USWORTH COLLIERY
PRIMARY SCHOOL

Maths Policy

Designated member of staff: Victoria Moore

Chair of Governors: Alison Logan

Approved by:	Curriculum and Standards	**Date:** 18.07.23
Last reviewed on:	January 2023	
Next review due by:	January 2026	

At Usworth Colliery, we …
Go places, do things, meet people and learn new things.

Maths Curriculum Intent

At Usworth Colliery:

- We want to inspire our children to be great mathematicians who are engaged in their learning and passionate about their work.
- Through careful planning that is linked to real life experience and cross-curricular content, we want to build resilient problem solvers who are challenged to try hard, reason using accurate vocabulary, think creatively and flexibly and are able to work collaboratively by communicating their ideas coherently. This could be through using practical resources, pictorial representations or formal written methods and explanations.
- We want our children to be excited and confident about their work and proud to share it with their peers, staff and visitors.

Implementation

Planning and Curriculum Design

At UCPS, we follow the NCETM Prioritisation Curriculum for Mathematics, based around the Ready to Progress Criteria published by the DfE 2020. (See Appendix) It is a blocked curriculum map to ensure that all pupils:

- become **fluent in the fundamentals** of mathematics, through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

We use our Usworth Colliery Long Term Plan and CFC support materials to form the basis of our whole school curriculum map and as a guide for medium term planning. This is regularly adapted both throughout the year and for each new year group to ensure it meets the needs of particular cohorts. This curriculum design was selected on the basis that it supports staff pedagogical content knowledge by identifying small steps in learning and offering suggestions on mathematical talk, generalisations, stem sentences and key questions to support children's learning.

Our staff support children by getting to know them individually, assessing their strengths and weaknesses and, because we want all our children to succeed, we adapt our curriculum to meet the needs of our SEN children, our most able children and our children who have faced the highest levels of disadvantage while still providing them with appropriate ambition and challenge. We use daily maths meetings (called Hi5) to revise and reinforce basic skills to ensure children are able to rapidly recall the facts they need to support their reasoning and problem solving. Where there are children who have gaps in their learning or who are not yet working at age related expectations, we use a combination of immediate and planned pre-teach intervention to help them to keep up and catch up with their peers and in some instances, we use pre-teaching to support vocabulary development and calculation practise particularly in groups of disadvantaged children who we know have narrower technical vocabulary banks in our setting.

To support children's reasoning and problem-solving skills, teachers model their own thinking alongside the use of pictorial models to support breaking down the problem. Teachers use goal free problems so all children have the opportunity to access the problem by verbalising what they already know. Problem – solving and reasoning opportunities are embedded in our curriculum design for each unit, however children are also explicitly taught the following problem-solving skills:
- trial and improvement
- working systematically
- working backwards
- visualising
- reasoning and convincing
- conjecturing and generalisation

Children are able to apply these skills during our problem-solving Friday lessons (which occur on the first Friday of every month). During these lessons children will work through the 4 stage problem solving process and have the opportunity to work collaboratively in mixed ability pairs or groups to support language development and the sharing of strategies / alternative approaches. Children are able to explore the problem and independently decide how they wish to record and represent their mathematical thinking. This work is recorded in a floorbook so learning can be revisited and children's comments can be captured at the point of learning. This is in line with our efforts to reduce maths anxiety and encourage collaborative peer learning. We know this helps our SEN children and girls especially.

Every classroom has a vocabulary wall of key words used so far to support explanations. Key vocabulary and stem sentences are displayed on each screen of the lesson IWB.

So that the majority of our children reach age related expectations at the end of each key stage, we use a mastery approach and lesson structure to teach Mathematics. We believe that to achieve coherence, learning needs to be broken down into small, accessible steps (to avoid cognitive overload) that allow children to make incremental progress by combining fluency in basic skills and methods with opportunities for rich and integrated reasoning and problem solving. It also offers our children the chance to use practical, concrete resources throughout lesson sequences, where

appropriate, to support their understanding alongside using pictorial or abstract recordings where children are ready to do so.

EYFS

Mathematics in EYFS is developed through purposeful, play based experiences and will be represented throughout the indoor and outdoor provision. Learning is based on pupil's interests and current themes and focuses on the expectations from Development Matters / Early Years Outcomes. Mathematical understanding is also developed through stories, songs, games, imaginative play, child-initiated learning and structured teaching. As pupils progress, they will be encouraged to record their mathematical thinking in a more formal way at the discretion of the EYFS staff when they identify that children are ready.

KS1 & KS2

It is expected that the vast majority of the children will progress through the programmes of study at broadly the same rate. In order to do so, there will be support and challenge built into each stage of the lesson. Examples of support could include using alternative recording strategies such as concrete equipment, working in a guided teacher group or with support from peers. Unless children are following an alternative curriculum through PIVATs or a lower year group objective, children will be given the same opportunities within the lesson. Examples of challenge could include answering, "What if…?' questions, developing their own problems or solving puzzles and problems with multiple steps.

Teaching and Delivering Mathematics

All lessons have the following structure:
1. **Explore**: children are given a problem, picture, stimulus or equipment to discuss. This gives teachers the opportunity to formatively assess pupils' understanding and adapt the next stage of the lesson if necessary.
2. **Structure and Model**: The teacher may model themselves or use rapid graspers to model new methods and strategies for certain skills or their thinking for reasoning and problem solving. This will be in a ping-pong style where the teacher allows opportunities for children to work practically, record or discuss before feeding back to the class. Again, formative assessment will be happening throughout this stage to set groupings for independent work and identify those who need further support or challenge.
3. **Intelligent Practise**: Children will work independently or in groups to complete the same task wherever possible. Support and challenge will be highlighted on the IWB screen, so children know where to go next or for support. They may self-select this or be guided by the teacher.
4. **Review/Assess**: Finally, there will be a chance to apply learning from the lesson to a new context or to share findings from the lesson and give the teacher a final chance to assess children. They will identify from this point who needs immediate intervention to be completed before the next lesson to help children with gaps to keep up with the lesson sequence.

Throughout each lesson, there will be opportunities to use CPA recording, to reason and solve problems. Variation is also used, either conceptually or procedurally, to ensure maximum progression and allow deep understanding:

Procedural variation – This is a deliberate change in the type of examples used and questions set, to draw attention to certain features.

Conceptual variation – When a concept is presented in different ways, to show what a concept is, in all of its different forms.

Hi5

We want our children to develop sufficient understanding and unconscious competence in their mathematical basic skills. Children are supported in embedding key concepts into long term memory to support them in recalling them fluently in a 15-minute maths meeting (Hi5) 4 times a week. This gives them time to practice counting, fact recall and calculation.

EYFS and KS1 follow the highly regarded Mastering Number Programme.

KS2 use the objectives set out in the TfC CFCC documentation and include some revision of previous year groups' content. They are reviewed and adapted by teachers to suit the needs of their children.

Maths across the Curriculum

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects. This has been proven to support retrieval from long term memory and keep concepts useable by recalling them across a range of contexts. There is time given in Science to cover statistics objectives through analysing graphs and tables as well as constructing these.

Additional cross-curricular planning is outlined in each year group's Topic and Science planning.

Information and communication technology (ICT)

ICT should be used in maths lessons to enhance the learning. iPads can be an effective tool to practise basic skills and rapid recall as well as to support depth of understanding within mathematical concepts and we use the TT Rockstars app to support our children's times tables knowledge. Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure.

Spoken language

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

Attainment Targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Planning

Teachers should draw upon high quality subject knowledge and astute planning to set challenging tasks based on systematic, accurate assessment of pupils' prior skills, knowledge and understanding. They should use well-judged, imaginative teaching strategies to engage and inspire learners.

Long Term Planning is taken from the statutory programmes of study and attainment targets for mathematics published 2013. Some objectives have been moved between year groups in line with NCETM recommendations; these are noted in the long-term plan so that teachers are aware. By spending sufficient time on embedding concepts deeply, we believe that learning will be transferred to the long-term memory.

Medium Term Planning is produced termly by teachers and uses the National Curriculum end of year objectives. This termly overview is adapted and altered throughout year as necessary. Medium term planning for Hi5 also identifies opportunities to recap previous blocks outside of the lesson.

Short Term Planning is in the form of weekly and daily lesson planning adapted and differentiated as necessary. An end of block assessment is administered at the end of each unit of work to gauge pupil understanding and to assess progress. These are created by teachers before each unit of work.

Teachers should plan and teach, mathematical problem solving in context and link the activities to the Learning Challenge Curriculum, wherever possible. Where appropriate, mathematical challenges should also be written into the Learning Challenge homework and delivered through topic lessons. Lessons and the steps within them ensure small sequential steps, that at times have links to other content domains, enable information to be embedded into the long term memory.

In EYFS mathematical skills are taught through a range of adult directed tasks and independent play opportunities. Activities are planned and resourced in accordance with Early Years Foundation Stage Profile and linked to current themes or individual interests. Children are assessed mainly through observation of their application of skills. Next steps for learning are provide and documented in individual Learning Logs.

Progression of calculation
We have a policy for progression in calculation to ensure continuity and consistency throughout the school. This can be found within each year group's Long-Term Plan and CFC documentation.

Support and Challenge, including support for SEN.
We believe that all children, wherever possible, should be given equal and balanced access to the curriculum in line with the views of Debbie Morgan (NCETM Primary Director). All children have access to support and challenge throughout lessons. This is incorporated into all mathematics lessons and is done in various ways. Children will not routinely be pre-grouped (unless identified by formative or summative assessment) and any support or additional challenge will be available to all pupils. Teachers may direct pupils to either of these mechanisms through their formative assessment in lessons. Examples of support could include:

- Pre-teach intervention either based on individual lesson objectives in the days before a lesson or as blocks revisiting previous content in advance of a new teaching block being introduced to the class.
- Open ended activities/investigations where differentiation is by outcome.
- Providing a variety of resources depending on abilities eg: Counters, cubes, 100 squares, number lines, mirrors.
- Guided support from teacher or TA in class, annotated in books as 'G'.
- Planned intervention programmes delivered by HLTAs and TAs such as 'First class@number' or 'Success with Arithmetic'.
- Timely support and intervention; systematically and effectively checking pupils' understanding throughout lessons.

There may be a very small number of children with very specific needs, who may be grouped according to their PIVAT targets to ensure that teaching is tailored to their specific needs. This would be done in consultation with the SENDCo, SLT and Maths Lead where the needs of a particular (group of) individual(s) are found to be Well Below age related expectations and following an SEN Support Plan.

Additional challenge may be provided, including:
- Questions that incorporate multiple content-domains.
- Open ended, rich problem solving opportunities.
- Setting appropriately challenging tasks based on systematic, accurate assessment of pupils' prior skills, knowledge and understanding.
- Ensuring that marking and constructive feedback is frequent and of a consistently high quality enabling pupils to understand how to improve their work; children must be given time to respond to feedback.

Where children do not access mainstream Maths lessons because they work within either Base or Thrive provision, they follow a reduced timetable as set out by their EHCP or SEN Support Plan.

Maths is taught following the same lesson structure as the rest of the school but reasonable adjustments are made as appropriate.

Marking *(see Marking policy and Guidance)*
The main purpose of our marking policy is to give children consistency in their learning – to ensure that as children progress through school they benefit from the feedback they are given through constructive guidance about how to improve and given time to make those improvements. Reasonable adjustments will be made for SEN children where appropriate.

TA feedback
In Maths lessons, support staff will assist in the delivery of the national curriculum, in direct contact with pupils. The role involves working with groups and individual pupils under the direction of the class teacher. Through wave 1 provision, a differentiated lesson should require support staff to work with a group of children. This should happen daily. At the end of the session, or at an agreed appropriate time with the class teacher, support staff should feedback to ensure the teacher has full knowledge of the progress and achievement of those pupils supported.
Support staff must record on pupil work whether work was done independently or with support.

Monitoring and assessment
The teaching and learning of Maths is monitored through:
- Lesson observations (formal and informal)
- Work scrutiny
- Scrutiny of planning
- Tracking and monitoring of pupil progress
- Pupil conferences
- Learning walks
- Informal 'drop ins'

Assessment *(see Assessment Policy)*
Processes
- Progress and achievement targets are set based on pupils' previous key stage results.
- Pupil progress and achievement is recorded and tracked using Pupil Asset across the year but data captures happen at least termly and this data is discussed at pupil progress meetings.
- Pupil Progress Meetings are held termly, to discuss pupils' individual attainment and progress towards targets, as well as the attainment and progress of subgroups such as: boys, girls, SEN and those in receipt of the Pupil Premium funding. These meetings are held in consultation between the class teacher, teaching assistant, phase leaders and the Headteacher. Actions are agreed to support any learners who are not on target to reach their end of term target level. This may include changes to teaching methods, teaching content, involvement in intervention groups or the need for outside specialist support.
- Performance Management whole school targets usually include a progress target for mathematics and these are monitored through the performance management process.

Summative and Statutory Assessments
End of Term Assessments:
Children in Y2, 3, 4, 5 and 6 are assessed periodically and progress and attainment data is recorded on Pupil Asset. These assessments are carried out towards the end of every term (three times per year for Y3, 4 and 5; twice per year in Y2 and Y6 who complete the national SATs for mathematics in the summer term) and are used to monitor the performance of individuals, groups and cohorts as well as identifying gaps and next steps for planning.

Teacher assessment judgements are then recorded on Pupil Asset using school descriptors (see Assessment Policy). If there is any disparity between test and teacher assessments, the Maths Subject Leader and SLT will moderate judgements with staff where necessary.

Staff have been provided with a Guide to completing End of Term Assessments, detailing how to administer the tests, what support can be provided and suggested percentages for each banding for each year group.

EYFS and Year 1
EYFS and Year 1 children do not carry out any formal summative assessment. Instead, they are constantly assessed by their teachers and teaching assistants. In EYFS, staff determine which indicators from the NC/Development Matters Framework have been met and provide next steps to support progress. In Year 1, children access the end of block assessments from WRH in small groups with their teacher. No formal recording may take place and is done so using the knowledge of staff.

End of Block Assessments:
Children in Y2-6 will carry out a post-block assessment task to identify any gaps in learning that need to be addressed using a 'pause and stretch' lesson(s). Children who do not need to revisit content are offered the opportunity to access additional rich problem-solving tasks. This is recorded on Pupil Progress documentation and work will be evident in books or floor-books. Staff complete an end of block assessment grid to show if each child is below, at or above ARE for this unit. Gaps are recorded and are used to identify children who may need pre-teach intervention the following year. If they have been identified as below, support is outlined to demonstrate how children will catch up.

Formative Assessment
Formative assessment in Maths includes:
- Explore tasks at the beginning of each lesson
- Post Block assessments identify further support needed
- Hi5 class mental and oral work
- Peer and Adult marking within lessons to identify children who need immediate intervention
- Self-assessment and self-selection for guided teacher groups or immediate intervention.
Teachers use their in-lesson assessments to adapt their teaching as necessary.

Reporting to parents
Parents receive termly reports indicating pupils' achievement at the end of each term and are invited to termly parents' meetings. Parents in EYFS are given the opportunity to follow their children's learning with access to the SeeSaw app. They can see regularly updated work from across the curriculum, including children's Maths work.

Homework *(see Homework Policy)*
It is our school policy to provide parents and carers with opportunities to work with their children at home. These activities may only be brief but are valuable in promoting children's learning in mathematics. Maths activities are sent home on a half-termly basis and take the form of Flashback 4 memory jogging tasks to keep content domains in continual revision.

Website
The maths page of the school website provides a range of supporting and informative materials for parents and children such as:
- links to mathematical websites
- the school maths policies
- multiplication table practise songs

Monitoring and the role of the Subject Leader
The Maths Subject Leader is responsible for:
- Leading in the development of Maths throughout the school
- Monitoring the planning, teaching and learning of mathematics throughout the school

- Helping raise standards in Maths
- Providing teachers with support in the teaching of mathematics
- Providing staff with CPD opportunities in relation to Maths within the confines of the budget and the School Improvement Plan
- Monitoring and maintain high quality resources
- Keeping up to date with new developments in the area of Mathematics and disseminate this to all staff.

Monitoring of teaching and learning will be ascertained from lesson observations (termly), learning walks (termly) and book scrutiny (half-termly). All monitoring is added to the yearly overview in advance and is circulated to staff in September by the DHT. Any updates are regularly re-circulated. This ensures staff are aware of the timing and focus of any monitoring in advance. Feedback will be provided personally and individually for lesson observations. For learning walks and book scrutiny, feedback will either be provided individually or generally depending upon the nature of the monitoring. Any general feedback will be anonymised.

Where monitoring identifies the need for staff to receive support, appropriate CPD will be found and recommended or support will be provided in school from a member of the Maths team. This could be through supported planning, lesson observations of other staff, watching Maths team members teach in their own class, sharing best practice of planning or of work from books. Planning will be monitored in line with support plans where the need is identified by SLT.

Staff Continued Professional Development
At Usworth Colliery, staff CPD is relevant to the everyday work of teachers and teaching assistants and is centred around supporting our belief that we can make a difference to the outcomes of our children. Links between the content of CPD and their effect on children's learning and outcomes are made explicit.

Performance management and regular, focussed monitoring allows the HT, DHT and Maths subject leader to identify areas of need and appropriate training is arranged for staff based on their starting points. Where it is identified that staff require support with their pedagogical content knowledge, they are given tailored support during their PPA by either the Maths Subject Lead or DHT.

The subject leader and the maths team attend a wide variety of CPD and subject leader' meetings and disseminate information and provide training to staff at planned staff meetings. UCPS is working with the GNMH teacher research groups across a 2-year period (2018-2020) to support staff pedagogical and content knowledge and to refine the school's curriculum. The HT is heavily involved in this project and meets with the GNMH representative termly throughout 2019-20 to review and evaluate the project.

Governance
We have an identified maths governor who meets with the subject leader at the beginning of each year to discuss the data and action plan. A series of events involving the maths governor are then planned to link with the maths action plan and the School Development Plan. These events can include work scrutiny, learning walks, pupil interviews, meeting with staff and lesson observations etc. The Governor delivers reports to the full governing body after each visit.

Author: Victoria Moore

Agreed date:

Implementation date: APRIL 2023.

Review date: **Every 3 years (April 2026) or in response to National or LA guidance**

Signed: …………………………………………….

Date:………………………………………………..

Head Teacher

Signed: …………………………………………….

Date: …………………………………………….

Chair of Governors

Appendix: National Curriculum Statutory Requirements for the teaching of Mathematics.

Reception
Reception, Statutory requirements: number
Pupils should be taught to:
- count reliably with numbers from 1 to 20
- place numbers to 20 in order
- say one more or one less than a given number to 20
- in practical activities add and subtract two single digit numbers and count on or back to find the answer
- solve problems including doubling, halving and sharing

Reception, Statutory requirements: shape, space and measure
Pupils should be taught to:
- use everyday language to talk about size, weight, capacity, position, distance, time and money
- compare quantities and objects to solve problems
- recognise, create and describe patterns
- explore everyday objects and shapes
- use mathematical language to describe objects and shapes

Key stage 1 – Years 1 and 2:
The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources and practical applications [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of year 2, pupils should know all the number bonds up to and including 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage.

Year 1
Year 1, Statutory requirements: number and place value
Pupils should be taught to:
- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less
- identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in numerals and words.

Year 1, Statutory requirements: addition and subtraction
Pupils should be taught to:
- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20

- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9.

Year 1, Statutory requirements: multiplication and division
Pupils should be taught to:
- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Year 1, Statutory requirements: fractions
Pupils should be taught to:
- recognise, find and name a half as one of two equal parts of an object, shape or quantity
- recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Year 1, Statutory requirements: measurement
Pupils should be taught to:
- compare, describe and solve practical problems for:
- lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
- mass/weight [for example, heavy/light, heavier than, lighter than]
- capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
- time [for example, quicker, slower, earlier, later]
- measure and begin to record the following:
- lengths and heights
- mass/weight
- capacity and volume
- time (hours, minutes, seconds)
- recognise and know the value of different denominations of coins and notes
- sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]
- recognise and use language relating to dates, including days of the week, weeks, months and years
- tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.

Year 1, Statutory requirements: geometry - properties of shape
Pupils should be taught to:
- recognise and name common 2-D and 3-D shapes, including:
- 2-D shapes [for example, rectangles (including squares), circles and triangles]
- 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].

Year 1, Statutory requirements: geometry position and direction
Pupils should be taught to:
- describe position, direction and movement, including whole, half, quarter and three-quarter turns.

Year 2
Year 2, Statutory requirements: number and place value
Pupils should be taught to:
- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)

- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use <, > and = signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Year 2, Statutory requirements: addition and subtraction
Pupils should be taught to:
- 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
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- 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
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Year 2, Statutory requirements: multiplication and division
Pupils should be taught to:
- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ($\times$), division ($\div$) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Year 2, Statutory requirements: fractions
Pupils should be taught to:
- recognise, find, name and write fractions 1/3, ¼, 2/4, ¾ of a length, shape, set of objects or quantity
- write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and ½

Year 2, Statutory requirements: measurement
Pupils should be taught to:
- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- compare and order lengths, mass, volume/capacity and record the results using >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money

- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- know the number of minutes in an hour and the number of hours in a day.

Year 2, Statutory requirements: geometry - properties of shape
Pupils should be taught to:
- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

Year 2, Statutory requirements: geometry position and direction
Pupils should be taught to:
- order and arrange combinations of mathematical objects in patterns and sequences
- use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).

Year 2, Statutory requirements: statistics
Pupils should be taught to:
- interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask and answer questions about totalling and comparing categorical data.

Lower Key Stage 2 – Years 3 and 4
The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Year 3
Year 3, Statutory requirements: Number – number and place value
Pupils should be taught to:
- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number

- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

Year 3, Statutory requirements – addition and subtraction
Pupils should be taught to:
- add and subtract numbers mentally, including:
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Year 3, Statutory requirements: multiplication and division
Pupils should be taught to:
- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- 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.

Year 3, Statutory requirements: fractions
Pupils should be taught to:
- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 =6/7)
- compare and order unit fractions, and fractions with the same denominators
- solve problems that involve all of the above.

Year 3, Statutory requirements: measurement
Pupils should be taught to:
- measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- measure the perimeter of simple 2-D shapes
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks

- estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events [for example to calculate the time taken by particular events or tasks].

Year 3, Statutory requirements: geometry - properties of shape
Pupils should be taught to:
- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- recognise angles as a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

Year3, Statutory requirements: statistics
Pupils should be taught to:
- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

Year 4
Year4, Statutory requirements: number and place value
Pupils should be taught to
- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.

Year4, Statutory requirements: addition and subtraction
Pupils should be taught to:
- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Year 4, Statutory requirements: multiplication and division
Pupils should be taught to:
- recall multiplication and division facts for multiplication tables up to 12 × 12

- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Year 4, Statutory requirements: fractions and decimals
Pupils should be taught to:
- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- add and subtract fractions with the same denominator
- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to ½, 1/4/ ¾
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places.

Year 4, Statutory requirements: measurements
Pupils should be taught to:
- Convert between different units of measure [for example, kilometre to metre; hour to minute]
- measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
- find the area of rectilinear shapes by counting squares
- estimate, compare and calculate different measures, including money in pounds and pence
- read, write and convert time between analogue and digital 12- and 24-hour clocks
- solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

Year 4, Statutory requirements: geometry - properties of shape
Pupils should be taught to:
- compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- identify acute and obtuse angles and compare and order angles up to two right angles by size
- identify lines of symmetry in 2-D shapes presented in different orientations
- complete a simple symmetric figure with respect to a specific line of symmetry.

Year 4, Statutory requirements: geometry position and direction
Pupils should be taught to:
- describe positions on a 2-D grid as coordinates in the first quadrant
- describe movements between positions as translations of a given unit to the left/right and up/down
- plot specified points and draw sides to complete a given polygon.

Year 4, Statutory requirements: statistics

Pupils should be taught to:

- interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
- solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

Upper Key Stage 2 – Years 5 and 6

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should read, spell and pronounce mathematical vocabulary correctly.

Year 5

Year 5, Statutory requirements: number and place value

Pupils should be taught to:

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Year 5, Statutory requirements: addition and subtraction

Pupils should be taught to:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Year 5, Statutory requirements: multiplication and division

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19

- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Year 5, Statutory requirements: fractions including decimals and percentages
Pupils should be taught to:
- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $2/5 + 4/5 = 6/5 = 1\ 1/5$]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, $0.71 = 71/100$]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1/2 , ¼, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25.

Year 5, Statutory requirements: measurement
Pupils should be taught to:
- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time

- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Year 5, Statutory requirements: geometry – properties of shape
Pupils should be taught to:
- identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- draw given angles, and measure them in degrees (o)
- identify: angles at a point and one whole turn (total 360°), angles at a point on a straight line and ½ a turn (total 180°); other multiples of 90°
- use the properties of rectangles to deduce related facts and find missing lengths and angles
- distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Year 5, Statutory requirements: geometry – position and direction
Pupils should be taught to:
- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

Year 5, Statutory requirements: statistics
Pupils should be taught to:
- solve comparison, sum and difference problems using information presented in a line graph
- complete, read and interpret information in tables, including timetables.

Year 6
Year 6, Statutory requirements: number and place value
Pupils should be taught to:
- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.

Year 6, Statutory requirements: addition, subtraction, multiplication and division
Pupils should be taught to:
- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division

- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Year 6, Statutory requirements: fractions including decimals and percentages
Pupils should be taught to:
- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions > 1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ x ½ = 1/8]
- divide proper fractions by whole numbers [for example, 1/3 ÷ 2 =1/6]
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8]
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Year 6, Statutory requirements: ratio and proportion
Pupils should be taught to:
- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
- solve problems involving similar shapes where the scale factor is known or can be found
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Year 6, Statutory requirements: algebra
Pupils should be taught to:
- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables.

Year 6, Statutory requirements: measurement
Pupils should be taught to:
- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- convert between miles and kilometres
- recognise that shapes with the same areas can have different perimeters and vice versa
- recognise when it is possible to use formulae for area and volume of shapes
- calculate the area of parallelograms and triangles

- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3].

Year 6, Statutory requirements: geometry – properties of shape

Pupils should be taught to:
- draw 2-D shapes using given dimensions and angles
- recognise, describe and build simple 3-D shapes, including making nets
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Year 6, Statutory requirements: geometry – position and direction

Pupils should be taught to:
- describe positions on the full coordinate grid (all four quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Year 6, Statutory requirements: statistics

Pupils should be taught to:
- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average.