Great Chesterford C. of E. Primary Academy

GREAT CHESTERFORD
C of E PRIMARY ACADEMY

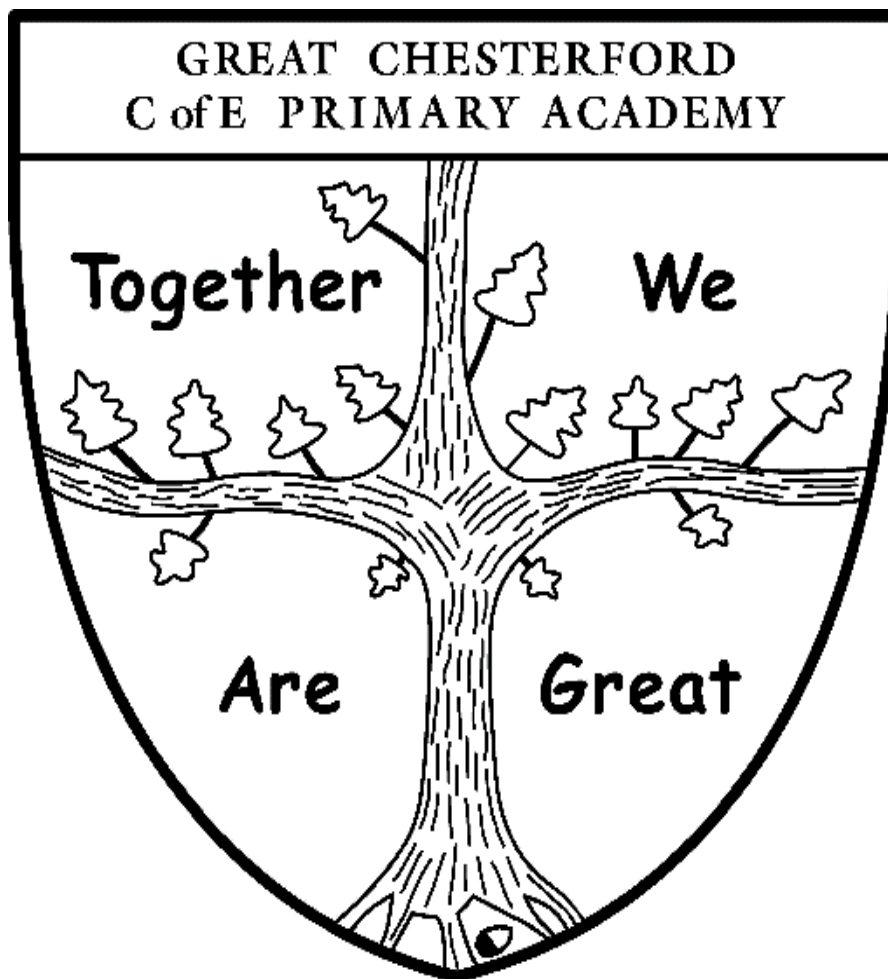Together We

Are Great

Two are better off than one, because together they can work more effectively.

Ecclesiastes 4:9

Mathematics and Calculation Policy

At Great Chesterford C. of E. Primary Academy, our aim is to provide the best possible education for each child in the context of a caring Christian community. Our school values underpin all aspects of school life, including behaviour and relationships within our school. Our school values are: God's Guidance, Respect One Another, Excellent Behaviour, Aiming High and Tremendous Teamwork. Our Golden Rule is to 'treat others as you would like to be treated'.

Our curriculum promotes the spiritual, cultural, intellectual, moral, mental physical, health and social well-being of each child. We strive to provide a high standard of education for all children, irrespective of gender, culture, ability or aptitude.

Aims and Objectives

The 2014 National Curriculum for Maths aims to ensure that all children:
• Become fluent in the fundamentals of Mathematics
• Are able to reason mathematically
• Can solve problems by applying their Mathematics

At Great Chesterford, these skills are embedded within Maths lessons and developed consistently over time. We are committed to ensuring that children are able to recognise the importance of Maths in the wider world and that they are also able to use their mathematical skills and knowledge confidently in their lives in a range of different contexts. We want all children to enjoy Mathematics and to experience success in the subject, with the ability to reason mathematically. We are committed to developing children's curiosity about the subject, as well as an appreciation of the beauty and power of Mathematics.

Organisation

In order to achieve the above aims, teachers devise medium-term plans drawing upon the National Curriculum and Early Years Foundation Stage materials. Various written resources and books are used which include Abacus and White Rose materials. Each daily maths lesson will incorporate a mental maths activity as well as the teaching and practise of maths skills. Weekly investigation lessons will be taught in each key stage 2 class.

When teaching mathematics, we provide opportunities for:
• Group work
• Paired work
• Whole class teaching
• Individual work

Pupils are involved in:
• The development of mental strategies
• Written methods
• Practical work
• Investigational work
• Problem solving
• Mathematical discussion
• Consolidation of basic skills and number facts
• ICT opportunities

Mathematics contributes to many subjects and it is important the children are given opportunities to apply and use Mathematics in real contexts across the curriculum.

Inclusion

At our school we teach maths to all children, whatever their ability. Mathematics forms part of the school curriculum policy to provide a broad and balanced curriculum to all children. Through our mathematics teaching we provide learning opportunities that enable all pupils to make progress. We do this by ensuring the activities are differentiated but challenging for each child's needs. Marking and assessments help us to consider each child's attainment and progress and to plan future lessons appropriately.

Sometimes we select children to take part in maths activities with other schools in the local area.

EYFS

Mathematics is a specific area of the Early Years Foundation Stage (July 2020). The aim is for children to build the foundations to excel in maths with a particular emphasis on developing a deep understanding of numbers to 10. Spatial reasoning skills are also developed through exploring shape, space and measures. Short daily maths sessions take place and children have the opportunity to develop their understanding through practical activities, using a range of manipulates, both in the classroom and through outside learning. Children develop a positive attitude towards maths and use mathematical and everyday language to explain their thinking.

Role of Subject Co-ordinator

The role of the subject co-ordinator is to oversee the implementation and delivery of the Mathematics curriculum and to ensure there is progression from year group to year group. They should offer expertise and guidance to other staff members. Where appropriate, they will lead staff meetings on mathematics or offer advice on in-service training which will be in-line with the School Development Plan. The co-ordinator is also responsible for the requisition of resources required for the teaching of mathematics. This will be within the confines of the school budget.

Role of the teacher

The class teacher is responsible for planning and delivering the Mathematics curriculum for the children within their class, liaising with the co-ordinator when necessary. Teachers will ensure progression in the acquisition of mathematical skills with due regard to the National Curriculum for Mathematics and our school's calculation policy (see appendix). They will liaise with colleagues within school, pre-school providers and colleagues in secondary education to ensure the provision is appropriate.

Teachers will continue to develop and update their skills, knowledge and understanding of mathematics through appropriate CPD training. Throughout each year, it is the class teachers' responsibility to inform parents of pupils' progress, achievements and attainments in mathematics either through verbal feedback or in the form of a written report. It is also the teacher's responsibility to carry out pupil assessments and keep record of their progress (see Assessment and Record Keeping Policy).

Role of Support Staff

Support staff will work with small groups of children or individuals needing assistance to promote and enhance their learning as directed by the class teacher. Teaching assistants will liaise closely with the teacher to monitor the children's progress and will make notes and observation records as necessary. The support staff will have access to and follow daily plans, class intervention plans and any One Plans, which outline the delivery of the curriculum for groups and individuals.

Parental and Community Involvement

Parents have a vital role to play and the school seeks to work in partnership with parents. Parents are encouraged to help their child with Mathematics homework activities and to feedback in the home/school link books as appropriate. During Themed weeks parents and the wider community are invited into school to enrich the mathematical learning across the school. Parents are also invited into school during the Autumn and Spring terms to discuss the progress of their child with the class teacher.

In the Summer term they are invited in to collect the yearly written report and look at their child's work. If significant changes have been made to the mathematics curriculum, curriculum evenings or workshops are held for parents to keep them informed.

Cross- Curricular

As well as teaching specific maths skills, the children need to understand how these relate to real life situations to make them meaningful. We offer opportunities for the children to use the mathematical skills in different contexts across the primary curriculum. We also aim to teach children about the importance of economic well-being, through a variety of different tasks and activities. Spiritual, Moral, Social and Cultural (S.M.S.C.) aspects are addressed through the teaching of maths as recorded on medium term plans.

Computing

Children will use computing programmes and websites to reinforce and develop their mathematical understanding. Programmes will allow opportunities for the children to work together to talk through specific mathematics problems and find solutions. They will also use their maths skills when working with databases and spreadsheets. When teachers see fit, homework activities may be set online.

Classrooms and Resources

The classrooms should be organised appropriately to ensure the environment is stimulating and promotes mathematics. Displays should be used to support mathematical concepts and reinforce teaching points. These should be changed regularly. Each classroom has a designated unit for maths resources. These should be kept orderly and be clearly labelled so that the children can access them independently. Larger mathematics resources for whole school use are kept in a storage unit in the study room.

Assessment and Record Keeping

Assessment is regarded as an integral part of teaching and learning and is a continuous process so that appropriate teaching strategies can be used. It is the responsibility of the class teacher to assess all pupils in their class, but peer and self-assessment are also equally important. The children should also be involved in target setting for mathematics. Each pupil has a maths ladder in their maths book which is updated regularly by the class teacher and may assist with target setting.

In the Early Years Foundation Stage, assessments and observations of the children's skills and understanding are made. The children are assessed against the Early Learning Goals at the end of the Reception year and their attainment is reported to parents in the end of year report. At the end of Key Stage 1, the children are assessed on their mathematics skills through tests and tasks. These outcomes are reported to the LA and to parents. At the end of Key Stage 2, the children complete statutory tests for maths. These outcomes are reported to the LA, to parents and to the secondary schools. The results from any non-statutory mathematics test taken in Year 3, 4 and 5 are used for target setting and monitoring progress.

All children have equal access to the curriculum regardless of their gender or background. This is monitored by analysing pupil performance throughout the school to ensure that there is no disparity between groups.

Homework

Homework is used to support mathematics. Often multiplication or addition bonds are set to develop the children's recall of basic facts. Other mathematical homework tasks are set to extend and reinforce the learning carried out in school and help to build their fluency in maths skills. Homework tasks will be set to meet the individual needs of the child. Please refer to the homework policy.

Promoting Racial Equality

We aim for children to develop respect and concern for, and an interest in people throughout the world regardless of culture, race or religion. We hope that they will gain a greater understanding of the economic status and way of life of different cultures.

Monitoring

The implementation of this policy will be monitored by the headteacher, co-ordinator and governing body.

Evaluation and Review

The Mathematics policy of the school is regularly evaluated and updated in line with the Curriculum Policy and the School Development Plan.

This policy was written by the subject co-ordinator in consultation with the headteacher, staff and governors. It will be reviewed yearly.

Adopted by staff _____ (signed) _____ (date)

Adopted by governors _____ (signed) _____ (date)

EARLY YEARS FOUNDATION STAGE	
Children in the Reception Class follow the Early Years Foundation Stage curriculum (July 2020). They will be given a solid foundation in practical arithmetic upon which to build. Children will develop a deep understanding of number knowledge to 10, including the relationships between them and number patterns. Maths is taught through a range of activities, songs and games. They will also explore and learn addition and subtraction number bonds through the use of objects and apparatus.	
Mental calculation	**Essential Knowledge for ALL children**
One more of a given number to 20. One less than a given number to 20. Subitise up to 5. Recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10. Double facts to 10.	Count in 1's to 20. Have a deep understanding of number to 10, including the composition of each number. Write numbers from 1- 10. One more or one less than a given number to 10. Compare quantities to 10. Add and subtract two single-digit numbers using quantities or objects. Count on or back to solve an addition or subtraction number sentence. Counts an irregular arrangement of objects. Practical doubling, sharing and exploring odd and even.

KEY STAGE 1

Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, children will develop an understanding of how numbers work, so that they are confident with 2-digit numbers and beginning to read and say numbers above 100.

Addition and Subtraction: A focus on number bonds, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts, and ensures that all children leave Year 2 knowing the pairs of numbers which make all the numbers up to 10 at least. Children will also have experienced and been taught pairs to 20. Children's knowledge of number facts enables them to add several 1-digit numbers, and to add/subtract a 1-digit number to/from a 2-digit number. Another important conceptual tool is the ability to add/subtract 1 or 10, and to understand which digit changes and why. This understanding is extended to enable children to add and subtract multiples of 10 to and from any 2-digit number. The most important application of this knowledge is the ability to add or subtract any pair of 2-digit numbers by counting on or back in 10s and 1s. Children may extend this to adding by partitioning numbers into 10s and 1s.

Multiplication and Division: Children will be taught to count in 2s, 3s, 5s and 10s, and will relate this skill to repeated addition. Children will meet and begin to learn the associated ×2, ×3, ×5 and ×10 tables. Engaging in a practical way with the concept of repeated addition and the use of arrays enables children to develop a preliminary understanding of multiplication, and asking them to consider how many groups of a given number make a total will introduce them to the idea of division. Children will also be taught to double and halve numbers, and will thus experience scaling up or down as a further aspect of multiplication and division.

Fractions: Fractions will be introduced as numbers and as operators, specifically in relation to halves, quarters and thirds.

Year 1		

	Mental calculation	Essential Knowledge for ALL children
Y1 **+**	Number bonds ('story' of 5, 6, 7, 8, 9 and 10) Count on in 1s from a given 2-digit number Add two 1-digit numbers Add three 1-digit numbers, spotting doubles or pairs to 10 Count on in 10s from any given 2-digit number Add 10 to any given 2-digit number Use number facts to add 1-digit numbers to 2-digit numbers e.g. *Use 4 + 3 to work out 24 + 3, 34 + 3* Add by putting the larger number first	Know the + and = symbol Know number bonds to 10 Count in 1s Count in 10s Count on 1 from any given 2-digit number Add two 1-digit numbers

	Mental calculation	Essential Knowledge for ALL children
Y1 −	Number bonds ('story' of 5, 6, 7, 8, 9 and 10) Count back in 1s from a given 2-digit number Subtract one 1-digit number from another Count back in 10s from any given 2-digit number Subtract 10 from any given 2-digit number Use number facts to subtract 1-digit numbers from 2-digit numbers e.g. *Use 7 − 2 to work out 27 − 2, 37 − 2*	Know the − and = symbols Know subtraction facts to 10 Count back in 1s from 20 to 0 Count back in 10s from 100 to 0 Count back 1 from any given 2-digit number
Y1 ×	Begin to count in 2s, 5s and 10s Begin to say what three 5s are by counting in 5s, or what four 2s are by counting in 2s, etc. Double numbers to 10	Know doubles up to 10. Begin to count in 2s, 5s and 10s Double numbers to 10 using fingers
Y1 ÷	Begin to count in 2s, 5s and 10s Find half of even numbers to 12 and know it is hard to halve odd numbers Find half of even numbers by sharing Begin to use visual and concrete arrays or 'sets of' to find how many sets of a small number make a larger number	Know halves of even numbers to 20. Begin to count in 2s, 5s and 10s Find half of even numbers by sharing

Year 2

	Mental calculation	**Essential Knowledge for ALL children**

Y2 +	Number bonds – know all the pairs of numbers which make all the numbers to 12, and pairs with a total of 20
	Count on in 1s and 10s from any given 2-digit number
	Add two or three 1-digit numbers
	Add a 1-digit number to any 2-digit number using number facts, including bridging multiples of 10
	    e.g. *45 + 4*
	    e.g. *38 + 7*
	Add 10 and small multiples of 10 to any given 2-digit number
	Add any pair of 2-digit numbers
		Know addition facts to 20 and solve related addition facts to 100
		Know pairs of numbers which make each total up to 10
		Add a 1-digit number to a 2-digit number by counting on in 1s
		Add 10 and small multiples of 10 to a 2-digit number by counting on in 10s
		Add three 1-digit numbers
		Use addition facts to add a 1-digit number to a 2-digit number

Y2 −	Number bonds – know all the pairs of numbers which make all the numbers to 12
	
	Count back in 1s and 10s from any given 2-digit number
	
	Subtract a 1-digit number from any 2-digit number using number facts, including bridging multiples of 10
	    e.g. *56 – 3*
	    e.g. *53 – 5*
	
	Subtract 10 and small multiples of 10 from any given 2-digit number
	
	Subtract any pair of 2-digit numbers by counting back in 10s and 1s or by counting up
		Know subtraction facts to 20.
		
		Subtract a 1-digit number from a 2-digit number by counting back in 1s
		
		Subtract 10 and small multiples of 10 from a 2-digit number by counting back in 10s
		
		Subtract a 1-digit number from a 2-digit number using known facts

Y2 ×	Count in 2s, 5s and 10s
	
	Begin to count in 3s
	
	Begin to understand that multiplication is repeated addition and to use arrays
	    e.g. *3 × 4 is three rows of 4 dots*
	
	Begin to learn the ×2, ×3, ×5 and ×10 tables, seeing these as 'lots of'
	    e.g. *5 lots of 2, 6 lots of 2, 7 lots of 2*
	
	Double numbers up to 20
	
	Begin to double multiples of 5 to 100
	
	Begin to double 2-digit numbers less than 50 with 1s digits of 1, 2, 3, 4 or 5
		Count in 2s, 5s and 10s
		
		Begin to use and understand simple arrays
		    e.g. *2 × 4 is two lots of four*
		
		Double numbers up to 20
		
		Double multiples of 10 to 50
		
		Know the 2x, 5x and 10x tables
		
		Know x and = symbols

Y2 ÷	Count in 2s, 5s and 10s
	
	Begin to count in 3s
	
	Using fingers, say where a given number is in the 2s, 5s or 10s count
	    e.g. *8 is the fourth number when I count in 2s*
	
	Relate division to grouping
	    e.g. *How many groups of 5 in 15?*
	
	Halve numbers to 20
	
	Begin to halve numbers to 40 and multiples of 10 to 100
	
	Find $^1/_2$, $^1/_3$, $^1/_4$ and $^3/_4$ of a quantity of objects and of amounts (whole number answers)
		Count in 2s, 5s and 10s
		
		Say how many rows in a given array
		    e.g. *How many rows of 5 are in an array of 3 × 5?*
		
		Halve even numbers to 20
		
		Find $^1/_2$ and ¼ of amounts
		
		Know the ÷ and = symbols

LOWER KEY STAGE 2

In Lower Key Stage 2, children build on the concrete and conceptual understandings they have gained in Key Stage 1 to develop a real mathematical understanding of the four operations, in particular developing arithmetical competence in relation to larger numbers.

Addition and subtraction: Children are taught to use place value and number facts to add and subtract numbers mentally and they will develop a range of strategies to enable them to discard the 'counting in 1s' or fingers-based methods of Key Stage 1. In particular, children will learn to add and subtract multiples and near multiples of 10, 100 and 1000, and will become fluent in complementary addition as an accurate means of achieving fast and accurate answers to 3-digit subtractions. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced.	**Multiplication and division:** This key stage is also the period during which all the multiplication and division facts are thoroughly memorised, including all facts up to 12 × 12. Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by a 1-digit number are taught, as are mental strategies for multiplication or division with large but 'friendly' numbers, e.g. when dividing by 5 or multiplying by 20.	**Fractions and decimals:** Children will develop their understanding of fractions, learning to reduce a fraction to its simplest form, as well as finding non-unit fractions of amounts and quantities. The concept of a decimal number is introduced and children consolidate a firm understanding of 1-place decimals, multiplying and dividing whole numbers by 10 and 100.

Year 3

	Mental calculation	**Written calculation**	**Essential Knowledge for ALL children**
Y3 +	Know pairs with each total to 20 e.g. *2 + 6 = 8, 12 + 6 = 18, 7 + 8 = 15* Know pairs of multiples of 10 with a total of 100 Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning Add multiples and near multiples of 10 and 100 Perform place-value additions without a struggle e.g. *300 + 8 + 50 = 358* Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number e.g. *104 + 56 is 160 since 104 + 50 = 154 and 6 + 4 = 10* *676 + 8 is 684 since 8 = 4 + 4 and* *76 + 4 + 4 = 84* Add pairs of 'friendly' 3-digit numbers e.g. *320 + 450* Begin to add amounts of money using partitioning	Use expanded column addition to add two or three 3-digit numbers or three 2-digit numbers Begin to use compact column addition to add numbers with 3 digits Begin to add like fractions e.g. *³/₈ + ¹/₈ + ¹/₈* Recognise like fractions that add to 1 e.g. *¹/₄ + ³/₄* e.g. *³/₅ + ²/₅*	Know pairs of numbers which make each total to 20 Know pairs of multiples of 10 with a total of 100 Add two 2-digit numbers by counting on in 10s and 1s e.g. *56 + 35 is 56 + 30 and then add the 5* Understand simple place-value additions e.g. *200 + 40 + 5 = 245* Use place value to add multiples of 10 or 100

Y3 −	Know pairs with each total to 20 　　e.g. *8 – 2 = 6* 　　e.g. *18 – 6 = 12* 　　e.g. *15 – 8 = 7* Subtract any two 2-digit numbers Perform place-value subtractions without a struggle 　　e.g. *536 – 30 = 506* Subtract 2-digit numbers from numbers > 100 by counting up 　　e.g. *143 – 76 is done by starting at 76. Then add 4 (80), then add 20 (100), then add 43, making the difference a total of 67* Subtract multiples and near multiples of 10 and 100 Subtract, when appropriate, by counting back or taking away, using place value and number facts Find change from £1, £5 and £10	Use counting up as an informal written strategy for subtracting pairs of 3-digit numbers 　　e.g. *423 – 357* Begin to subtract like fractions 　　e.g. $^7/_8 - ^3/_8$ Use expanded column subtraction with 'friendly' numbers	Know pairs of numbers which make each total up to 20. Count up to subtract 2-digit numbers 　　e.g. *72 – 47* Subtract multiples of 5 from 100 by counting up 　　e.g. *100 – 35* Subtract multiples of 10 and 100
Y3 ×	Know by heart all the multiplication facts in the ×2, ×3, ×4, ×5, ×8 and ×10 tables Multiply whole numbers by 10 and 100 Recognise that multiplication is commutative Use place value and number facts in mental multiplication 　　e.g. *30 × 5 is 15 × 10* Partition teen numbers to multiply by a 1-digit number 　　e.g. *3 × 14 as 3 × 10 and 3 × 4* Double numbers up to 50	Use partitioning (grid multiplication) to multiply 2-digit and 3-digit numbers by 'friendly' 1-digit numbers	Know by heart the ×2, ×3, x4, ×5 and ×10 tables Double given tables facts to get others Double numbers up to 25 and multiples of 5 to 50

	Mental calculation	Written calculation	Essential Knowledge for ALL children

Y3 ÷	Know by heart all the division facts derived from the ×2, ×3, ×4, ×5, ×8 and ×10 tables
	Divide whole numbers by 10 or 100 to give whole number answers
	Recognise that division is not commutative
	Use place value and number facts in mental division
	    e.g. *84 ÷ 4 is half of 42*
	Divide larger numbers mentally by subtracting the 10th multiple as appropriate, including those with remainders
	    e.g. *57 ÷ 3 is 10 + 9 as 10 × 3 = 30 and*
	    9 × 3 = 27
	Halve even numbers to 100, halve odd numbers to 20
	Find tenths of a multiple of ten by dividing by 10.
		Perform divisions just above the 10th multiple using horizontal or vertical jottings and understanding how to give a remainder as a whole number
		Find unit fractions of quantities and begin to find non-unit fractions of quantities
			Know by heart the division facts derived from the ×2, ×3, x4, ×5 and ×10 tables
			Halve even numbers up to 50 and multiples of 10 to 100
			Perform divisions within the tables including those with remainders
			    e.g. *38 ÷ 5*

Year 4

	Mental calculation	Written calculation	Essential Knowledge for ALL children

Y4 +	Add any two 2-digit numbers by partitioning or counting on
	Know by heart/quickly derive number bonds to 100 and to £1
	Add to the next 100, £1 and whole number
	    e.g. *234 + 66 = 300*
	    e.g. *3·4 + 0·6 = 4*
	Perform place-value additions without a struggle
	    e.g. *300 + 8 + 50 + 4000 = 4358*
	Add multiples and near multiples of 10, 100 and 1000
	Add £1, 10p, 1p to amounts of money
	Use place value and number facts to add 1-, 2-, 3- and 4-digit numbers where a mental calculation is appropriate
	    e.g. *4004 + 156 by knowing that 6 + 4 = 10 and*
	    that 4004 + 150 = 4154 so the total is 4160
		Column addition for 3-digit and 4-digit numbers
		    e.g.
		
		$$\begin{array}{r} 5\ 3\ 4\ 7 \\ 9\ 2\ 2\ 8 \\ +\ 1\ 2\ 9\ 5 \end{array}$$
		
		Add like fractions
		    e.g. $^3/_5 + ^4/_5 = ^7/_5 = ^7/_5$
		Be confident with fractions that add to 1 and fraction complements to 1
		    e.g. $^2/_3 + \_ = 1$
			Add any 2-digit numbers by partitioning or counting on
			Add 'friendly' larger numbers using knowledge of place value and number facts
			Use column addition to add pairs of 3- and 4-digit numbers

Y4
−
	Subtract any two 2-digit numbers
	Know by heart/quickly derive number bonds to 100
	Perform place-value subtractions without a struggle
	    e.g. *4736 – 706 = 4030*
	Subtract multiples and near multiples of 10, 100, 1000, £1 and 10p
	Subtract multiples of 0·1
	Subtract by counting up
	    e.g. *503 – 368 is done by adding*
	    368 + 2 + 30 + 100 + 3 (so we added 135)
	Subtract, when appropriate, by counting back or taking away, using place value and number facts
	Subtract £1, 10p, 1p from amounts of money
	Find change from £10, £20 and £50
		Use column subtraction for 3- and 4-digit numbers, which includes decomposition
		Use complementary addition to subtract amounts of money, and for subtractions where the larger number is a near multiple of 1000 or 100
		    e.g. *2002 – 1865*
		Subtract like fractions
		    e.g. $\frac{4}{5} - \frac{3}{5} = \frac{1}{5}$
		Use fractions that add to 1 to find fraction complements to 1
		    e.g. $1 - \frac{2}{3} = \frac{1}{3}$
			Use counting up with confidence to solve most subtractions, including finding complements to multiples of 100
			    e.g. *512 – 287*
			    e.g. *67 + _ = 100*

Y4
×
	Know by heart all the multiplication facts up to 12 × 12
	Recognise factors up to 12 of 2-digit numbers
	Multiply whole numbers and 1-place decimals by 10, 100, 1000
	Multiply multiples of 10, 100 and 1000 by 1-digit numbers
	    e.g. *300 × 6*
	    e.g. *4000 × 8*
	Use understanding of place value and number facts in mental multiplication
	    e.g. *36 × 5 is half of 36 × 10*
	    e.g. *50 × 60 = 3000*
	Partition 2-digit numbers to multiply by a 1-digit number mentally
	    e.g. *4 × 24 as 4 × 20 and 4 × 4*
	Multiply near multiples by rounding
	    e.g. *33 × 19 as (33 × 20) – 33*
	Find doubles to double 100 and beyond using partitioning
		Use a vertical written method to multiply a 1-digit number by a 3-digit number (ladder method and short multiplication)
		Use an efficient written method to multiply a 2-digit number by a number between 10 and 20 by partitioning (grid method)
			Know by heart multiplication tables up to 12 × 12
			Multiply whole numbers by 10 and 100
			Use the grid method to multiply a 2-digit or a 3-digit number by a number ≤ 6

	Begin to double amounts of money e.g. *£35·60 doubled is £71·20*		
Y4 **÷**	Know by heart all the division facts up to 144 ÷ 12 Divide whole numbers by 10, 100, to give whole number answers or answers with 1 decimal place Divide multiples of 100 by 1-digit numbers using division facts e.g. *3200 ÷ 8 = 400* Use place value and number facts in mental division e.g. *245 ÷ 20 is half of 245 ÷ 10* Divide larger numbers mentally by subtracting the 10th or 20th multiple as appropriate e.g. *156 ÷ 6 is 20 + 6 as 20 × 6 = 120 and* *6 × 6 = 36* Find halves of even numbers to 200 and beyond using partitioning Begin to halve amounts of money e.g. *half of £52·40 is £26·20*	Use a written method to divide a 2-digit or a 3-digit number by a 1-digit number (short division) Give remainders as whole numbers Begin to reduce fractions to their simplest forms Find unit and non-unit fractions of larger amounts	Know by heart all the division facts up to 144 ÷ 12 Divide whole numbers by 10 and 100 to give whole number answers or answers with 1 decimal place Find unit fractions of amounts

	UPPER KEY STAGE 2

Children move on from dealing mainly with whole numbers to performing arithmetic operations with both decimals and fractions.

Addition and subtraction: Children will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits and also decimal numbers with up to 2 decimal places. Mental strategies for adding and subtracting increasingly large numbers will also be taught. These will draw upon children's robust understanding of place value and knowledge of number facts. Negative numbers will be added and subtracted.	**Multiplication and division:** Efficient and flexible strategies for mental multiplication and division are taught and practised, so that children can perform appropriate calculations even when the numbers are large, such as *40 000 × 6* or *40 000 ÷ 8*. In addition, it is in Years 5 and 6 that children extend their knowledge and confidence in using written algorithms for multiplication and division.	**Fractions, decimals, percentages and ratio:** Fractions and decimals are also added, subtracted, divided and multiplied, within the bounds of children's understanding of these more complicated numbers. Children will also calculate simple percentages and ratios.

	Year 5	

	Mental calculation	Written calculation	Essential Knowledge for ALL children
Y5 +	Know number bonds to 1 and to the next whole number Add to the next 10 from a decimal number e.g. *13·6 + 6·4 = 20* Add numbers with 2 significant digits only, using mental strategies e.g. *3·4 + 4·8* e.g. *23 000 + 47 000* Add 1- or 2-digit multiples of 10, 100, 1000, 10 000 and 100 000 e.g. *8000 + 7000* e.g. *600 000 + 700 000* Add near multiples of 10, 100, 1000, 10 000 and 100 000 to other numbers e.g. *82 472 + 30 004* Add decimal numbers which are near multiples of 1 or 10, including money e.g. *6·34 + 1·99* e.g. *£34·59 + £19·95*	Use column addition to add two or three whole numbers with up to 5 digits Use column addition to add any pair of 2-place decimal numbers, including amounts of money Begin to add related fractions using equivalences e.g. $\frac{1}{2} + \frac{1}{6} = \frac{3}{6} + \frac{1}{6}$ Choose the most efficient method in any given situation	Add numbers with only 2 digits which are not zeros e.g. *3·4 + 5·8* Derive swiftly and without any difficulty number bonds to 100 Add large numbers using knowledge of place value and number facts Use column addition to add groups of 4- and 5-digit numbers

	Use place value and number facts to add two or more 'friendly' numbers, including money and decimals e.g. *3 + 8 + 6 + 4 + 7* e.g. *0·6 + 0·7 + 0·4* e.g. *2056 + 44*		
Y5 **−**	Subtract numbers with 2 significant digits only, using mental strategies e.g. *6·2 − 4·5* e.g. *72 000 − 47 000* Subtract 1- or 2-digit multiples of 10, 100, 1000, 10 000 and 100 000 e.g. *8000 − 3000* e.g. *60 000 − 200 000* Subtract 1- or 2-digit near multiples of 10, 100, 1000, 10 000 and 100 000 from other numbers e.g. *82 472 − 30 004* Subtract decimal numbers which are near multiples of 1 or 10, including money e.g. *6·34 − 1·99* e.g. *£34·59 − £19·95* Use counting up subtraction, with knowledge of number bonds to 10, 100 or £1, as a strategy to perform mental subtraction e.g. *£10 − £3·45* e.g. *1000 − 782* Recognise fraction complements to 1 and to the next whole number e.g. *1 $^2/_5$ + $^3/_5$ = 2*	Use column subtraction to subtract numbers with up to 5 digits Use complementary addition for subtractions where the larger number is a multiple or near multiple of 1000 Use complementary addition for subtractions of decimal numbers with up to 2 places, including amounts of money Begin to subtract related fractions using equivalences e.g. $^1/_2$ − $^1/_6$ = $^2/_6$ Choose the most efficient method in any given situation	Derive swiftly and without difficulty number bonds to 100 Use counting up with confidence to solve most subtractions, including finding complements to multiples of 1000 e.g. *3000 − 2387*
Y5 **×**	Know by heart all the multiplication facts up to 12 × 12 Multiply whole numbers and 1- and 2-place decimals by 10, 100, 1000, 10 000 Use knowledge of factors and multiples in multiplication	Use short multiplication to multiply a 1-digit number by a number with up to 4 digits Use long multiplication to multiply 3-digit and 4-digit numbers by a number between 11 and 20 Choose the most efficient method in any given situation	Know multiplication tables to 12 × 12 Multiply whole numbers and 1-place decimals by 10, 100 and 1000 Use knowledge of factors as aids to mental multiplication e.g. *13 × 6 is double 13 × 3* e.g. *23 × 5 is $^1/_2$ of 23 × 10*

	e.g. *43 × 6 is double 43 × 3*
	e.g. *28 × 50 is ¹/₂ of 28 × 100 = 1400*
	Use knowledge of place value and rounding in mental multiplication
	    e.g. *67 × 199 as 67 × 200 − 67*
	Use doubling and halving as a strategy in mental multiplication
	    e.g. *58 × 5 is half of 58 × 10*
	    e.g. *34 × 4 is 34 doubled twice*
	Partition 2-digit numbers, including decimals, to multiply by a 1-digit number mentally
	    e.g. *6 × 27 as 6 × 20 (120) plus 6 × 7 (42)*
	    e.g. *6·3 × 7 as 6 × 7 (42) plus 0·3 × 7 (2·1)*
	Double amounts of money by partitioning
	    e.g. *£37·45 doubled is £37 doubled (£74) plus 45p doubled (90p) giving a total of £74·90*
		Find simple percentages of amounts
		    e.g. *10%, 5%, 20%, 15% and 50%*
		Begin to multiply fractions and mixed numbers by whole numbers ≤ 10
		    e.g. *4 × ²/₃ = ⁸/₃ = 2 ²/₃*
			Use the grid method to multiply numbers with up to 4 digits by 1-digit numbers
			Use the grid method to multiply 2-digit numbers by 2-digit numbers

**Y5
÷**
	Know by heart all the division facts up to 144 ÷ 12
	Divide whole numbers by 10, 100, 1000, 10 000 to give whole number answers or answers with 1, 2 or 3 decimal places
	Use doubling and halving as mental division strategies
	    e.g. *34 ÷ 5 is (34 ÷ 10) × 2*
	Use knowledge of multiples and factors, as well as tests for divisibility, in mental division
	    e.g. *246 ÷ 6 is 123 ÷ 3*
	    e.g. *We know that 525 divides by 25 and by 3*
	Halve amounts of money by partitioning
	    e.g. *¹/₂ of £75·40 = ¹/₂ of £75 (£37·50) plus half of 40p (20p) which is £37·70*
	Divide larger numbers mentally by subtracting the 10th or 100th multiple as appropriate
		Use short division to divide a number with up t 4 digits by a number ≤ 12
		Give remainders as whole numbers or as fractions
		Find non-unit fractions of large amounts
		Turn improper fractions into mixed numbers and vice versa
		Choose the most efficient method in any given situation
			Know by heart division facts up to 144 ÷ 12
			Divide whole numbers by 10, 100 or 1000 to give answers with up to 1 decimal place
			Use doubling and halving as mental division strategies
			Use an efficient written method to divide numbers ≤ 1000 by 1-digit numbers
			Find unit fractions of 2- and 3-digit numbers

	e.g. *96 ÷ 6 is 10 + 6, as 10 × 6 = 60 and 6 × 6 = 36* e.g. *312 ÷ 3 is 100 + 4 as 100 × 3 = 300 and 4 × 3 = 12* Know tests for divisibility by 2, 3, 4, 5, 6, 9 and 25 Know square numbers and cube numbers Reduce fractions to their simplest form		

Year 6

	Mental calculation	**Written calculation**	**Essential Knowledge for ALL children**
Y6 +	Know by heart number bonds to 100 and use these to derive related facts 　　e.g. *3·46 + 0·54* Derive, quickly and without difficulty, number bonds to 1000 Add small and large whole numbers where the use of place value or number facts makes the calculation do-able mentally 　　e.g. *34 000 + 8000* Add multiples of powers of 10 and near multiples of the same 　　e.g. *6345 + 199* Add negative numbers in a context such as temperature where the numbers make sense Add two 1-place decimal numbers or two 2-place decimal numbers less than 1 　　e.g. *4·5 + 6·3* 　　e.g. *0·74 + 0·33* Add positive numbers to negative numbers 　　e.g. *Calculate a rise in temperature or continue a sequence beginning with a negative number*	Use column addition to add numbers with up to 5 digits Use column addition to add decimal numbers with up to 3 decimal places Add mixed numbers and fractions with different denominators	Know number bonds to 1 and to the next whole number, using numbers with 2 decimal places Use place value and number facts to add 'friendly' large or decimal numbers 　　e.g. *3·4 + 6·6* 　　e.g. *26 000 + 54 000* Use column addition to add pairs of 2-place decimal numbers
Y6 −	Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition	Use column subtraction to subtract numbers with up to 6 digits	Use number bonds to 100 to perform mental subtraction of numbers up to 1000 by complementary addition

	e.g. *1000 – 654 as 46 + 300 in our heads*
	Use number bonds to 1 and 10 to perform mental subtraction of any pair of 1-place or 2-place decimal numbers using complementary addition and including money
	    e.g. *10 – 3·65 as 0·35 + 6*
	    e.g. *£50 – £34·29 as 71p + £15*
	Use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to 2 places
	    e.g. *467 900 – 3005*
	    e.g. *4·63 – 1·02*
	Subtract multiples of powers of 10 and near multiples of the same
	Subtract negative numbers in a context such as temperature where the numbers make sense
		Use complementary addition for subtractions where the larger number is a multiple or near multiple of 1000 or 10 000
		Use complementary addition for subtractions of decimal numbers with up to 3 places, including money
		Subtract mixed numbers and fractions with different denominators
			e.g. *1000 – 654 as 46 + 300 in our heads*
			Use complementary addition for subtraction of integers up to 10 000
			    e.g. *2504 – 1878*
			Use complementary addition for subtractions of 1-place decimal numbers and amounts of money
			    e.g. *£7·30 – £3·55*

Y6
×
	Know by heart all the multiplication facts up to 12 × 12
	Multiply whole numbers and decimals with up to 3 places by 10, 100 or 1000
	    e.g. *234 × 1000 = 234 000*
	    e.g. *0·23 × 1000 = 230*
	Identify common factors, common multiples and prime numbers and use factors in mental multiplication
	    e.g. *326 × 6 is 652 × 3 which is 1956*
	Use place value and number facts in mental multiplication
	    e.g. *4000 × 6 = 24 000*
	    e.g. *0·03 × 6 = 0·18*
	Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25
	    e.g. *28 × 25 is a quarter of 28 × 100 = 700*
	Use rounding in mental multiplication
		Use short multiplication to multiply a 1-digit number by a number with up to 4 digits
		Use long multiplication to multiply a 2-digit number by a number with up to 4 digits
		Use short multiplication to multiply a 1-digit number by a number with 1 or 2 decimal places, including amounts of money
		Multiply fractions and mixed numbers by whole numbers
		Multiply fractions by proper fractions
		Use percentages for comparison and calculate simple percentages
			Know by heart all the multiplication facts for multiples of ten up to 120 x 120
			Multiply whole numbers and 1- and 2-place decimals by 10, 100 and 1000
			Use an efficient written method to multiply a 1-digit or a teen number by a number with up to 4 digits by partitioning (grid method)
			Multiply a 1-place decimal number up to 10 by a number ≤ 100 using the grid method

	e.g. *34 × 19 as (34 × 20) – 34*
	Multiply 1- and 2-place decimals by numbers up to and including 10 using place value and partitioning
	    e.g. *3·6 × 4 is 12 + 2·4*
	    e.g. *2·53 × 3 is 6 + 1·5 + 0·09*
	Double decimal numbers with up to 2 places using partitioning
	    e.g. *36·73 doubled is double 36 (72) plus double 0·73 (1·46)*		

Y6
÷
	Know by heart all the division facts up to 144 ÷ 12
	Divide whole numbers by powers of 10 to give whole number answers or answers with up to 3 decimal places
	Identify common factors, common multiples and primes numbers and use factors in mental division
	    e.g. *438 ÷ 6 is 219 ÷ 3 which is 73*
	Use tests for divisibility to aid mental calculation
	Use doubling and halving as mental division strategies, for example to divide by 2, 4, 8, 5, 20 and 25
	    e.g. *628 ÷ 8 is halved three times: 314, 157, 78·5*
	Divide 1- and 2-place decimals by numbers up to and including 10 using place value
	    e.g. *2·4 ÷ 6 = 0·4*
	    e.g. *0·65 ÷ 5 = 0·13*
	    e.g. *£6·33 ÷ 3 = £2·11*
	Halve decimal numbers with up to 2 places using partitioning
	    e.g. *Half of 36·86 is half of 36 (18) plus half of 0·86 (0·43)*
	Know and use equivalence between simple fractions, decimals and percentages, including in different contexts
		Use short division to divide a number with up to 4 digits by a 1-digit or a 2-digit number
		Use long division to divide 3-digit and 4-digit numbers by 2-digit numbers
		Give remainders as whole numbers or as fractions or as decimals
		Divide a 1-place or a 2-place decimal number by a number ≤ 12 using multiples of the divisors
		Divide proper fractions by whole numbers
			Know by heart all the division facts for multiples of ten up to 14400 ÷ 120
			Divide whole numbers by 10, 100, 1000 to give whole number answers or answers with up to 2 decimal places
			Use an efficient written method, involving subtracting powers of 10 times the divisor, to divide any number of up to 1000 by a number ≤ 12
			    e.g. *836 ÷ 11 as 836 – 770 (70 × 11) leaving 66 which is 6 × 11, giving the answer 76*
			Divide a 1-place decimal by a number ≤ 10 using place value and knowledge of division facts

	Recognise a given ratio and reduce a given ratio to its lowest terms		