



Cornerstone Multi Academy Trust

Teaching of Mathematics Policy

The Teaching of Mathematics
Elements of Mathematics
Teaching of Calculation

Policy for the Teaching of Mathematics

The purpose of this policy is to layout the methods that the Cornerstone Academy Trust will use to promote outstanding Mathematics teaching across the Trust. We recognise that while each of our four key strands (as outlined below) may be taught with some diversity, due to age and linked projects, each one is key to a learner's development into a well-rounded mathematician.

Breadth of study

Careful planning and preparation ensure that throughout the school children engage in:

- practical activities and tasks using a variety of resources
- problem solving to challenge thinking
- individual, paired, group and whole class learning and discussions
- purposeful practise where time is given to apply their learning
- open and closed tasks
- a range of methods of calculating e.g. pictorial strategies, the use of resources for concrete understanding, mental, pencil & paper, jotting, formal methods and using a calculator
- working with technology and devices as a mathematical tool

Through our project-based approach to teaching and learning we also seek to explore and utilise further opportunities to use and apply mathematics across all subject areas.

Teachers planning and organisation

The National Curriculum for Mathematics 2014, Development Matters and the Early Learning Goals (Number, Shape Space & Measure) provide the long-term planning for mathematics taught in the school.

Teachers work in year group teams across the trust to plan and deliver lesson sequences, based on the termly curriculum document and mapped out in the year group OneNote notebook. In this way they support and develop the year group team through shared planning, shared resourcing and an ongoing professional dialogue which is expected to accompany each weeks' delivery in class. The trust seeks to ensure a mastery approach to teaching and learning is delivered, to ensure children develop a deep, secure and relational understanding of mathematics, which has number at its heart. Teachers endeavour to provide plenty of time to build reasoning and problem-solving elements into the wider curriculum.

Timings

All classes have a daily mathematics lesson. Maths is also incorporated into other subject work, and specific practice times are also given either during morning/before-school work and after lunch and during independent time for:

- Fast Maths
- Fast Arithmetic
- Accelerated Maths
- Athletics
- Completion of mathematics challenges set by mentors/maths teachers

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Resources

Practical, tactile and visual resources are understood to be a core tool in developing children's mathematical understanding. As children's theoretical and conceptual understanding of mathematics (and the interrelated links) practical tools may become less necessary (and even slow down thinking) but will always be available should they be required. The use of resources in maths can support children in their abstract understanding, in which, children have concrete materials to visibly observe the mathematical changes/operations and make sense of what is happening. This is crucial in mastery as it supports the children's ability to make connections and eventually apply the concept in a range of different contexts.

Each class has a stock of core resources that are age appropriate. These include, but are not limited to:

- Number lines and number squares
- 1:1 item such as beads, cubed, tiddlywinks
- Numicon
- Deans Apparatus
- Fraction Walls
- 3D and 2D Shape Sets
- Coins and Money

These resources are available in all classes across the trust, differentiated per year group. In this way, shared planning is possible based on equivalent resource availability.

Online Resources

Class teachers have received CPD and appropriate training on various online maths resources, these include:

- Mathletics
- Discovery Education
- Accelerated Maths
- Purple Mash
- ClickView
- Whiteboard

EYFS

EYFS planning is devised and recorded in the same way, although the ELGs are the primary objective source.

Teachers of the EYFS in the Nursery ensure the children learn through a mixture of adult-led activities; planned and resourced as N1, N2 group activities and 'next step' activities with keyworkers. Child-initiated activities are facilitated through a learning environment that ensures engagement and challenge within the continuous provision provides a rich variety of opportunities, both indoors and outdoors, to develop and apply mathematical understanding. Our focus is on providing a range of hands-on learning experiences and sensitive adult interaction to ensure progress is made. The EYFS mathematics curriculum aims to develop mathematical knowledge and skills but also foster a positive attitude and interest in mathematics. There is an initial assessment of a child's mathematical knowledge and understanding within 6 weeks of starting nursery. Ongoing observations are recorded in Evidence me which tracks their development throughout their time in nursery.

In Reception children are taught maths through whole class sessions, this is then followed up with a balance of focused group work and independent activities as part of continuous provision. There are

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purposeful play opportunities carefully planned throughout the classroom and outside learning area focusing on number and shape, these give children an opportunity to explore and apply the knowledge and skills that they have been taught. We teach two focused maths lessons a week and teach a fast maths session three days a week which focuses on number recognition, counting and quick calculation. Our planning objectives are taken from the development matters statements of the EYFS document, and we work towards the children achieving the Early Learning Goals at the end of Reception. Our Assessment is carried out through continuous observations, pictures are taken and then recorded on evidence me which is used to track each child's progress and to plan their next steps.

The 2012 Curriculum framework provides guidance through the different Ages and Stages of development from Birth to 60 months. The two strands running through the mathematical development in the EYFS are 'Number' and 'Shape, Space and Measure'. The Development Matters statements provide check points for a child's development and as teachers we support the children to make the incremental steps to achieve these goals.

From September 2021 we will be following the EYFS 2020 Curriculum with guidance for Birth to 3 years, 3-4 years old and Reception children, aged 4-5 years old.

SEND / Able Pupils

Daily Mathematics lessons are inclusive of pupils with Special Educational Needs and disabilities. Where required, children's IEP's incorporate suitable objectives from the National Curriculum for Mathematics or Development Matters and teachers keep these in mind when planning work. These targets may be worked upon within the lesson as well as on a 1:1 basis outside the mathematics lesson. Maths focused intervention in school helps children with gaps in their learning and mathematical understanding. These are delivered by trained support staff and overseen by the SENCO and/or the class teacher.

Within the daily mathematics lesson teachers have a responsibility to not only provide differentiated activities to support children with SEND but also activities that provide sufficient challenge for children who are high achievers. It is the teachers' responsibility to ensure that all children are challenged at a level appropriate to their ability. Where relevant, the trust Pupil Premium policy also details how additional support or challenge may be delivered.

SEND / Able pupils virtual

Support for pupils with SEND will continue as mentioned above using Microsoft Teams. Where appropriate Teaching Assistants will be guided by class teacher and/or SENCO to specific children who they will call via Teams. They will provide support and guide the child through their work, offering additional practise and individualised work as they would in a classroom setting. Lessons will continue to be differentiated, separate lessons will be set up and children will be individually directed to the appropriate lesson matched to their ability, ensuring appropriate levels of challenge for the most able pupils.

Equal Opportunities

Positive attitudes towards mathematics are encouraged, so that all children, regardless of race, gender, ability or special needs, including those for whom English is an additional language, develop an enjoyment and confidence with mathematics. This policy is in line with the school's 'Racial Equality' policy. The aim is to ensure that everyone makes progress and gains positively from lessons and to plan inclusive lessons. Lessons involving lots of visual, aural and kinaesthetic elements will benefit all children including those for whom English is an additional language (EAL).

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Review: 2025

Differentiated questions are used in lessons to help children and planned support from Teaching Assistants and other adults. In all lessons, learning objectives and success criteria are clearly displayed and discussed. The emphasis in lessons is to make teaching interactive and lively, to engage all children encouraging them to talk about mathematics.

Lessons involve elements of:

- Instruction – giving information and structuring it well.
- Demonstrating – showing, describing and modelling mathematics using appropriate resources and visual displays.
- Explaining and illustrating – giving accurate and well-paced explanations.
- Questioning and discussing.
- Consolidating.
- Reflecting and evaluating responses – identifying mistakes and using them as positive teaching points.
- Summarising – reviewing mathematics that has been taught enabling children to focus on next steps

Pupils' Records of Work

All children will have a maths book in which the majority of their mathematics work will be collected and evidenced. Children are encouraged to use their own jottings to support their work throughout all year groups, in addition to mental strategies and utilising more formal written methods. Class whiteboard is used for students to work collaboratively in maths and allows children the opportunity to make jottings and notes which they perceive as not being marked. OneNote is used with the class notebook tool to allow pupils and teachers to snapshot work and evidence learning as is appropriate to the age of the learner.

Summative assessment results are recorded in a separate pupil records OneNote. This is only available to teachers and will collate information from the early years through the year 6, including twice a year PTM assessments results.

Marking

Marking of children's work is used to not only identify correct and incorrect answers, but also to signal the next step in their understanding. Work is marked against success criteria, in line with the trust marking policy, and includes next steps. Children are encouraged to self-assess their work and ideally given time to read teachers' comments and make corrections or improvements and to identify where they have made misconceptions and how to resolve them. Responses to marking are made as close to the work as possible, ideally at the start of the next lesson. Teachers may also provide challenge questions to extend the children's understanding and encourage them to apply the mathematical skill explored into a new context, this could be by providing an 'incorrect' sum for the children to correct, offering a word problem, or even encouraging the children to write their own questions, supporting the children to develop a relational understanding of the concept. Some pieces of work in mathematics may be marked by children themselves or their peers, exercises involving routine practice with support and guidance from the teacher – particularly in Years 5 & 6. Tools within OneNote and Office365 are also used as appropriate to snapshot evidence of learning or to match to children's individual targets.

Marking Virtually

Marking and feedback for children working virtually is achieved in a similar way as mentioned above. Work is marked against criteria in line with the trusts policy. Using assignments in MS Teams, teachers can create specific criteria and rubrics for a given assignment. Once they have had the assignment returned, teachers can provide children with tailored feedback and next steps which are immediately returned to the child to view.

Assessment and Recording

Assessment is an integral part of teaching and learning and is a continuous process. Teachers make assessments of children daily through:

- regular marking of work
- analysing errors and picking up on misconceptions
- asking questions and listening to answers
- facilitating and listening to discussions
- making observations

Assessment and Recording Virtually

Assessment whilst learning virtually needs to be carefully managed and planned for. Teachers can accommodate for this through:

- Marking of assignments in Teams
- Using MS Forms to assess understanding regularly
- Area specific Mathematics assigned activities (clearly displays gaps in children's knowledge)
- Tracking of Accelerated Maths participation and completion
- Reviewing the answers children provide in response to questions in interactive videos on ClickView
- Reviewing assignments set on Discovery Education
- Providing opportunities for work to be uploaded to evidence me (EYFS)

These ongoing assessments inform future planning and teaching. Lessons are adapted readily and evaluated considering these assessments.

In line with the Trust's assessment calendar, pupils complete GL PTM Maths tests twice a year to snapshot progress. This is reviewed both within year group progress meetings and subject lead meetings.

Role of the Maths Lead

- To lead in the development of maths throughout the school.
- To monitor the planning, teaching and learning of mathematics throughout the school.
- To help raise standards in maths.
- To provide teachers with support in the teaching of mathematics.
- To provide staff with CPD opportunities in relation to maths within the confines of the budget and the School Improvement Plan
- To monitor and maintain high quality resources.
- To keep up to date with new developments in the area of mathematics

Appendix 1 – Four Aspects of Mathematical Understanding

As a trust, we believe that outstanding mathematics teaching is composed from four key strands.

- 1. Children must be given adequate opportunity for skills and knowledge development** in order to become confident enough to recall and utilise mathematical processes and operations in the aforementioned four strands. *It should be recognised that this strand underpins effective mathematics teaching.*
- 2. Children will be taught through investigative, Pure Mathematics**, in which children use and apply mathematical principles to situations that require a problem-solving approach such as trial and error.
- 3. Children will be taught to problem solve.** *Example:* Searching for patterns to solve mathematical problems.
- 4. Children will be given opportunities to apply Mathematics across the curriculum**, for example: keeping accounts as part of the Global Enterprise Challenge (GEC), or surveying public opinion as part of the Global Communities Project (GCP).

Teachers within the trust also recognise that the four-strands underpinning our Math's curriculum can, and should, overlap as part of daily classroom teaching. We therefore seek to teach through a blended approach, rather than dealing with the strands in isolation.

Strand 1: Skills and Knowledge Development

Children must cement their understanding of calculation through repetition in order to become confident enough to recall and utilise mathematical processes and operations in the aforementioned four strands. It should be recognised that this strand underpins effective mathematics teaching.

Students will be provided with opportunities for repetitive practice in the following ways:

- *In the classroom*, students may be engaged in exercises related to their current math's topic. This will primarily utilise Accelerated Math's.
- *At home, or during independent work time*, students will follow a personalised programme of Accelerated Math's throughout the academic year.

Accelerated Math's

It is our aim, as a trust, that Accelerated Maths is used both at school, as part of daily activities, and at home. While the trust maintains its 'no homework' policy (with the exception of Year 6), we believe that a blended approach, with teachers and parents working together, will deliver the best outcomes for the children. Therefore, we are providing children from year two upwards with an additional book for their extended **Maths** that they use to jot and solve the AM problems when at home. While we would like them to bring it in regularly, this is simply to allow us to support children by checking their written workings when the AM software and the teacher identify trends in issues for a particular child.

Strand 2: Investigative Mathematics

The trust recognises that children must be taught through investigative, Pure Mathematics, in which children use and apply mathematical principles to situations that require a problem-solving approach such as trial and improvement.

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Review: 2025

- *In the classroom*, students may be engaged in investigations related to their current mathematics topic. This will allow students to utilise the skills and knowledge that they have acquired within an open-ended context when the path to an answer is not always clear.
- **Examples of investigative mathematics might include** exploring famous mathematicians' works, such as 'The Vitruvian Man' or the 'Fibonacci Sequence.' This may also include situations in which students must utilise a trial and improvement approach to refine their answers and fulfill certain success criteria.
- When investigating, students should be taught to show their workings in a clear and precise manner and to annotate them, in order to explain their thinking.

Strand 3: Problem Solving Mathematics

The trust recognises that children must be presented with opportunities to solve problems mathematically, using logical reasoning to bring about a set of success criteria. Problem solving and mathematical investigation are closely linked, and activities may not be discretely defined as one or the other.

- *In the classroom*, students may be taught to solve problems within a variety of contexts. As in the case of investigative mathematics, this will allow students to utilise the skills and knowledge that they have acquired to reason and proceed towards a specific outcome. This is reflected in other curriculum subject policies, such as Science, where cross-curricular links to Math's are highly desirable in the teaching process.
- The trust also recognises that the applied mathematics approach can only be successful when combined with and preceded by the necessary skills and knowledge acquisition.

Strand 4: Applied Mathematics as part of a project-based curriculum

Children will be given opportunities to use Mathematics as part of a Project-Based Curriculum, for example: keeping accounts as part of the Global Enterprise Challenge (GEC), or surveying public opinion as part of the Global Communities Project (GCP).

- Children will be taught to use Mathematics to investigate the world around them. Example: Using averages and graphical representations to analyse scientific data. Opportunities for cross curricular links to be drawn will be prioritised in the planning of mathematical projects.
- The trust recognises the importance of applied mathematics to the well-rounded development of its students. Applied mathematics allows learning to be purposeful, engaging and contextualised.
- The trust also recognises that the applied mathematics approach can only be successful when combined with and preceded by the necessary skills and knowledge acquisition.

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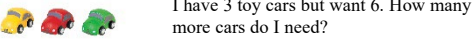
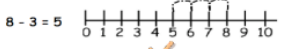
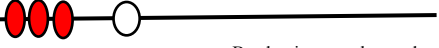
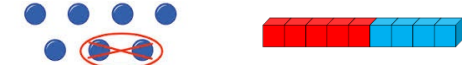
Appendix 2 Teaching and Learning of Calculation


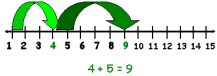

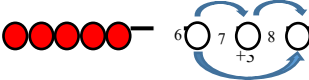
Introduction

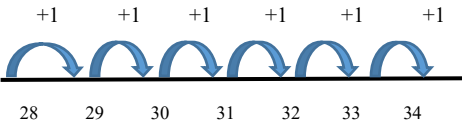
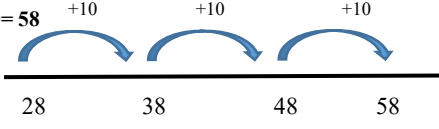
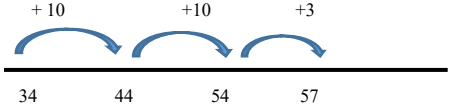
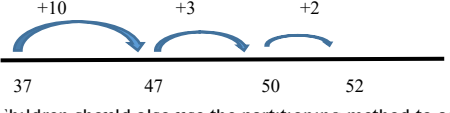
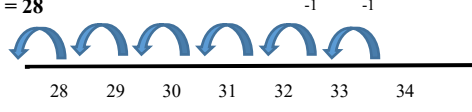
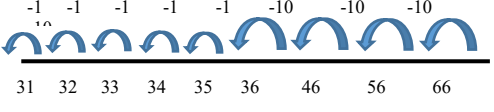
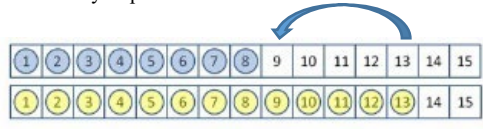
This calculation policy has been written in line with the programmes of study taken from the revised **National Curriculum for Maths (2014)**. It provides guidance on appropriate calculation methods and progression. The content is set out in yearly blocks under the following headings: addition, subtraction, multiplication and division.

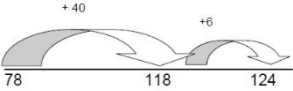
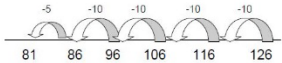
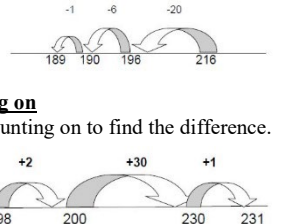
Aims of the Policy

- To ensure consistency and progression in our approach to calculation
- To ensure that children develop a consistent, reliable formal written method of calculation of all operations
- To ensure that children can use these methods accurately with confidence and understanding.

Updated: National Curriculum Review: Jan 2021 AL Jun 2022	National Curriculum	Guidance	Addition	Subtraction	Vocabulary
EYFS	<p>Children count reliably with numbers from 1 to 20, place them in order and say which number is more or less than a given number.</p> <p>Using quantities and objects they add and subtract two single-digit numbers and count on or back to find the answer</p>	<p>Children will use songs, rhymes, games, activities and practical situations to count and order numbers from 1-20 and find one more or one less.</p> <p>Children will begin to relate addition to combining two groups of objects first by counting all and then by counting on.</p> <p>Children will begin to relate subtraction to "taking away".</p>	<p>Teachers will model addition using a range of practical resources.</p>  <p>$5 + 1 = 6$</p> <p>When counting on the link with calculating must be made explicit: EG: 0 add 1 equals 1, 1 add 1 equals 2 etc.</p> <ul style="list-style-type: none"> - Children will also experience counting in tens, fives, and twos. - Make a record in pictures, words or symbols of addition activities already carried out. Children are encouraged to develop a mental picture of the number system in their heads. As well as practical objects, children should use number tracks then progressing onto number lines. - Construct number sentences to go with practical activities. Children will first count all to combine two groups of objects. Then they will move onto full number sentences. Children should understand the = symbol as 'the same as'. <p>STEP 1  "add"  "equals" 4</p> <p>STEP 2 2 "add"  "equals" 4</p> <p>STEP 3 $2 + 2 = 4$</p> <ul style="list-style-type: none"> - Solve simple word problems using their fingers - Begin to relate the addition of doubles to counting on as well as showing the inverse eg $6 - 3 = 3$. 	<p>Teachers will model addition using a range of practical resources.</p>  <p>$5 - 1 = 4$</p> <ul style="list-style-type: none"> - Relate subtraction to taking away and counting how many objects are left.  <ul style="list-style-type: none"> - Construct number sentences to go with practical activities  <p>$8 - 3 = 5$</p>  <p>$4 - 1 = 3$</p> <p>Bead strings can be used to illustrate subtraction</p> <ul style="list-style-type: none"> - 10 subtract 1 equals 9/1 less than 10/10 take away 1 equals 9 - Children will also experience counting in tens, fives and twos – Starting and finishing at different numbers is important. - Make a record in pictures, words or symbols of subtraction activities already carried out. Children are encouraged to develop ways of recording calculations with pictorial representations.  <p>$9 - 4 = 5$ 9 is 4 more than 5</p> <p>age of a</p> <p>context for learning. Eg comparing blocks for packed lunches/school dinners.</p>	<p>Add, more, make, sum, total Altogether Score Double One more...two more...ten more... How many more/less than...? Take away Leave How many are left/have gone? One less/two less/ten less How many fewer is...? Difference between Is the same as</p>

Year 1	<p>Pupils will be taught to:</p> <p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs</p> <p>Represent and use number bonds and subtraction facts to 20</p> <p>Add and subtract one and two digit numbers to 20 including 0</p> <p>Solve simple one step problems with addition and subtraction using concrete objects and pictorial representations and missing number problems</p>	<p>Pupils will memorise and reason with number bonds 10 and 20 in several forms. They should realise the effect of adding 0.</p> <p>Pupils will combine and increase numbers counting forwards and backwards</p> <p>Children will discuss and solve problems including using quantities. Problems will include: add, put together, altogether, difference between, take away, total, more than/less than.</p>	<p>ENSURE the children are confident with the previous year's methods before moving on.</p> <ul style="list-style-type: none"> - Children should be encouraged to show pictorial recordings of their working out with number sentences. - Bead strings should be used to show addition including bridging through 10. Numicon can also be used to model bridging through 10.  <ul style="list-style-type: none"> - Children may should use number tracks and number lines marked out in jumps of one. They may begin to use number lines marked out in jumps of five and ten to support calculation. - Use a number line to illustrate that addition can be done in any order and to recognise that more than two numbers can be added together. - Eg " Start at 0 and count on 4, then count on 5"  <ul style="list-style-type: none"> - Continue using a number line with increasing difficulty. Eg " Put your finger on 8 and count on 7" 	<p>ENSURE the children are confident with the previous year's methods before moving on.</p> <ul style="list-style-type: none"> - Children should engage in practical activities for "taking away" that is finding how many are left from a collection of objects when some are removed. Eg " Take two apples away, how many are left?" $6 - 2 = 4$  <ul style="list-style-type: none"> - Children should use number tracks to count back for subtraction. Eg "Put your finger on 5 and count back 4" - Progress onto marked number line. Include going through ten. - Children also need practical activities of 'finding the difference' involving making a comparison between the numbers in two groups of objects. A number bar can be used to help illustrate that 8-5 means the difference between 8 and 5 or the difference between 5 and 8.  <ul style="list-style-type: none"> - Bead strings can be used to show subtraction including bridging through 10. - Children can count up from the smallest number to the largest number to find the difference using resources such as beads cubes and number lines. - Begin to use and show how to subtract 9 by adding or subtracting 10 and adjusting 1. Children work on visualising $10=9+1$ $9=10-1$ 	<p>+, add, more, plus, make, sum, total, altogether Double, near double, two more, ten more How many more to make How many more is... than...? Subtract, take away, leave, minus, one less, two less, ten less How many fewer is...than...? How much less is? Difference between = the same as Half, halve</p>
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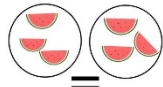
Year 2	<p>Pupils will be taught to:</p> <p>Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods</p> <p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>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</p> <p>Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.</p> <p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</p>	<p>Pupils will extend their understanding of the language of addition and subtraction to include difference and sum.</p> <p>Pupils will practice addition and subtraction to 20 to become increasingly fluent in deriving number facts. Eg $3+7 = 10$ $10 - 3 = 7$</p> <p>They will check their calculations using the inverse.</p> <p>Recording addition and subtraction in columns supports place value and efficient written methods.</p>	<ul style="list-style-type: none"> - Children should use number lines marked out in jumps of one and ten and learn which would be the most appropriate for a given calculation. - Children will use empty number lines counting on in ones within 100. Continue to use visual images to support this. Encourage children to use the language of ridging and partitioning when explaining their strategies. <p>Counting on</p> <ul style="list-style-type: none"> - Counting on in ones and tens (Jumping for tens) <p>$28+6 = 34$</p>  <ul style="list-style-type: none"> - Counting on in tens <p>$28+30 = 58$</p>  <ul style="list-style-type: none"> - Then helping the children become more efficient by adding tens in one jump.  <ul style="list-style-type: none"> - If the children are confident, they can use more efficient jumps. - $37 + 15 = 52$  <ul style="list-style-type: none"> - Children should also use the partitioning method to add two digit numbers. $43 + 25 = 68$ $40 + 3 + 20 + 5 = 68$ - Then move onto calculations that bridge tens. <p style="text-align: right;">Count $\frac{24}{91} = \frac{20}{80} + \frac{4}{11}$</p> <p>Compensation</p> <ul style="list-style-type: none"> - Children should be taught to that when adding 9, it is easier to add 10 and subtract 1. 	<ul style="list-style-type: none"> - Children should use strings and number lines to support calculations. - They should use empty number lines so they record their own marking. <p>Counting back</p> <ul style="list-style-type: none"> - Counting back on an empty number lines within 100, in ones and tens. <p>$34-6 = 28$</p>  <ul style="list-style-type: none"> - Use partitioning on an empty number line and help the children to become more efficient by subtracting the units in one jump by using know number facts. Questions which require the children to bridge through ten can help them to become more efficient. <p>$76-45 = 31$</p>  <ul style="list-style-type: none"> - Continue this by subtracting the tens in one jump and the units in one jump. Eg: $42-25 = 17$ $42 - 20 - 2 - 3 = 17$ <p>Counting on</p> <ul style="list-style-type: none"> - It is important children experience and begin to understand the difference between two numbers by counting on. The use of models is extremely important.  <p>The difference between 8 and 13 is 5.</p> <ul style="list-style-type: none"> - C The difference between 8 and 13 is 5. age of $13 - 5 = 8$ $8 \square = 13$ - Further develop subtraction with numbers which bridge 100. <p>Compensation</p> <ul style="list-style-type: none"> - When subtracting 9, it is easier to subtract 10 then add 1. 	<p>+, add, more, plus, make, sum, total, altogether, plus, sum</p> <p>Double, near double, two more, ten more, hundred more</p> <p>How many more to make How many more is... than...? Subtract, take away, leave, minus, one less, two less, ten less, one hundred less</p> <p>How many fewer is...than...? How much less is? Difference between = the same as Half, halve</p> <p>Tens boundary</p>
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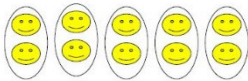


<p>Year 3</p>	<p>Pupils will be taught to:</p> <p>Add and subtract mentally a 'near multiple of 10' to or from a 2 digit number</p> <p>Add and subtract numbers mentally, including:</p> <ul style="list-style-type: none"> - A three-digit number and ones - A three-digit number and tens - A three-digit number and hundreds <p>Add and subtract numbers with up to three digits, using formal written methods of column addition and subtraction</p> <p>Know by heart all addition and subtraction facts to 20</p> <p>Estimate the answer to a calculation and use inverse operations to check answers</p> <p>Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</p> <p>Add and subtract fractions with the same denominator within one whole</p>	<p>Pupils should practice solving varied addition and subtraction questions</p> <p>For mental calculations two digit numbers should exceed 100</p> <p>Pupils will understand place value and partitioning.</p> <p>Children should encounter problems with money of the same unit including giving change.</p>	<p>- Children will further develop the use of the empty number line with increasingly larger numbers which bridge 100.</p> <p>Counting on</p> <p>- Count on from the largest number bridging tens and 100s. A 100 or 200 square can be used for support.</p> <p style="text-align: center;">$78 + 46 = 124$</p>  <p>- Further develop this with 3 digit and 2 digit numbers</p> <p>- Partition numbers with calculations which bridge 100.</p> <p>Eg: $85 + 37 = 80 + 5 + 30 + 7$</p> $\begin{array}{r} 80 + 30 = 110 \\ 5 + 7 = 12 \\ 110 + 12 = 122 \end{array}$ <p>- Introduce expanded written method presented in columns. This will lead to the formal written method. Use the language of place value to ensure understanding.</p> <p>Eg: $63 + 32 = 95$</p> $\begin{array}{r} 60 + 3 \\ 30 + 2 \\ \hline 90 + 5 = 95 \\ \quad \quad 5 \quad (3+2) \\ \quad \quad \underline{90} \quad (60 + 30) \\ \quad \quad \quad 95 \end{array}$ <p>- Then introduce calculations where it is necessary to bridge 10 returning to the expanded method initially if necessary.</p> <p>Eg $68 + 24 = 92$</p> $\begin{array}{r} 60 + 8 \\ \quad \quad 20 + 4 \\ \hline 80 + 12 = 92 \end{array}$ <p>- If children are ready introduce the formal written method where it is necessary to 'carry' ten from the units to the tens column. Use the language of place value to ensure understanding. The digit that has been 'carried' needs to be recorded under the tens column. When children are confident extend to include digits which bridge across the tens and hundreds.</p> <p>Eg: $68 + 24 = 92$</p> $\begin{array}{r} 68 + \\ \underline{24} \\ 92 \end{array}$ <p>Compensation</p> <p>- For near multiples of ten eg $49p + 73p = 122p$</p>	<p>- Children will further develop the use of empty number lines with increasingly larger numbers which bridge 100.</p> <p>Counting back</p> <p>- Subtracting the tens and ones in one jump. (Focus on Efficiency – Bridging through tens can help).</p> <p>- Move onto more efficient jumps e.g. $-40, -5$</p> <p style="text-align: center;">$126 - 45 = 81$</p>  <p>- Extend with larger numbers by counting back.</p>  <p>Counting on</p> <p>- Counting on to find the difference.</p> <p style="text-align: center;">$231 - 198 = 33$</p> <p>Compensation</p> <p>- For near multiples of 10 e.g. $63 - 8 = 55$</p> <p>Expanded Written method</p> <p>- Presented both horizontally and vertically in columns.</p> <p>Eg $78 - 23 = 55$</p> $\begin{array}{r} 70 + 8 \\ \quad \quad - 20 + 3 \\ \hline 50 + 5 = 55 \end{array}$ <p>Replace the + symbol with 'and'</p> <p>- This will lead to the formal written method.</p> <p>Eg $78 - 23 = 55$</p> $\begin{array}{r} 78 \\ \quad \quad - 23 \\ \hline 55 \end{array}$ <p>Use the language of place value.</p> <p>- Introduce the expanded written method where exchange is required. Children will need to practice partitioning numbers in this way.</p> <p>Eg $73 - 27 = 46$</p> $\begin{array}{r} 70 + 3 \\ \quad \quad - 20 + 7 \\ \hline 40 + 6 = 46 \end{array}$ <p>- When children are confident with the above method introduce the formal written method with exchange.</p> <p>Eg $73 - 27 = 46$</p> $\begin{array}{r} 73 \\ \quad \quad - 27 \\ \hline 46 \end{array}$ <p>If children are confident move onto numbers over 100</p>	<p>+ add, addition More, plus. Sum, total, altogether, double, near double, more more...two more...ten more...one hundred more</p> <p>How many more to make</p> <p>How many more is... than...?</p> <p>- Subtract, subtraction, take away, minus, leave, how many left over</p> <p>One less... two less...ten less...one hundred less</p> <p>How much less is...?</p> <p>Difference between?</p> <p>Half, equals Tens boundary Hundreds boundary</p>
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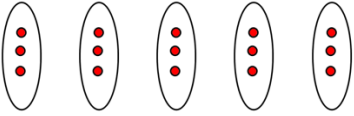



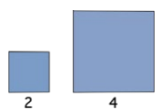
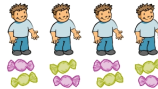

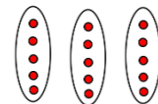
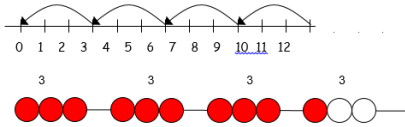
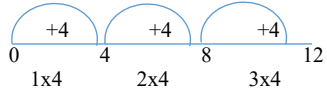
<p>Year 4</p>	<p>Pupils will be taught to:</p> <p>Add and subtract numbers with up to 4 digits using the formal written methods of column addition and subtraction where appropriate</p> <p>Estimate and use inverse operations to check answers to a calculation</p> <p>Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</p> <p>Solve simple measure and money problems involving fractions and decimals to 2 decimal places.</p>	<p>Pupils should continue to practice mental and columnar addition and subtraction with increasingly large numbers.</p>	<ul style="list-style-type: none"> - Continue to teach empty number lines where appropriate. - Further develop the formal written method of addition with 3 and 4 digit numbers as appropriate - Revisit the expanded method first if necessary. $176 + 147 = 323$ $\begin{array}{r} 176 \\ + 147 \\ + 13 \quad (7+6) \\ + 110 \quad (70+40) \\ + 200 \quad (100+100) \\ \hline 323 \end{array}$ <p>- This will lead to the formal written method. Use the language of place value to ensure understanding. Eg 7 + 6 = 13. The digits that are being 'carried' should be recorded under the line in the correct column.</p> $176 + 147 = 323$ $\begin{array}{r} 147 \\ + 176 \\ \hline 323 \end{array}$ <ul style="list-style-type: none"> - If children are confident move onto 4 digit number + 3 digit number. Continue to develop with 2 four digit numbers and with decimals in the context of money and measures. <p>Compensation</p> <ul style="list-style-type: none"> - Continue to teach the concept of compensation where children round and adjust to the nearest 10 and 100 especially in the context of money. Eg £4.99 + £6.99 = £5.00 - 1p + £7.00 - 1p = £12.00 - 2p - £11.98 	<ul style="list-style-type: none"> - Continue to teach empty number lines where appropriate. - Further develop the formal written method of subtraction with 3 and 4 digit numbers as appropriate. Revisit the expanded method first. - Continue to use base 10 materials to support understanding. $258 - 73 = 185$ $\begin{array}{r} 200 + 50 + 8 \\ - 70 + 3 \\ \hline \end{array} \quad \text{becomes} \quad \begin{array}{r} 100 + 150 + 8 \\ - 70 + 3 \\ \hline 100 + 80 + 5 = 185 \end{array}$ <p>- You might want to replace the + sign with 'and'.</p> <p>This leads to the formal written method involving exchanging.</p> $\begin{array}{r} 115 \\ 258 \\ - 73 \\ \hline 175 \end{array}$ <p>Use the language of place value to ensure understanding</p> <ul style="list-style-type: none"> - Further develop by subtracting three digit number and three digit number, initially partitioning leading onto the written formal method. - When children are confident develop with four digit numbers and decimal numbers (in the context of money and measures). $\begin{array}{r} 115 \\ 3625 \\ - 1219 \\ \hline 2406 \end{array}$ <p>Counting back and compensation</p> <ul style="list-style-type: none"> - When appropriate (using number lines) bridging through 10, 100, 1000 and rounding and adjusting (compensating) e.g. 42p - 5p or 193 litres - 18 litres. 	<p>+ add, addition More, plus. Sum, total, altogether, double, near double, more more.. two more...ten more...one hundred more</p> <p>How many more to make</p> <p>How many more is... than...?</p> <p>- Subtract, subtraction, take away, minus, leave, how many left over</p> <p>One less... two less...ten less...one hundred less</p> <p>How much less is...?</p> <p>Difference between?</p> <p>Half, equals Tens boundary Hundreds boundary</p>
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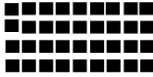
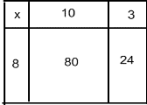
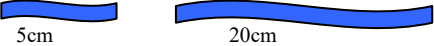
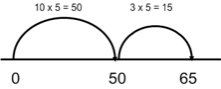
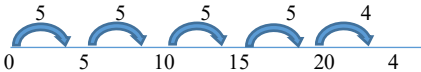


Year 5	<p>Pupils will be taught to:</p> <p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)</p> <p>Calculate mentally a difference such as 8006 - 2993</p> <p>Add and subtract numbers mentally with increasingly large numbers</p> <p>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p> <p>Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{2}{5}$ $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.</p>	<p>Pupils should continue to practice mental and columnar addition and subtraction with increasingly large numbers.</p> <p>They should practise mental calculations with increasingly large numbers to aid fluency.</p>	<p>- Continue to develop the formal written method of addition with larger number (including decimals) with the addition of three or more numbers.</p> <p>Compact Method</p> $\begin{array}{r} 21848 \\ + 1523 \\ \hline 23371 \end{array}$ $\begin{array}{r} 154.75 \\ + 233.82 \\ \hline 388.57 \end{array}$ <p>Compensation</p> <p>- Continue to teach the concept of compensation where children round and adjust to the nearest 10 and 100 especially in the context of money. Eg £4.95 + £6.80 + £9.14 £5.00 - 5p + £7.00 - 20p + £9.00 + 14p £5.00 + £7.00 + £9.00 = £21.00 +14 - 25p = -11 £21.00 - 11p = £20.89</p>	<p>- Continue to develop the formal written method of subtraction with larger number (including decimals) with the addition of three or more numbers.</p> <p>Compact Method</p> $\begin{array}{r} 500 + 0 + 3 \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array}$ <p>400 + 90 + 13 - 200 + 70 + 8 200 + 20 + 5</p> <p>Return to the expanded method using base 10 if necessary.</p> <p>- When children are confident move onto formal written method.</p> $\begin{array}{r} 4913 \\ 503 \\ - 278 \\ \hline 225 \end{array}$ $\begin{array}{r} 61211 \\ 12734 \\ - 1367 \\ \hline 11364 \end{array}$ <p>- Introduce the subtraction of decimals in the context of money and measures.</p> $\begin{array}{r} 16512 \\ 46625 \\ - 8372 \\ \hline 8253 \end{array}$	<p>+ add, addition More, plus. Sum, total, altogether, double, near double, more more... two more...ten more...one hundred more</p> <p>How many more to make</p> <p>How many more is... than...?</p> <p>- Subtract, subtraction, take away, minus, leave, how many left over</p> <p>One less... two less...ten less...one hundred less</p> <p>How much less is...?</p> <p>Difference between?</p> <p>Half, equals Tens boundary Hundreds boundary</p>
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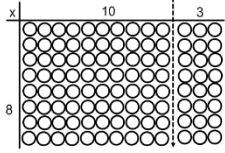


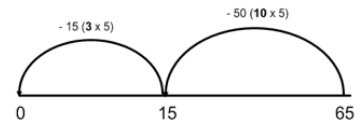
Year 6	<p>Pupils will be taught to:</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p> <p>Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</p> <p>Perform mental calculations, including with mixed operations and large numbers</p> <p>Check solutions by applying inverse operations or estimating using approximations</p> <p>Be able to solve a range of problems in different contexts including fractions, decimals, ratio and percentages.</p>	<p>They should undertake mental calculations with increasingly large numbers and more complex calculations.</p> <p>Pupils should round answers to a specified degree of accuracy.</p> <p>Pupils explore the order of operations using brackets.</p>	<ul style="list-style-type: none"> - Children should continue to use the formal written method for calculations with larger number and decimals. - Children should; <ul style="list-style-type: none"> - add several numbers with different numbers of digits - Begin to add two or more decimal fractions with up to four digits and either one or two decimal places. - Know that decimal points need to line up under each other, particularly when adding and subtracting mixed amounts. Eg. $401.2 + 0.067 + 34.67$ 	<ul style="list-style-type: none"> - Children should continue to use the formal written method for calculations with larger number and decimals. - Children should; <ul style="list-style-type: none"> - be able to subtract with different numbers of digits. - Begin to subtract two or more decimal fractions with up to three digits and either one or two decimal places. - Know that the decimal points should line up. 	<p>+ add, addition More, plus. Sum, total, altogether, double, near double, more more...two more...ten more...one hundred more</p> <p>How many more to make</p> <p>How many more is... than...?</p> <p>- Subtract, subtraction, take away, minus, leave, how many left over</p> <p>One less... two less...ten less...one hundred less</p> <p>How much less is...?</p> <p>Difference between?</p> <p>Half, equals Tens boundary Hundreds boundary</p>
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	National Curriculum	Guidance	Multiplication	Division	Vocabulary
EYFS	<p>Children count reliably with numbers from 1 to 20 place them in order and say which number is more or less than another given number.</p> <p>Use quantities and objects, they add and subtract two single digit numbers and count on or back to find the answer.</p> <p>The solve problems with doubling, halving and sharing.</p>	<p>Within play or other practical situations.</p> <p>Use everyday play objects. The child uses a range of strategies to add and subtract quantities.</p> <p>In a range of play and practical contexts the child explores and solves problems involving doubling, halving and sharing.</p>	<ul style="list-style-type: none"> - Children will experience equal groups of objects. - They will count in 2s and 10s and begin to count in 5s. This should be provided through songs, rhyme and practical and visual stimuli. Eg Counting pairs of socks in 2s.  <ul style="list-style-type: none"> - They will work on practical problem solving activities involving equal sets or groups. - Eg 4 hands of 5 fingers is the same as 20 fingers. - Children should also be using doubling to compliment halving. Eg “Double the amount of coins I have”. 	<ul style="list-style-type: none"> - Children will understand equal groups and share items out in play. They will count in 2s and 10s and later in 5s.  <ul style="list-style-type: none"> - Children should experience halving in context. Eg Halving apples and sandwiches. - Children should have opportunities to practice finding half of number in practical situations. - Children should have practice of exploring division by sharing objects out equally. Eg “ one for you...one for me.” 	<p>Equal sets Group Double Halve Share Left over</p>
Year	Solve simple one step problems involving multiplication and division, calculating the answer	Through grouping and sharing small quantities,	<ul style="list-style-type: none"> - Children will experience equal groups of objects. - They will count in 2's 10s and 5s in practical contexts. They will use vocabulary associated with multiplication. 	<ul style="list-style-type: none"> - Children will understand equal groups and share out items in play and problem solving. 	<p>Equal sets Group Double Halve</p>

	<p>using concrete objects, pictorial representations and arrays with the support of the teacher.</p>	<p>pupils should begin to understand multiplication and division, doubling numbers and quantities and finding simple fractions of objects and quantities.</p> <p>They should make connections between arrays, number patterns and counting in 2s, 5s and 10s.</p>	<p> Eg Six pairs of socks, how many altogether? – 2,4,6,8,10,12</p> <p> Eg Three pots of ten crayons, how many altogether? 10, 20, 30</p> <p>- Children should experience doubling in a range of contexts.</p> <p> Eg $5 + 5 = 10$, $2 + 2 = 4$</p> <p>- They should begin to understand multiplication as repeated addition as an array in context. They should begin to use symbols and language. Eg $5 \times 2 = 10$, 5 multiplied by 2, 5 times 2 and $5 + 5$. Also 10 divided by $5 = 2$</p> <p></p>	<p> Eg Share these 8 apples between 2 people. How many apples will each child have?</p> <p>- Children will move from sharing to grouping.</p> <p> Eg Put 20 crayons into pots of 10, how many pots do we need?</p> <p>- Children should experience halving in a range of practical contexts eg Sandwiches and apples.</p> <p> $5 + 5 = 10$ Double 5 is 10 $10 - 5 = 5$ Half of 10 is 5</p> <p>- Children will use arrays to support early division.</p> <p> How many faces altogether? How many groups of 2?</p> <p> 5 Groups of 2, 10 divided into 2 is 5</p> <p>- Make arrays to find division facts for $\frac{1}{2}$ and $\frac{1}{4}$</p> <p></p> <p>- Model recording</p>	<p>Share Left over</p>
<p>Year 2</p>	<p>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</p>	<p>Pupils should use a variety of language to describe multiplication and division. They are taught through equal grouping and sharing out quantities. Relate multiplication tables to arrays and repeated addition and finding</p>	<p>- Children will develop their understanding of multiplication and use jottings to support calculation:</p> <p> How many 3's in 15?</p> <p>Repeated Addition</p>	<p>- Children will develop their understanding of division and use jottings to support calculation. They should make the link between counting in equal steps and grouping.</p> <p>Sharing</p>	<p>Lots of, groups of, times, multiply, multiplied by, multiple of, once, twice, three times, 10 times, twice as</p>

	<p>Understand and solve problems using multiplication as repeated addition or as describing an array including mental methods and problems in context</p> <p>Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs</p> <p>Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p> <p>Write fractions eg $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{1}{2} = \frac{2}{4}$</p>	<p>more complex fractions of objects and quantities.</p> <p>Introduce children to multiplication tables. Children should be fluent in 2, 5 and 10 and make connections between them.</p> <p>Links should be made between place value and 10 and the clock face and 5.</p> <p>Children should begin to use other multiplication tables, recall multiplication facts and related division facts. Children should relate multiplication and division to grouping and sharing linking these to fractions and measures using the inverse to develop reasoning.</p> <p>Pupils should work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities relating these to fractions and measures. They use inverse calculations to develop reasoning.</p>	<p>5 times 3/ 5 x 3/ five three times/ Three groups of five/ 5+5+5=15</p>  <p>5 Groups of three coins How many coins altogether? $3+3+3+3+3=15$ 5 groups of 3 $3 \times 5 = 15$ $3 \times 5 = 15$ $5 \times 3 = 15$</p> <p>And on a number line</p>  <p>Arrays Use arrays to support multiplication</p>  <p>3×5</p>  <p>5×3</p> <p>Scaling Exploring contexts such as this is half as big as/twice as long as/ 3 times as tall as.</p> 	 <p>'8 sweets shared between 4 people, how many do they get each?'</p> <p>Relate fractions to the sharing aspect of division through arrays and model the recording. Eg $8 \div 2 =$ half of 8.</p> <p>Grouping or repeated subtraction</p> <p>There are 6 sweets, how many people can have 6 sweets each?</p>  <p>'How many groups of 5?' '15 shared equally between 3 people is...?' '15 divided by 3 equals 5' $15 \div 3 = 5$ '15 divided by 5 equals 3' $15 \div 5 = 3$</p>  <p>Repeated subtraction using a number line or bead bar</p> <p>$12 \div 3 = 4 - 12 - 3 - 3 - 3 - 3$</p>  <p>Children should be encouraged to use their known multiplication facts to work out the corresponding division.</p> <p>Using symbols to stand in for unknown numbers to complete equations using the inverse operation.</p> <p>$\square + 2 = 4$ $20 \div \triangle = 4$ $\square \div \triangle = 4$</p> <p>Scaling</p> <p>Pete ran 8k on Saturday. On Sunday he ran half as far. How far did he run on Sunday?</p>	<p>big...long...tal 1</p> <p>Repeated addition Array Row, column, double, halve, Share, Share equally, One each... two each... three each.</p> <p>Group in pairs, threes, tens</p> <p>Equal groups of, Divide, Divided by, divided into, left, left over.</p>
Year 3	<p>Recall and use multiplication facts for 3, 4, 8 times table.</p> <p>Write and calculate mathematical statements for multiplication and</p>	<p>Children should continue to practice their mental recall of multiplication tables when calculating statements in order to improve fluency. Through doubling, they connect the 2,4 and 8 times table</p>	<p>- Children will continue to use repeated addition Use number lines or bead to support. Eg $4 \times 3 = 12$ $12 = 4$ three times 3 lots of $4 = 12$ $4 + 4 + 4 = 12$</p> 	<ul style="list-style-type: none"> - Ensure that in Y3 the emphasis is on grouping rather than sharing, except when using fractions. - Children continue to use number lines and known number facts to solve division following on from repeated addition. - Use number lines and multiplication facts to solve division problems including remainders. 	<p>Lots of, times, multiply, multiplication, multiple of, multiple, product of, once...twice...</p>

	<p>division using known multiplication tables including for 2 digit numbers by 1 digit numbers using mental methods and progressing to efficient written methods.</p> <p>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.</p>	<p>Pupils should develop efficient mental methods. Eg. $4 \times 12 \times 6 = 4 \times 6 \times 12 = 20 \times 12$ and multiplication and division facts eg. $3 \times 5 = 15$ $15 \div 3 = 5$ $15 \div 5 = 3$ to derive corresponding facts eg. $30 \times 5 = 150$ or $150 \div 3 = 50$</p> <p>Children will develop reliable written methods for multiplication and division starting with calculations of two-digit numbers by one digit numbers and progressing to the efficient written method for multiplication and division.</p> <p>Children should solve simple problems in context, deciding which operation to use and why including measuring and scaling contexts.</p>	<p>Arrays and Grid method Children should be able to model a multiplication using an array. This will help them with the grid method.</p>  <p>$4 \times 9 = 36$ $36 \div 4 = 9$</p>  <p>$9 \times 4 = 36$ $36 \div 9 = 4$ $80 + 24 = 104$ Moving towards 2 digit x 1 digit using place value. $90 \times 4 = 40 \times 9 = 360$ $360 \div 9 = 40 = 360 \div 4 = 90$</p> <p>Formal Method</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Step 1</th> <th style="text-align: left; border-bottom: 1px solid black;">Step 2</th> <th style="text-align: left; border-bottom: 1px solid black;">Step 3</th> </tr> </thead> <tbody> <tr> <td>$13 \times 8 = 104$</td> <td>13</td> <td>$13 \times$</td> </tr> <tr> <td>$10 + 3$</td> <td>$\times 8$</td> <td>$\underline{8}$</td> </tr> <tr> <td>$X \quad 8$</td> <td>$24 (3 \times 8)$</td> <td>104</td> </tr> <tr> <td>$\underline{24 (3 \times 8)}$</td> <td>$+ 80 (10 \times 8)$</td> <td></td> </tr> <tr> <td>$+ 80 (10 \times 8)$</td> <td>104</td> <td></td> </tr> <tr> <td>104</td> <td></td> <td></td> </tr> </tbody> </table> <p>Using symbols to stand for unknown numbers to complete equations using inverse operations $\square \times 5 = 20$ $3 \times \square = 18$ $\square \times \square = 32$</p> <p>Scaling Find a ribbon that is 4 times as long as the blue ribbon</p>  <p>5cm 20cm</p> <p>Partitioning using place value $37 \times 5 = (30 \times 5) + (7 \times 5)$ $= 150 + 35$ $13 \times 5 = 65$ (Partition 13 into 10 + 3) $10 \times 5 = 50$ $3 \times 5 = 15$</p> 	Step 1	Step 2	Step 3	$13 \times 8 = 104$	13	$13 \times$	$10 + 3$	$\times 8$	$\underline{8}$	$X \quad 8$	$24 (3 \times 8)$	104	$\underline{24 (3 \times 8)}$	$+ 80 (10 \times 8)$		$+ 80 (10 \times 8)$	104		104			<p>- Move into Chunking (Grouping) using these steps. Encourage children to be as efficient as possible.</p> <p>Grouping or sharing Use empty number lines to count forwards and jump back to make the link between repeated subtraction. $24 \div 5 = 4 \text{ r } 4$</p>  <p>Move towards more efficient methods. 2×5 2×5 4</p>  <p>Formal Written methods –The bus stop method</p> <p>Introduce the formal layout using multiplication/division facts that children know. This can be recorded as;</p> <p>$24 \div 3 = 8$</p>  <p>‘Twenty four divided by three equals eight.’ ‘How many threes are there in twenty four?’</p> <p>Using symbols to stand for unknown numbers to complete equations using inverse operations (2 digit ÷ 1 digit) $\square \div 2 = 20$ $26 \div \square = 13$ $\square \div \square = 45$</p> <p>Find unit fractions of numbers and quantities</p> <p>Start to relate fractions to division in context. Eg. A cake recipe for 8 people uses 500g of flour. How much flour would I need to make a cake for 4 people? What is $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{6}$ of 12 litres?</p>	<p>three times...ten times. Times as big/wide/long etc. Repeated addition, array, row, column, Double halve, share, share equally, one each, two each, three each. Group in pairs, threes, tens. Equal groups of. Divide, division, Divided by/into Left, left over, remainder, remaining.</p>
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Year 4	<p>Pupils should be taught to:</p> <p>Recall multiplication facts for times tables up to 12 x 12.</p> <p>Use place value, known and derived facts to</p>	<p>Pupils should continue to practise multiplication facts and related division to aid fluency.</p>	<p>- 2 and 3 digit x 1 digit. Include 0 and 1 - Children will still use arrays, where necessary, leading into the grid method of multiplication. (As above)</p> <p>Grid Method Children need to be encouraged to approximate first and use their known number facts.</p>	<p>- 2 and 3 digit numbers divided by 1 digit numbers. Include $\div 0$ and 1.</p> <p>Number lines and know multiplication facts to solve division Children will continue to develop their use of number lines and multiplication facts to solve division problems. Initially these should be multiples of 10, 5, 2 and 1 – Numbers with which the children are more familiar.</p>	<p>Lots of, times, groups of, multiply, multiplication, multiple of, product, once, twice, three times...etc</p>																					

	<p>multiply and divide mentally, including multiplying by 0 and 1, dividing by 1 and multiplying by three numbers.</p> <p>Recognise and use factor pairs and commutatively in mental calculations.</p> <p>Multiply 2 digit and 3 digit by 1 digit numbers using the formal written layout.</p> <p>Solve problems involving multiplying and adding, integer scaling and harder problems such as n objects are connects to m objects.</p> <p>Solve simple measure and money problems involving fractions and decimals to two decimal places.</p>	<p>Pupils should practise mental methods and should extend to 3 digit numbers to derive facts such as $200 \times 3 = 600$, $600 \div 3 = 200$.</p> <p>Pupils should practice to become fluent in the efficient method of short multiplication using multi digit numbers, and short division when dividing by 1 digit numbers.</p> <p>Pupils should solve 2 step problems in context choosing the appropriate operation and using increasingly harder numbers.</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">3</td> </tr> <tr> <td style="padding: 5px;">8</td> <td style="padding: 5px;">80</td> <td style="padding: 5px;">24</td> </tr> </table>  </div> <p style="text-align: center;">Partitioning</p> <p>using place value (Continued from Year 3)</p> $37 \times 5 = (30 \times 5) + (7 \times 5)$ $= 150 + 35$ $= 185$ <p>Expanded method</p> $\begin{array}{r} 23 \\ \times 8 \\ \hline 160 \\ 184 \end{array}$ <p>Compact method</p> $36 \times 4 = 144$ <p>Ensure the carried over digit is under the correct column.</p> $\begin{array}{r} 36 \\ \times 4 \\ \hline 144 \end{array}$ <p>Recognise and use factor pairs</p> $21 \times 8 = 7 \times 3 \times 2 \times 4 = 168$ <p>Encourage children to multiply 3 single digits and link to contexts such as volume.</p>	x	10	3	8	80	24	<p>Short Division</p> <p>Illustrate using horizontal and vertical bead bar and number line to make the link between the vertical method and chunking using knowledge of multiples as the divisor.</p> <div style="display: flex; justify-content: space-around;">   </div> $72 \div 3 = 24$ <p>If a child struggles subtracting, just encourage to count forwards</p> <p>from zero in multiples of the divisor to reach the dividend.</p> <p>Formal written layout</p> $\begin{array}{r} 3 \overline{) 72} \\ \underline{-30} \\ 42 \\ \underline{-42} \\ 0 \end{array}$ <p>Continue working on the formal written method for division known as the Bus Stop method.</p> $\begin{array}{r} 4 \\ 8 \overline{) 32} \end{array}$ <p>Continue using this and start to introduce remainders</p> $25 \div 3 = 8 \text{ r}1$ <p>This could also be modelled on an empty number line.</p> $\begin{array}{r} 8 \text{ r}1 \\ 3 \overline{) 25} \end{array}$ $65 \div 5 = 13$  <p>Children need to make sensible decisions about rounding up or down after division problems accordingly particularly with problems in context.</p> <p>Continue relating division to fractions and scaling</p> <p>Eg. A pair of jeans cost £60. In a sale they were reduced by a quarter. How much do they cost now?</p> <p>- Children should calculate $tu \div u$ mentally with jottings</p>	<p>times as big, long, wide etc. repeated addition, array, row, column, double, halve, share, share equally, group into tens, threes etc. Divide, division, divided by, divided into, remainder, factor, quotient. Divisible by, inverse. halve</p>	
x	10	3										
8	80	24										
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Year 5</p>	<p>Pupils should be taught to:</p> <p>Identify multiples and factors, including all factor pairs and common factors of two numbers.</p> <p>Know and use vocabulary of prime numbers and prime factors and non-prime numbers.</p> <p>Establish whether a number up to 100 is a prime and recall prime numbers up to 19.</p>	<p>Pupils should practise and extend their use of the efficient written methods of multiplication and division. They know and apply multiplication facts and related division.</p>	<p>Grid method</p> <p>Children should calculate $Tu \times u$ mentally, with jottings. Children should use the grid method for larger numbers.</p> <table style="border-collapse: collapse; margin-bottom: 10px;"> <tr> <td style="padding: 5px;">300</td> <td style="padding: 5px;">40</td> <td style="padding: 5px;">6</td> </tr> </table> <table border="1" style="border-collapse: collapse; margin-bottom: 10px;"> <tr> <td style="padding: 5px;">9</td> <td style="padding: 5px;">2700</td> <td style="padding: 5px;">360</td> <td style="padding: 5px;">54</td> </tr> </table> $\begin{array}{r} 2700 \\ 360 + \\ \hline 3114 \end{array}$ <p>Short multiplication (multiplication by a single digit)</p> <p>Children should approximate first.</p>	300	40	6	9	2700	360	54	<p>Formal written method</p> <p>Children continue to practise the formal method of short division with whole number answers.</p> $184 \div 8 = 23$ $\begin{array}{r} 023 \\ 8 \overline{) 1824} \end{array}$ $432 \div 5 = 86 \text{ r}2$ <p>And with remainders</p> $\begin{array}{r} 086 \text{ r}2 \\ 5 \overline{) 4332} \end{array}$	<p>Lots of, times, groups of, multiply, multiplication, multiple of, product, once, twice, three times...etc times as big, long, wide etc. repeated</p>
300	40	6										
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	<p>Multiply up to 4 digits by 2 and 3 digit numbers using formal written method, including long multiplication for 2 digit numbers. Multiply and divide numbers mentally using known facts. Divide numbers up to 4 digits by 1 digit using the formal written method of short division and interpret remainders appropriately for the context. Multiply and divide whole numbers and decimals by 10, 100 and 1000. Recognise and use square and cubed numbers and use the correct notation. Solve problems using knowledge of factors, multiples, squares and cubes. Solve problems with all four operations and with an understanding of how to use the inverse. Solve problems with multiplication and division, including scaling by simple fractions and problems involving simple rates. Solve problems which require knowledge of percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, and those fractions with a denominator of 10 or 25.</p>	<p>They should know and understand the terms factor, prime, multiple, square and cube numbers. Children should interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, decimals, or by rounding. (eg $98 \div 4 = 24r = 24 \frac{1}{2}$ 24.5, or rounded to 25) Pupils use multiplication and division as inverse to support the introduction of ratio. Eg multiplying or dividing by powers of 10 in scale drawings or by multiplying or divided by 1000 when converting between units.</p>	<p>$346 \times 9 = 350 \times 10 = 3500$</p> <p>Long multiplication (Multiplication by more than a single digit) Children should approximate first. $23 \times 11 = 20 \times 10 = 2100$</p> <p>$23 \times 11 = 253$ This leads to...</p> <table style="display: inline-table; margin-right: 20px;"> <tr><td style="text-align: right;">23</td><td></td></tr> <tr><td style="text-align: right;">X 11</td><td></td></tr> <tr><td style="text-align: right;">3 (1 x 3)</td><td></td></tr> <tr><td style="text-align: right;">20 (1 x 20)</td><td></td></tr> <tr><td style="text-align: right;">+ 30 (10 x 3)</td><td></td></tr> <tr><td style="text-align: right;">200 (10 x 20)</td><td></td></tr> <tr><td style="text-align: right;">253</td><td></td></tr> </table> <table style="display: inline-table;"> <tr><td style="text-align: right;">23</td><td></td></tr> <tr><td style="text-align: right;">X 11</td><td></td></tr> <tr><td style="text-align: right;">+ 23 (1 x 23)</td><td></td></tr> <tr><td style="text-align: right;">230</td><td></td></tr> <tr><td style="text-align: right;">230</td><td></td></tr> <tr><td style="text-align: right;">253</td><td></td></tr> </table> <p>Extend to two larger digit numbers: $56 \times 27 = (50 + 6) \times (20 + 7) = 1512$</p> <p>Expanded Long multiplication:</p> <table style="display: inline-table; margin-right: 20px;"> <tr><td style="text-align: right;">56</td><td></td></tr> <tr><td style="text-align: right;">X 27</td><td></td></tr> <tr><td style="text-align: right;">42 (7x8)</td><td></td></tr> <tr><td style="text-align: right;">350 (7x50)</td><td></td></tr> <tr><td style="text-align: right;">+ 120 (20x6)</td><td></td></tr> <tr><td style="text-align: right;">1000 (20x50)</td><td></td></tr> <tr><td style="text-align: right;">1512</td><td></td></tr> </table> <p>This leads to</p> <table style="display: inline-table;"> <tr><td style="text-align: right;">56</td><td></td></tr> <tr><td style="text-align: right;">X 27</td><td></td></tr> <tr><td style="text-align: right;">392 (7 x 56)</td><td></td></tr> <tr><td style="text-align: right;">+ 1120 (20 x 56)</td><td></td></tr> <tr><td style="text-align: right;">1512</td><td></td></tr> </table> <p>Use the language of place value to ensure understanding. In this example there are digits that have been 'carried' over in the partial products. Add the partial products.</p> <p>When children are comfortable with long multiplication extend with three digit numbers.</p> <table style="display: inline-table;"> <tr><td style="text-align: right;">124</td><td></td></tr> <tr><td style="text-align: right;">X 26</td><td></td></tr> <tr><td style="text-align: right;">744 (6 x 124)</td><td></td></tr> <tr><td style="text-align: right;">+ 2480 (20 x 124)</td><td></td></tr> <tr><td style="text-align: right;">3224</td><td></td></tr> </table> <p>Children should multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up with each other.</p> <table style="display: inline-table;"> <tr><td style="text-align: right;">x 4 0.9</td><td></td></tr> <tr><td style="text-align: right;">3 12 2.7</td><td></td></tr> <tr><td style="text-align: right;">12</td><td></td></tr> <tr><td style="text-align: right;">+ 2.7</td><td></td></tr> <tr><td style="text-align: right;">14.7</td><td></td></tr> </table>	23		X 11		3 (1 x 3)		20 (1 x 20)		+ 30 (10 x 3)		200 (10 x 20)		253		23		X 11		+ 23 (1 x 23)		230		230		253		56		X 27		42 (7x8)		350 (7x50)		+ 120 (20x6)		1000 (20x50)		1512		56		X 27		392 (7 x 56)		+ 1120 (20 x 56)		1512		124		X 26		744 (6 x 124)		+ 2480 (20 x 124)		3224		x 4 0.9		3 12 2.7		12		+ 2.7		14.7		<p>The remainder can also be expressed as a fraction or a decimal.</p> <ul style="list-style-type: none"> - Children need to make sensible decisions about rounding up or down after division, according to the context. - Children need to make links between known facts involving multiplication, division and fractions. - Eg $2000 \div 400$, $2000 \div 4$, $2000 \div 5$, $2000 \div 500$, 400×5, 500×4, $\frac{1}{4}$ of 2000, $\frac{1}{5}$ of 2000. 	<p>addition, array, row, column, double, halve, share, share equally, group into tens, threes etc. Divide, division, divided by, divided into, remainder, factor, quotient. 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Year 6	<p>Pupils should be taught to:</p> <p>Multiply multi digit numbers up to 4 digits by two digit whole number using the efficient method of long multiplication.</p> <p>Divide numbers up to 4 digits by a two digit whole number using the efficient method of long division and interpret remainders as whole numbered remainders, fractions or by rounding as appropriate for the</p>	<p>Pupils should practise the 4 operations using larger numbers and using the most efficient method. They should complete increasingly complex calculations mentally using larger numbers.</p>	<p>Short multiplication, by a single digit. Grid method, Expanded and contracted vertical method. Grid Method & Compact method including with decimals</p> <p>Children should approximate first.</p> <p>4346×8</p> <table border="1" style="display: inline-table; margin-right: 20px;"> <tr><td style="text-align: center;">4000</td><td style="text-align: center;">300</td><td style="text-align: center;">40</td><td style="text-align: center;">6</td></tr> <tr><td style="text-align: center;">32000</td><td style="text-align: center;">2400</td><td style="text-align: center;">320</td><td style="text-align: center;">48</td></tr> </table> <table style="display: inline-table;"> <tr><td style="text-align: right;">4346</td><td></td></tr> <tr><td style="text-align: right;">x 8</td><td></td></tr> <tr><td style="text-align: right;">2344</td><td></td></tr> <tr><td style="text-align: right;">34768</td><td></td></tr> </table> <p>$53 \cdot 2 \times 24 = 1276 \cdot 8$</p>	4000	300	40	6	32000	2400	320	48	4346		x 8		2344		34768		<p>Children should continue to use jottings and mental methods as well as written methods to solve short division (by a single digit).</p> <div style="text-align: center;"> <p>$1268 \div 4 = \square$</p> <p>$1200 \div 4 = 300$</p> <p>$60 \div 4 = 15$</p> <p>$8 \div 4 = 2$</p> <hr style="width: 50%; margin: 0 auto;"/> <p>$1268 \div 4 = 317$</p> </div>	<p>Lots of, times, groups of, multiply, multiplication, multiple of, product, once, twice, three times...etc times as big, long, wide etc. repeated addition, array, row, column,</p>																																																						
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<p>context, perform mental calculations including with mixed operations and large numbers.</p> <p>Identify factors, common multiples and prime numbers. Use their knowledge of the four operations to carry out calculations with the four operations.</p> <p>Solve multi step problems in context, deciding which operations to use and why.</p> <p>Use estimation to check answers to calculations and determine, in the context of the problems, the accuracy.</p> <p>Be able to solve a range of problems in different contexts including fractions, decimals, percentages, ratio and proportion.</p>	<p>Children should continue to use all multiplication tables and maintain fluency when calculating statements.</p> <p>Pupils should round answers to a specified degree of accuracy.</p> <p>Pupils explore the order of operations using brackets.</p> <p>Common factors can be related to finding equivalent fractions.</p>	<table border="1" data-bbox="616 247 806 391"> <tr> <td>x</td> <td>50</td> <td>3</td> <td>0.2</td> <td></td> </tr> <tr> <td>20</td> <td>1000</td> <td>60</td> <td>4</td> <td>1064.0</td> </tr> <tr> <td>4</td> <td>200</td> <td>12</td> <td>0.8</td> <td>212.8</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>1276.8</td> </tr> </table> <p style="text-align: center;">53.2 x 24.0 ----- 212.8 (53.2 x 4) 1064.0 (53.2 x 20) ----- 1276.8</p> <p>Children should know that decimal points line up together.</p> <p>BODMAS Brackets over division, multiplication, addition subtraction</p>	x	50	3	0.2		20	1000	60	4	1064.0	4	200	12	0.8	212.8					1276.8	<p>Solve divisions with 3 or 4 digit numbers ÷ 1 or 2 digit numbers. Children can continue to use informal jottings and/or use an empty number line to show chunking or counting back.</p> <p>Formal method of short division</p> <p>482 ÷ 5 = 96 r2</p> <p>The remainder can be expressed as a fraction</p> <p style="text-align: center;"> $5 \overline{) 482} \begin{array}{r} 096 \\ \text{r}2 \end{array}$ $5 \overline{) 482.4} \begin{array}{r} 096 \\ \text{r}20 \end{array}$ </p> <p>Dividing a 2 digit number using the formal method of Long Division</p> <p>Multiples of the divisor (5) have been subtracted from the dividend (482)</p> <table style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;"> $5 \overline{) 482} \begin{array}{r} 96 \\ - 450 \quad (90 \times 5) \\ \hline 32 \\ - 30 \quad (6 \times 5) \\ \hline 2 \text{ (remainder)} \end{array}$ </td> <td style="width: 50%;"> $15 \overline{) 432} \begin{array}{r} 28 \\ - 300 \quad (20 \times 15) \\ \hline 132 \\ - 120 \quad (8 \times 15) \\ \hline 12 \text{ (remainder)} \end{array}$ </td> </tr> </table> <p>Answer $96\frac{2}{5}$ most effective method for each calculation/problem they meet, including whether to use the standard, formal written method of long division:</p>	$5 \overline{) 482} \begin{array}{r} 96 \\ - 450 \quad (90 \times 5) \\ \hline 32 \\ - 30 \quad (6 \times 5) \\ \hline 2 \text{ (remainder)} \end{array}$	$15 \overline{) 432} \begin{array}{r} 28 \\ - 300 \quad (20 \times 15) \\ \hline 132 \\ - 120 \quad (8 \times 15) \\ \hline 12 \text{ (remainder)} \end{array}$	<p>double, halve, share, share equally, group into tens, threes etc. Divide, division, divided by, divided into, remainder, factor, quotient. Divisible by, inverse. halve</p>
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