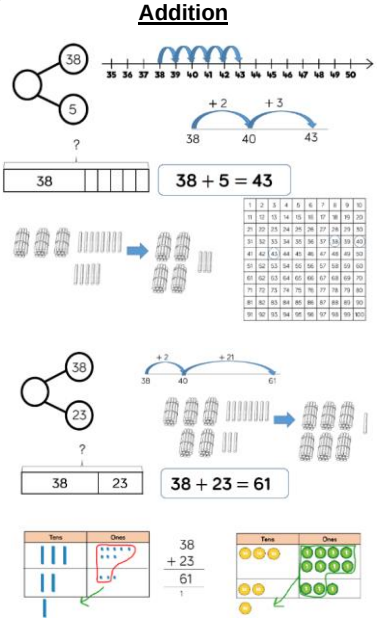
Division

What do they need to be able to do?
Solve one step problems involving division; halve numbers

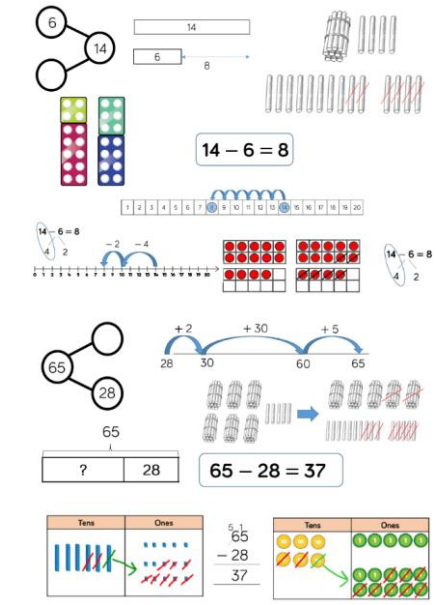
How should they do it?
Sharing and grouping amounts
Write a fact family
Use knowledge of division facts to write a number sentence

YEAR 2 METHODS

Addition

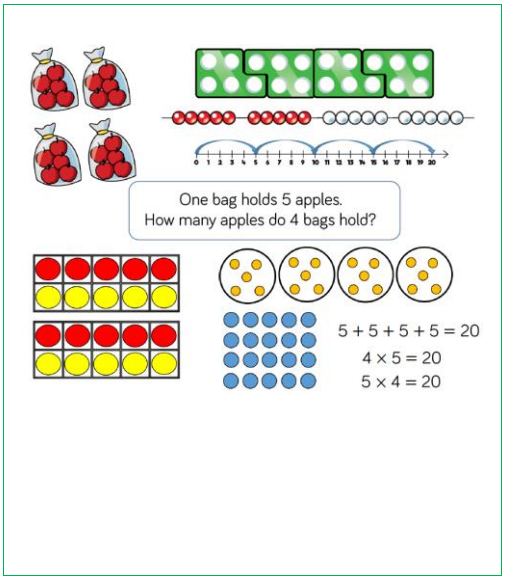


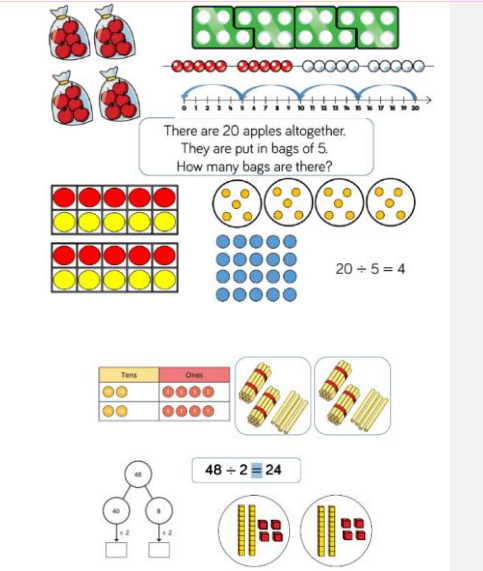
Subtraction



Multiplication

Division





YEAR 3 OUTCOMES

Addition

What do they need to be able to do?
Add three-digit numbers using a formal columnar method.
Add 1s, 10s and 100s mentally

How should they do it?
Use column addition to add numbers up to 1000.
Bar models, base 10, place value counters

Subtraction

What do they need to be able to do?
Subtract three-digit numbers using a formal columnar method.
Subtract 1s, 10s and 100s mentally

How should they do it?
Use column subtraction to subtract larger numbers, including decomposition as necessary.
Bar models, base 10, place value counters

Multiplication

What do they need to be able to do?
Multiply a 2 digit number by a 1 digit number
Know the 3, 4 and 8 x tables

How should they do it?
Expanded column method
Use of place value counters

Division

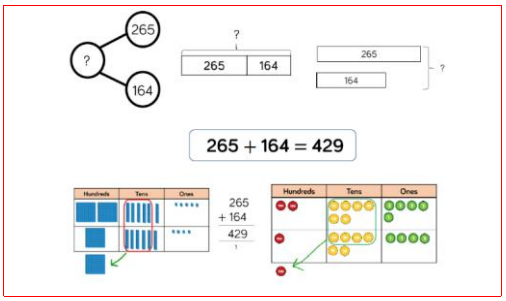
What do they need to be able to do?
Divide a 2 digit number by a 1 digit number.
Know division facts for the 3, 4 and 8 x tables.

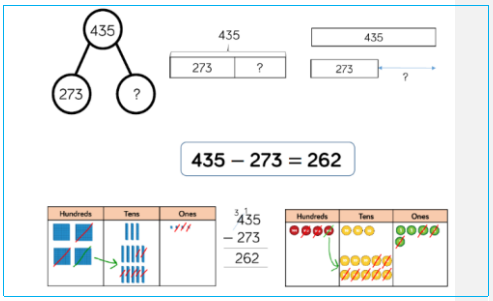
How should they do it?
Flexible partitioning in part-whole model
Use of base 10/ place value counters to exchange one ten for ten ones

YEAR 3 METHODS

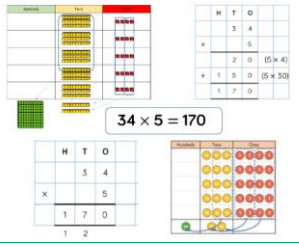
Addition

Subtraction





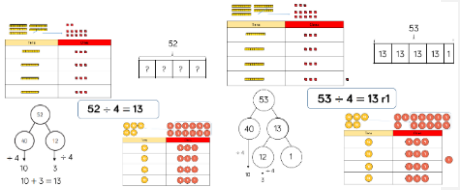
Multiplication



Division

Without remainders

With remainders



YEAR 4 OUTCOMES

Addition

What do they need to be able to do?
Add numbers up to 10,000.

How should they do it?
Use formal column addition to add larger numbers,
How should they do it?

Subtraction

What do they need to be able to do?
Subtract numbers up to 10,000

How should they do it?
Use column subtraction to subtract larger numbers, including decomposition if necessary

Multiplication

What do they need to be able to do?
Multiply a two or three digit number by a 1 digit number

How should they do it?
Formal short multiplication

Division

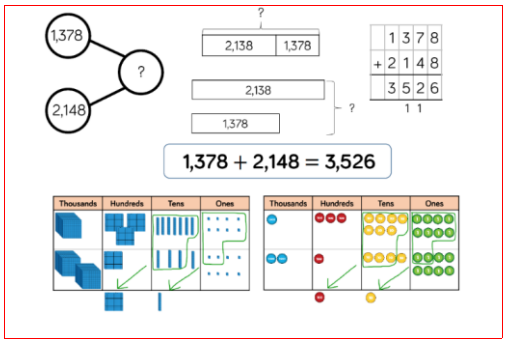
What do they need to be able to do?
Use mental methods to derive division facts (e. use 7 x 8 to solve 560 ÷ 7;
Begin to move towards a formal method of division, using concrete or pictorial methods.

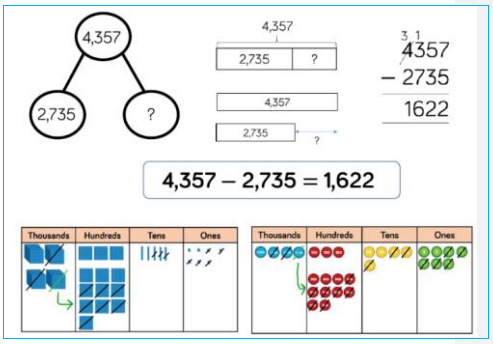
How should they do it?
Place value grids and flexible partitioning in the part-whole model. Begin formal written division method.

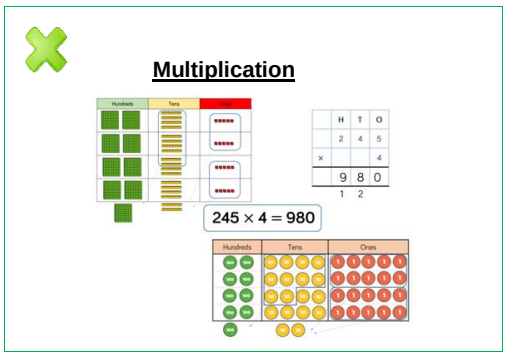
YEAR 4 METHODS

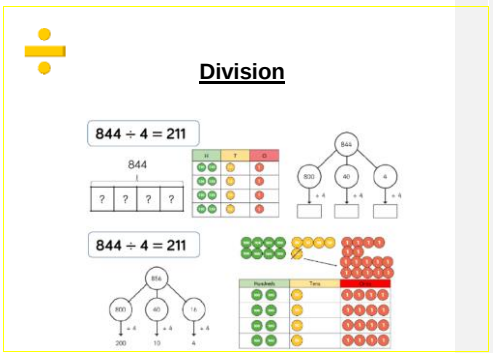
Addition

Subtraction









YEAR 5 OUTCOMES

Addition

What do they need to be able to do?
Add numbers with over 4 digits using a formal columnar method.

How should they do it?
Use column addition to add larger numbers, or numbers with decimals.

Subtraction

What do they need to be able to do?
Subtract numbers with over 4 digits using a formal columnar method.

How should they do it?
Use column subtraction to subtract larger numbers, or numbers with decimals, or
Select an appropriate mental method e.g. using number bonds to subtract from a power of ten.

Multiplication

What do they need to be able to do?
Multiply by a one or two digit number
Multiply by 10, 100 or 1000

How should they do it?
Short multiplication or long multiplication.
Mental method or place value grid to multiply by 10, 100 or 1000.

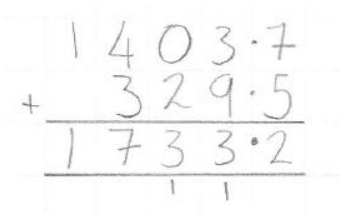
Division

What do they need to be able to do?
Divide a 3 or 4 digit number by a one digit number; Interpret remainders according to context, and represent appropriately (e.g as a fraction, decimal, round up or down etc;)

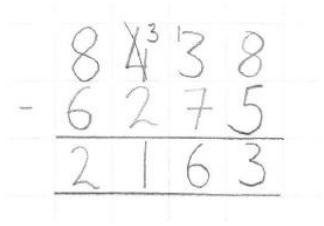
How should they do it?
Formal method of short division.
Represent the remainder as a fraction and/ or a decimal.

YEAR 5 METHODS

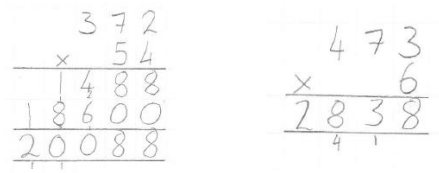
Addition



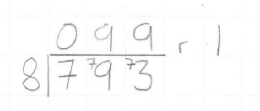
Subtraction



Multiplication



Division



or 99 $^{1}/_{8}$

YEAR 6 OUTCOMES

Addition

What do they need to be able to do?
Solve multi-step problems using an appropriate method.

How should they do it?
As Year 5 – using a formal columnar method.

Subtraction

What do they need to be able to do?
Solve multi-step problems using an appropriate method.

How should they do it?
As Year 5 – using a formal columnar method.

Multiplication

What do they need to be able to do?
Multiply a 4 digit number by a 2 digit number.

How should they do it?
Short multiplication or long multiplication.

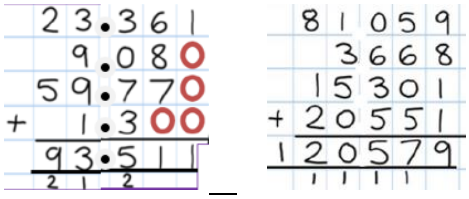
Division

What do they need to be able to do?
Divide a 3 or 4 digit number by a two digit number. Interpret remainders according to context, and represent appropriately (e.g. as a fraction, decimal, round up or down etc)

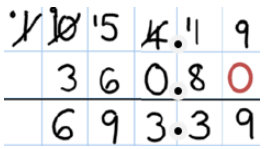
How should they do it?
Formal method of long division
Represent remainders as a fraction or a decimal.

YEAR 6 METHODS

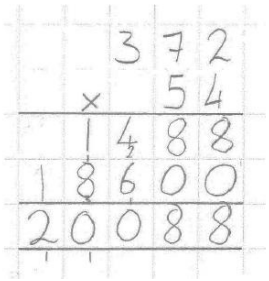
Addition



Subtraction



Multiplication



Division