KEW RIVERSIDE PRIMARY SCHOOL

Mathematics Policy

Committee ownership for this policy	Curriculum and Achievement Committee
Must be approved by FGB:	Full governing body or proprietor
Required by: 1 / 2 • Where 1 is indicated, the requirement is statutory • Where 2 is indicated, the requirement is recommended	2
Frequency of review:	Annually
Date last reviewed:	November 2019
Date of next review:	February 2022
Display on website:	Yes
Purpose:	The purpose of this policy is to set out the expectations of teaching and learning of mathematics at Kew Riverside.
Consultation:	Staff and Governors
Links with other policies:	● Whole school vision statement ● Inclusion Policy ● Teaching and Learning Policy ● Home Learning Policy

Intent

Here at Kew Riverside, we are enthusiastic, risk-taking mathematicians. Mathematics is a core subject of the National Curriculum and a tool for everyday life. It teaches children to make sense of the world around them through developing their ability to calculate, to reason and to problem solve.

At Kew Riverside, children develop skills, confidence and competence in mathematics. Through a shared ethos of passion and positivity, our children and staff cultivate a love of mathematics and a thirst for knowledge and challenge. Our classroom environments encourage exploration, questioning and mathematical talk as well as opportunities for children to develop and apply their ideas while making connections to the world around them.

By using a 'Maths Mastery Approach' and following the White Rose Primary Scheme of Learning, we ensure pupils develop deep understanding through small steps and opportunities to learn using concrete (manipulatives), pictorial and abstract (written) representations. Pupils who grasp concepts rapidly are challenged with rich and sophisticated problems, in order to prove depth of understanding, before any acceleration through new content. Those who are unable to prove fluency in a concept are given opportunities to consolidate and refine their understanding before moving on.

At Kew Riverside our aim is to develop

- a positive attitude towards mathematics and an awareness of the wonders of mathematics
- competence and confidence in mathematical knowledge, concepts and skills
- an ability to solve problems, to reason, to think logically and to work systematically and accurately
- initiative and an ability to work both independently and in cooperation with others
- an ability to communicate mathematics and use mathematical language.
- an ability to use and apply mathematics across the curriculum and in real life situations
- an understanding of mathematics through a process of enquiry and experimentation

Children will:

- be set appropriate learning challenges
- given the opportunity to learn in ways that maximise the chances of success
- be supported to tackle the specific barriers to progress they face

National Curriculum Aims (2014)

The National Curriculum for mathematics aims to ensure that all pupils:
• become **fluent** in the fundamentals of mathematics, including 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.

Implementation

Curriculum Development and Organisation:
At Kew Riverside Primary School, we follow a Maths Mastery approach to teaching mathematics using White Rose schemes of learning and guidance. This enables teachers to plan for mixed ability classes ensuring that every child succeeds therefore narrowing gaps in their learning. White Rose also ensures continuity and progression in the teaching of mathematics.

EYFS
In Early Years Foundation Stage, the '6 Key Areas of Early Mathematics Learning' are followed to ensure that children develop firm mathematic foundations. The 6 concepts are:
Cardinality and counting
Comparison
Composition
Pattern
Shape and Space
Measures

In Years 1-6, each element of the national curriculum is covered throughout the year:

KS1 and KS2
Number – number and place value
Number – addition and subtraction
Number – multiplication and division
Number – fractions
Measurement
Geometry – properties of shapes
Geometry – position and direction

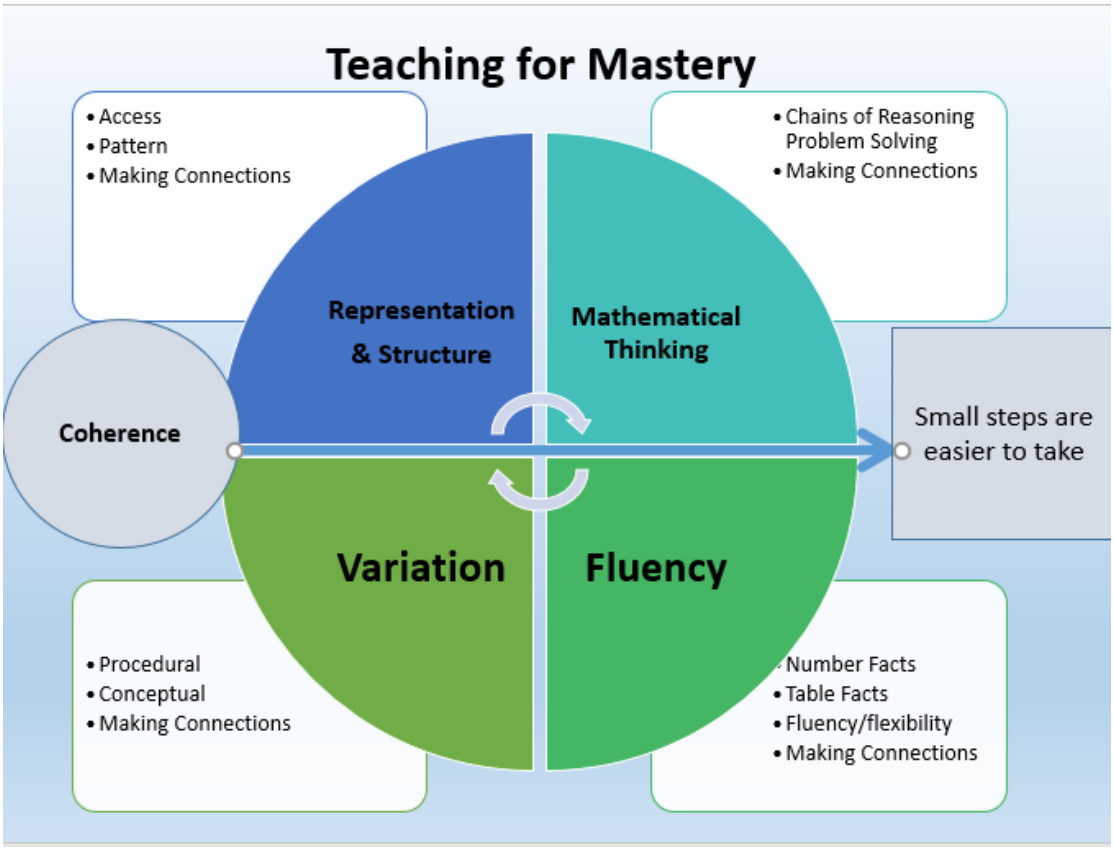
Upper KS1
Statistics

KS2
Number – fractions (including decimals)

Upper KS2
Number – fractions (including decimals and percentages)
Ratio and proportion
Algebra

Strategies for teaching

A Maths Mastery approach- Using Maths Mastery techniques helps to break the cycle of rote learning. Furthermore, it provides children with the opportunity to grasp 'real' Mathematics, empowering them with problem solving skills and a sense of achievement. At the core of mastery is the teaching of concepts alongside their procedural algorithms. By investigating a variety of methods, children learn to demonstrate number sense by selecting the most efficient methods for the task. Arming children with strategies to tackle problems logically, using what they already know.



Conceptual Variation is the opportunity to work on different representations of the same mathematical idea. This might be for instance looking **and** multiple representations of the number 54. with Diennes, PV counters, Gattegno grid, arrow cards, 100 square etc. These multiple representations will 'showcase' to pupils the different conceptual ideas that underpin a mathematical idea. So in the context of place value, some will reveal the quantity/ value of a digit, some will reveal the importance of position of a digit, others will support the order of the number and some will reveal the additive or multiplicative nature of place value.

Procedural variation is used to support pupils' deeper understanding of a mathematical procedure or process. This might be to compare the same procedure used to calculate two different sets of numbers. By asking the pupils to compare two successive procedures where the first is linked to a second. One can observe relationships, observe the variant and invariant properties of the procedure - i.e. **what stays the same and what changes?** (depending on the numbers/ conditions) leading to generalising about the procedure.

The majority of pupils are taught the same learning objective and move through the curriculum at the same pace. Due to this, pupil progress in lessons may be less dramatic when compared to the traditional teaching of Maths.

This can be seen in a positive light for three reasons:
1. The small steps in learning do not overwhelm pupils.
2. Every child can access the learning and the concepts are fully embedded before moving on.
3. Teachers can make formative assessments during lessons and can tackle misconceptions and difficulties through targeted questioning and same day interventions therefore the class can advance at roughly the same time.

All children are taught in class groups across the school. Extra provision is available to support: children with special educational needs; lower attaining children; academically more able children (AMA) and Children with English as an additional language (EAL). This includes: differentiated tasks, low threshold high ceiling (LTHC) tasks, smaller groups working with an adult (when appropriate), adapted learning objectives (for children working 2 or more year groups below), same day interventions, precision teaching and 1:1 or small group interventions working on times table and key instant recall facts (KIRF). (**See Inclusion)**

Planning and Organisation (Years 1-6)

The approach to the teaching of mathematics is based on:
- daily maths lessons showing small step progression through new concepts
- daily, 15 minute, discrete arithmetic sessions
- a mastery approach to teaching- broadening and deepening understanding rather than rapid acceleration
- opportunities for mathematic talk through stem sentences and exposure to age related mathematical vocabulary and terminology
- opportunities for direct, instructional teaching but also independent reasoning; whole class investigations and mixed ability pairs/groups

In the EYFS until September 2021, teaching is guided by the DFE's non-statutory document, 'Early Years Outcomes'. Teachers support children to work towards the **'Early Learning Goals for Mathematics' ('Number' and 'Shape, Space and Measure'),** which they are assessed against in the Summer Term of their Reception year.

From September 2021, teaching will be guided by the DFE's non-statutory document, 'Development Matters'. Teachers will support children to work towards the new **'Early Learning Goals for Mathematics' ('Number' and 'Numerical Patterns').** They will continue to be assessed against these in the Summer Term of their Reception year.

To ensure an effective transition, as children move into Year 1, they are initially taught maths following a similar timetable and teaching model to the EYFS. As the year progresses, and depending on the needs of each cohort, teaching will progress towards the whole class model.

Coverage maps are used throughout the school to ensure progression in objectives (See appendix 1). These maps are available to parents on the school website.

At Kew Riverside, White Rose, DfE Ready-to-progress criteria along with NCTEM Professional Development documents are used to aid planning and teacher subject knowledge. When planning, teachers show awareness of the gaps in the children's learning by using the assessment data markbooks (see Assessment Policy) and the children's individual coverage sheets.

Daily Arithmetic (15 minutes)
Children are taught a range of oral, mental and written maths strategies through their daily 15-minute arithmetic sessions. This enables them to consolidate written strategies and to work out answers mentally, as well as practising methods for quick recall of Key Instant Recall Facts (KIRF). These sessions should be recorded in the back of the children's maths books.
Evidence of times table teaching (including learning, revising and consolidating) should be present in all year groups. In Key Stage 2, 2 arithmetic sessions should be dedicated to multiplications practice with evidence of a weekly 'Rainbow Maths' sessions and in Key Stage 1, 1 arithmetic session should be dedicated to early multiplication (see Times Tables).

Main Lesson
The main lesson will be structured in the following sequence:

1) **Recap**- 5 key questions that recap and revisit prior learning as referenced in White Rose Planning.

2) **Small Step** (New Learning)- Introduction of the learning objective using concrete and pictorial representations. Introduction of any new vocabulary, modelled using sentence stems.

3) **Talk Task (Explore)-** Pupils are given the opportunity to talk about their learning using the practised vocabulary and resources; discussing and exploring the new concept. Teachers will use this opportunity to observe and question, using assessment for learning strategies (AFL); identifying any misconceptions and considering if children are ready to progress to more abstract approaches.

4) **Develop Learning (Model, Question Discuss)-** After the 'Talk Task', teachers will build on new learning and deepen the pupils' understanding by modelling reasoning and problem solving questions; providing opportunities for further discussion and questioning of concepts.

5) Independent Task (Guided Practice)- Pupils will begin the independent task by proving fluency in the concept. The children will then begin open ended activities/investigations or discrete tasks. **Adult support, scaffolded/ differentiated tasks, including challenge, will be provided for children. Target groups and children will be identified in the planning.**

6) Plenary (Reflect)- At the end of the session, teachers will review and/or recap on the learning. Whole class feedback sheets and AfL exit tasks will identify; **work to praise and share; children in need of further support; any misconceptions.** This will inform future planning.

Resourcing- Teachers follow a concrete, pictorial, abstract (CPA) approach while structuring their lessons (See Calculation Policy) and provide a variety of resources that can be accessed independently, to support all abilities, depending on appropriateness to the task eg. place value counters, multi-link cubes, 100 squares, number lines, ten frames, base ten, calculators, clocks.

The **use and application** of mathematical principles underpins the whole of mathematical teaching and learning. Opportunities are given so that all pupils can learn to apply their knowledge to a wide range of real life situations. The children will also be expected to demonstrate an ability to choose appropriate equipment and methods for the task and to communicate and justify their findings in an appropriate way, showing increasing concern for clarity and accuracy of meaning.

Times Tables

The quick recall of multiplication and division facts (times tables) is essential for all children. The ability to recall these facts quickly enables children to answer related questions with ease; proving computational fluency. There will be

It is therefore important that we approach the teaching and testing of times tables in a similar and progressive format from Year 2 to Year 6.

According to the National Curriculum, 2014, the expectation of times tables in each Year Group is as follows:

Year 1: counting as reciting numbers and counting as enumerating objects, and counting in twos, fives and tens from different multiples to develop their recognition of patterns in the number system.

Year 2: 2x, 5x, 10x

Year 3: 3x, 4x, 8x

Year 4: 6x, 7x, 9x, 11x, 12x - From June 2022, Year 4 will complete the statutory multiplication table check (MTC).

Year 5: All x and ÷ facts (12x12) square numbers & cube numbers

Year 6: All x and ÷ facts (12x12) and related language/symbols e.g. % and square root

There are many ways in which children can learn times tables - for example, playing games, quick-fire questions from an adult, chanting tables (full number sentences), writing the tables out and using songs, websites or apps. This learning needs to take place before the knowledge gained can be assessed in a test.

Evidence of times table teaching should be present in all year groups. 2 x per week minimum in KS2 (once in books). 1x in KS1 (this can be shown in planning not books). Students will follow 'Rainbow Maths' building up the x tables in a methodical and

progressive format, ensuring that facts are retained and revised along the journey. Once they have reached the 'Pot of Gold' children can compete to improve their time or move on to completing the 'Speedy Table' challenges. Teachers optimise transitional moments of the day, eg lining up for assembly or getting changed for PE, by singing or chanting multiplication facts in order to consolidate the children's times table recall.

From Year 2, times tables will be set on Times Tables Rock Stars (TTRS) as a homework each week. In Year 4, the children will have weekly exposure to the MTC format to prepare themselves for the computerised lay-out of the assessment.

The Presentation of Mathematics

All Maths books will contain the short date, margin and Learning Objective (L.O). In Reception and Year 1 the children will be provided with printed stickers. The children will write in pencil with one number per box. The children's self-assessment will be completed in green pen (see Marking and Feedback).

Unit Outcomes sheets (see appendix 2) will be used at the beginning of each White Rose Block. Success criteria should be written up or stuck in the bottom box- when appropriate. This can still be used in KS1 to detail process. Teacher's should also use the communication box to pose questions or for pupils to share concerns.

Each Maths book will contain a trimmed coverage sheet inside the front cover. The sheets show progression through the National Curriculum objectives. The child has the coverage sheet for the year group they are working on and it should be ticked off as taught and achieved

EYFS/ Year 1- Tapestry system is used to document evidence of children's mathematical understanding.

KS1- Photos should be used and **annotated** when necessary to show concrete use of apparatus.

In year one annotated stickers should be used by the adults documenting children responding/ reasoning during class input and continuous provision. With a minimum of 1 piece of recorded work per week.

Annotations can also be used in year 2 to show children's reasoning. Children should be given opportunities to write their own annotations (with given sentence stems).

Marking. Feedback and Self-Assessment

All staff should follow the school's Marking and Feedback Policy. All adult supported work should be identified with an 'S'.

Year 1: On-the-spot feedback is given to children in guided group work

When appropriate, children will begin to annotate their own work, explaining their thinking.

From Year 2 - Every piece of work should be marked either on the-spot, 'live,' marking by an adult, in purple pen, or by children marking their own books (KS2 only), in green pen – all L.Os should be acknowledged with a purple tick, if achieved, or a dot, if further consolidation is needed.

Whole Class Feedback (WCF) sheets should be used to identify; **work to praise and share; children in need further support; any misconceptions** and should inform future planning. Due to the planned 'microscopic progression' of Maths Mastery, for the majority of children, their next step would be the next planned lesson.

In addition, in Key Stage 2, every unit of work should include: - a summative task (eg a question) in the student-teacher dialogue box of the Unit Sheet (see appendix 2)

If photos are used, they should include an annotation to explain the learning demonstrated (rather than a description of the activity).

In KS2 (and from summer in year 2), pupils should **be self-assessing** against the LO at the end of most sessions by using the 'Emoji' self-assessment questions (see appendix 3) and sentence stems, when necessary. Exit tickets can also be used as a form of teachers' AfL.

Classroom Environment

In each classroom there will be Maths 'Working Walls'- These will include:

- Concept-specific success criteria and/or pictorial representations. These will be layered on flip-chart paper to show progression and enabling children to refer to past concepts
- Examples of children's work- colour photocopied and on the wall
- Vocabulary- linked to current unit
- Reasoning sentence stems
- Maths stories

Cross-curricular

Throughout the whole curriculum, opportunities exist to extend and promote mathematics. Teachers will explicitly refer to the mathematical concepts eg, graph during in Science and tessellation of shapes in Art. Teachers seek to take advantage of all these opportunities within our topic based curriculum, with links identified on all knowledge organisers'. On our annual Maths Day there is time dedicated purely to cross-curricular maths.

Home Learning

Please refer to the Home Learning Policy for specific year groups.

We provide parents and carers with opportunities to work with their children at home using the online coverage maps with children's personalised sheets being sent home termly. Children are expected to learn weekly KIRFs and times tables, from year 2 and consolidate their knowledge on Times Table Rock Stars. The children are also given an online, interactive activity through our subscribed sites- My Maths (from year 2) or Busy Things. These activities support and reinforce learning that occurs in the classroom.

Inclusion

We provide a mathematics curriculum which is accessible to all our children, regardless of race, gender, ability, culture or religion.

Children with Special Educational Needs or Disabilities, (SEND) are taught within the daily mathematics lesson (please see the section named The Mastery Approach). Groups or individual children may be withdrawn in small groups to receive extra support using multi-sensory mathematics same-day intervention programmes and precision teaching. This support should be given outside of /as an addition to the normal maths lesson to ensure that the children benefit from quality first teaching

All children should have equal access to the curriculum, irrespective of particular circumstances such as race, background, gender and capability. In the mathematics lessons we support children in a variety of ways:

eg. repeating instructions, breaking down instructions into smaller chunks, using clear definitions, emphasising key words, using visual images, playing mathematical games, encouraging children to join in counting, chanting, finger games, rhymes, using practical mathematical equipment and process-led success criteria as a technique checklist- when appropriate. Mixed ability groupings and pairs are used to extend pupils and provide peer to peer support.

Enrichment opportunities-

- **Cross curricular links to OAK, Science, Computing and DT**
- **Annual Maths Day**
- **Take Over Maths- an opportunity for the children to teach their peers**
- **AMA events at local secondary schools**
- **Maths Board Leaders that create weekly challenges for EYFS, KS1 and Key Stage 2**
- **Times Table Rock Stars Competitions**

Impact

Assessment and Record Keeping

Each class teacher is responsible for monitoring and evaluating the progress of their pupil's mathematics skills. Teachers use the National Curriculum key objectives as mapped in the coverage and progression maps and the school mark books to monitor progress, this information is passed on from one year group to the next during transition meetings and through the Excel database. Each child is given a coverage sheet of objectives from the year group they are working at. This coverage sheet is used to identify

if an objective has been taught and if a child has achieved the objective independently and at Greater Depth.

Along with the coverage sheets, end of block White Rose assessments are used to identify pupils' strengths and difficulties and the evaluation of children's work is used to inform future planning.

Other assessments include informal observations, peer assessment, oral questioning, regular mental tasks and planned activities designed to judge progress against the appropriate key objectives that are recorded in books.

The school's mark book system is used to closely monitor children's progress throughout the school. Assessment data is updated regularly and discussed termly as part of Pupil Progress Meetings (see Assessment Policy).

In the Early Years Foundation Stage (EYFS), observations and records are made of children's knowledge, understanding and comments. These are recorded on the 'Tapestry' Ipad assessment app or evidence is collected and then put into individual books. Summative maths assessments are made at 4 points throughout the year and are the EYFS mark books are updated. Each child is assessed at the end of the summer term against the 17 'Early Leaning Goals', 2 of which are directly linked to maths while others (eg- 'Communication and Language') also illustrate mathematical skills and reasoning. This is recorded in each individual child's 'Early Years Profile'.

End of Year Reports are completed before the end of the summer term. Teachers use the information gathered from the children's coverage sheets and their summative and formative assessments to help them comment on individual children's attainment and progress.

SATs – Y2 & Y6

Children are formally assessed at Year 2 and Year 6 according to SATs tests and tasks. Year 2 tests are assessed by the teacher and moderated within the borough, the year 6 tests are marked externally.

Teacher Assessments (TA) are closely analysed by the subject leader, Headteacher and Leadership Team before the submission of any data.

Monitoring and Review

Monitoring of the standards of children's work and of the quality of teaching in Mathematics is the responsibility of the Mathematics subject leader and Senior Leadership team. The work of the Mathematics Subject Lead also involves supporting colleagues in the teaching of mathematics, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school. Every term a report is written following Pupil Progress Meetings and analyses of whole school and class maths attainment; this will also link into target areas on the Schools Development Plan. A named member of the school's governing body is briefed to oversee the teaching of Mathematics. This link governor meets annually with the subject leader to review progress

Home-School Links

We regard the relationship with parents and carers very important in supporting their children's mathematics skills. We involve the parents in their children's learning by:-

- Providing regular parent's evenings twice a year and a drop-in session in Summer term as well as optional open afternoons when parents can look at, and discuss, their children's books.
- Sending home coverage sheets every term, detailing which areas of the curriculum have been taught and identifying if their child has achieved the taught objective
- Providing online coverage maps and curriculum maps on the school website which share the areas of maths that are being covered in each year group.
- Providing 'Rainbow Maths' documents and expectations on the school website
- Offering curriculum training sessions to inform parents on how we teach mathematics and how they can help through extra resources and encouraging additional work outside of the classroom to be undertaken
- Creating Times Table Rock Stars accounts for years 2-6
- Assigning MyMaths activities weekly as well as having 'open' activities available even when they are not set as a formal home learning for years 1-6.
- Providing 'Busy Things' access for all year groups to enjoy at home
- KIRF facts are also available on the website

Health and Safety

Please refer to the school Health and Safety Policy. Particular care is needed when working with pairs of compasses, scissors and use of the cooking facilities.

Roles and Responsibilities:

The subject leader for maths is responsible for the following areas:

- Ensuring understanding of the Renewed Framework amongst teachers, and teaching assistants.
- Attainment and progress in mathematics across the school.
- Keeping up to date with developments in maths teaching and policies.
- Observing colleagues and monitoring planning and quality of teaching.
- Providing and arranging INSET for staff.
- Leading by example in the way of teaching in own classroom.
- Preparing policy documents.
- Advising colleagues and helping to develop expertise.
- Encouraging the development of maths activities that are appropriately pitched and enable progress.
- Liaising with the Head Teacher, Leadership Team and Governors as appropriate.
- Making purchasing decisions.

- **Appendix 1- coverage sheets**

Maths Objectives: 	Taught	Achieved
Autumn		
Number and place value (within 10)		
Count to ten, forwards and backwards, beginning with 0 or 1, or from any given number.		
Count, read and write numbers to 10 in numerals and words.		
Given a number, identify one more or 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.		
Number - addition and subtraction (within 10)		
Represent and use number bonds and related subtraction facts within 10.		
Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.		
Add and subtract one digit numbers to 10, including zero.		
Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems.		
Geometry: Shape		
Recognise and name common 2-D shapes, including: (e.g. rectangles (including squares), circles and triangles).		
Recognise and name common 3-D shapes, including: (e.g. cuboids (including cubes), pyramids and spheres).		
Number and place value (within 20)		
Count to twenty, forwards and backwards, beginning with 0 or 1, from any given number.		
Count, read and write numbers to 20 in numerals and words.		
Given a number, identify one more or 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.		
Spring		
Number - addition and subtraction (within 20)		
Represent and use number bonds and related subtraction facts within 20.		
Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.		
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.		
Number and place value (within 50)		
Count to 50 forwards and backwards, beginning with 0 or 1, or from any number.		
Count, read and write numbers to 50 in numerals.		
Given a number, identify one more or 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.		
Count in multiples of twos, fives and tens.		
Measurement: length and height		
Measurement: Length and Height Measure and begin to record lengths and heights.		
Compare, describe and solve practical problems for: lengths and heights (for example, long/short, longer/shorter, tall/short, double/half).		
Measurement: weight and volume		
Measurement: Weight and Volume Measure and begin to record mass/weight, capacity and volume.		
Compare, describe and solve practical problems for 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].		
Summer		
Number: Multiplication and (including multiples of 2, 5 and 10)		
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.		
Number: Fractions		
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.		
Compare, describe and solve practical problems for: lengths and heights (for example, long/short, longer/shorter, tall/short, double/half)		
Compare, describe and solve practical problems for: 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].		
Geometry: Position and Direction		
Describe position, direction and movement, including whole, half, quarter and three quarter turns		
Number: Place Value (within 100)		
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.		
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, most, least.		
Measurement: Money		
Recognise and know the value of different denominations of coins and notes.		
Measurement: Time		
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.		
Compare, describe and solve practical problems for time [for example, quicker, slower, earlier, later].		
Measure and begin to record time (hours, minutes, seconds).		

Maths Objectives: 	Taught	Achieved
Autumn		
Number and place value		
Read and write numbers to at least 100 in numerals and in words.		
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.		
Use place value and number facts to solve problems.		
Count in steps of 2, 3 and 5 from 0, and in tens from any number, forward and backward.		
Number: Addition and Subtraction		
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 the addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.		
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.		
Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.		
Measurement: Money		
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.		
Number: Multiplication and Division		
Recall and use multiplication and division facts for the 2, 5 and 10 times tables, including recognising odd and even numbers.		
Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) sign.		
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts.		
Show that the multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.		

Spring		
Number: Multiplication and Division		
Recall and use multiplication and division facts for the 2, 5 and 10 times tables, including recognising odd and even numbers.		
Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.		
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts.		
Show that the multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.		
Statistics		
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 totaling and comparing categorical data.		
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.		
Number: Fractions		
Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity.		
Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.		
Measurement: Length and Height		
Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (liters/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 =.		
Summer		
Geometry: Position and Direction		
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).		
Order and arrange combinations of mathematical objects in patterns and sequences.		
Measurement: 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.		
Compare and sequence intervals of time.		
Measurement: Mass, Capacity and Temperature		
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 =.		

Maths Objectives: 	Taught	Achieved
Autumn		
Number and place value		
Identify, represent and estimate numbers using different representations.		
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.		
Read and write numbers up to 1000 in numerals and in words.		
Solve number problems and practical problems involving these ideas.		
Count from 0 in multiples of 4, 8, 50 and 100		
Number - addition and subtraction		
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.		
Number - multiplication and division		
Count from 0 in multiples of 4, 8, 50 and 100.		
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 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 objectives.		
Spring		
Number: Multiplication and Division		
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 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 objectives.		
Measurement: Money		
Add and subtract amounts of money to give change, using both £ and p in practical contexts.		

Statistics		
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.		
Measurement: Length and Perimeter		
Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).		
Measure the perimeter of simple 2D shapes.		
Number: Fractions		
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 and use fractions as numbers: unit fractions and non-unit fractions with small denominators.		
Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.		
Solve problems that involve all of the above.		
Summer		
Number: Fractions		
Recognise and show, using diagrams, equivalent fractions with small denominators.		
Compare and order unit fractions, and fractions with the same denominators.		
Add and subtract fractions with the same denominator within one whole [for example, $^3/_7 + ^1/_7 = ^4/_7$].		
Solve problems that involve all of the above.		
Measurement: Time		
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].		
Geometry: Property of Shapes		
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.		
Draw 2-D shapes and make 3-D shapes using modelling materials.		
Recognise 3-D shapes in different orientations and describe them.		
Measurement: Mass and Capacity		
Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)		

Maths Objectives: 	Taught	Achieved
Autumn		
Number and place value		
Count in multiples of 6, 7, 9. 25 and 1000.		
Find 1000 more or less than a given number.		
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.		
Count backwards through zero to include negative numbers.		
Number - addition and subtraction		
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.		
Measurement: Length and Perimeter		
Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.		
Convert between different units of measure [for example, kilometre to metre].		
Number - multiplication and division		
Recall and use multiplication and division facts for multiplicationtables up to 12 × 12.		
Count in multiples of 6, 7, 9. 25 and 1000.		
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.		
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.		
Spring		
Number: Multiplication and Division		
Recall and use 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.		
Measurement: Area		
Find the area of rectilinear shapes by counting squares.		

Number: Fractions		
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.		
Number: Decimals		
Recognise and write decimal equivalents of any number of tenths or hundredths.		
Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths.		
Solve simple measure and money problems involving fractions and decimals to two decimal places.		
Convert between different units of measure [for example, kilometre to metre].		
Summer		
Number: Decimals		
Compare numbers with the same number of decimal places up to two decimal places.		
Round decimals with one decimal place to the nearest whole number.		
Recognise and write decimal equivalents to ¼, ½ and ¾.		
Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths.		
Measurement: Money		
Estimate, compare and calculate different measures, including money in pounds and pence.		
Solve simple measure and money problems involving fractions and decimals to two decimal places.		
Measurement: Time		
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.		
Statistics		
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.		
Geometry: Property of Shape		
Identify acute and obtuse angles and compare and order angles up to two right angles by size.		
Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.		
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.		
Geometry: Position and Direction		
Describe positions on a 2-D grid as coordinates in the first quadrant.		
Plot specified points and draw sides to complete a given polygon.		
Describe movements between positions as translations of a given unit to the left/ right and up/ down.		

Maths Objectives:	Taught	Achieved
Autumn		
Number and place value		
Read, write, order and compare numbers to at least 1000000 and determine the value of each digit.		
Count forwards or backwards in steps of powers of 10 for any given number up to 1000000.		
Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero.		
Round any number up to 1000000 to the nearest 10, 100, 1000, 10000 and 100000.		
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.		
Number - addition and subtraction		
Add and subtract numbers mentally with increasingly large numbers.		
Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).		
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.		
Statistics		
Solve comparison, sum and difference problems using information presented in a line graph.		
Complete, read and interpret information in tables including timetables.		
Number - multiplication and division		
Identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 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 1,000.		
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.		
Measurement		
Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres.		
Calculate and compare the area of rectangles (including squares), including using standard units, square centimetres (cm^2) and square metres (m^2), and estimate the area of irregular shapes.		
Spring		
Number: Multiplication and Division		
Multiply and divide numbers mentally drawing upon known facts.		
Multiply numbers up to 4 digits by a one or two-digit number using a formal written method, including long multiplication for 2 digit numbers.		
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.		
Solve problems involving addition and subtraction, multiplication and division and a combination of these, including understanding the use of the equals sign.		
Number: Fractions		
Compare and order fractions whose denominators are 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 = $^{71}/_{100}$].		
Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.		
Number: Decimals and Percentages		
Read, write, order and compare numbers with up to three decimal places.		
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.		
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 ½, ¼, ⅕, ⅖, ⅘ and those fractions with a denominator of a multiple of 10 or 25.		
Summer		
Number: Decimals		
Solve problems involving number up to three decimal places.		
Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.		
Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.		
Geometry: Properties of Shape		
Identify 3D shapes, including cubes and other cuboids, from 2D representations.		
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.		
Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.		
Draw given angles, and measure them in degrees.		
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°.		
Geometry: Position and Direction		
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.		
Measurements: Converting Units		
Convert between different units of metric measure [for example, km and m; cm and m; cm and mm; g and kg; l and ml].		
Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.		
Solve problems involving converting between units of time.		
Measurement: Volume		
Estimate volume [for example using 1cm3 blocks to build cuboids		
(including cubes)] and capacity [for		
example, using water].		
Use all four operations to solve problems involving measure		

Objectives:	Taught	Achieved
Autumn		
Number and place value		
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.		
Number: Addition, Subtraction, Multiplication and Division		
Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.		
Multiply multi-digit number up to 4 digits by a 2-digit number using the formal written method of long multiplication.		
Divide numbers up to 4 digits by a 2-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 2-digit number using the formal written methods of division, 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 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		
Number: Fractions		
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 (e.g. 1/4 × 1/2 = 1/8).		
Divide proper fractions by whole numbers (e.g. 1/3 ÷ 2 = 1/6).		
Associate a fraction with division to calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8).		
Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are 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.		
Geometry: Position and Direction		
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.		

Spring		
Number: Decimals		
Identify the value of each digit in numbers given to 3 decimal places and multiply numbers by 10, 100 and 1,000 giving answers up to 3 decimal places.		
Multiply one-digit numbers with up to 2 decimal places by whole numbers.		
Use written division methods in cases where the answer has up to 2 decimal places.		
Solve problems which require answers to be rounded to specified degrees of accuracy.		
Number: Percentages		
Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison.		
Recall and use equivalences between simple fractions, decimals and percentages including in different contexts.		
Number: Algebra		
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.		
Measurement: Converting Units		
Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.		
Use, read, write, 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 3 d.p.		
Measurement: Perimeter, Area and Volume		
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 cm3, m3 and extending to other units (mm3, km3).		
Number: Ratio		
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 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.		
Summer		
Geometry: Properties of Shapes		
Draw 2-D shapes using given dimensions and angles.		
Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.		
Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.		
Draw 2-D shapes using given dimensions and angles.		
Statistics		
Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.		
Interpret and construct pie charts and line graphs and use these to solve problems.		
Calculate the mean as an average.		

Appendix 2- Example Unit Grid

	Unit Title: Number and Place Value	Grid 1

Key Vocabulary: Highlight the words that you know in pink and words you don't know YET in green.

digits	decimal point	tenths
millions	variety	hundredths
inequality	place-value	thousandths
decimal	order	convert

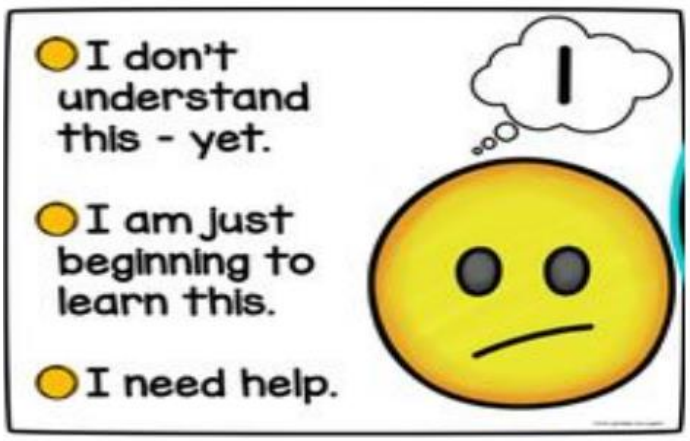
Maths Outcome: This week we will:

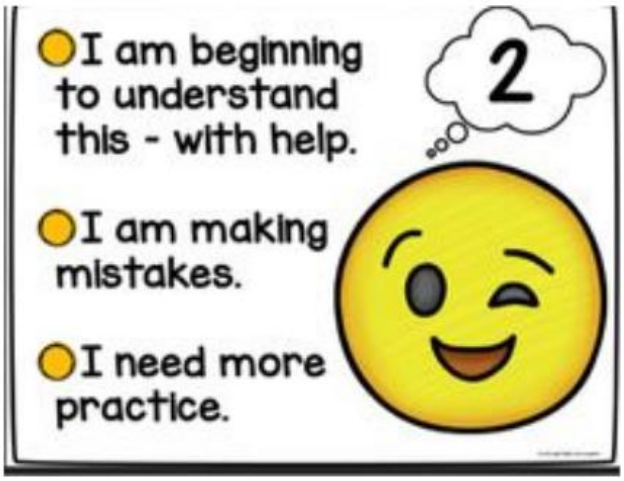
- I can convert a written number into its numerical representation;
- I can use a variety of methods, including place value tables and whole-part models;
- I can identify the value of a digit within a number.
- I can read numbers with up to nine figures;
- I can identify larger and smaller numbers relative to each other;
- I can use <, > and = to represent difference and equivalence.

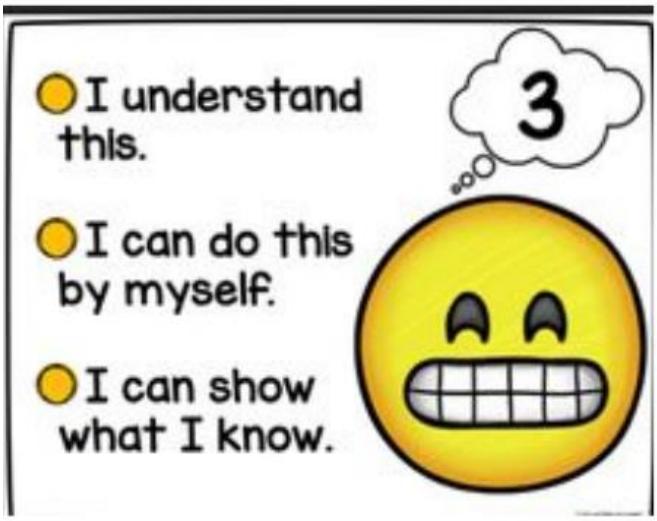
Student Teacher Dialogue:

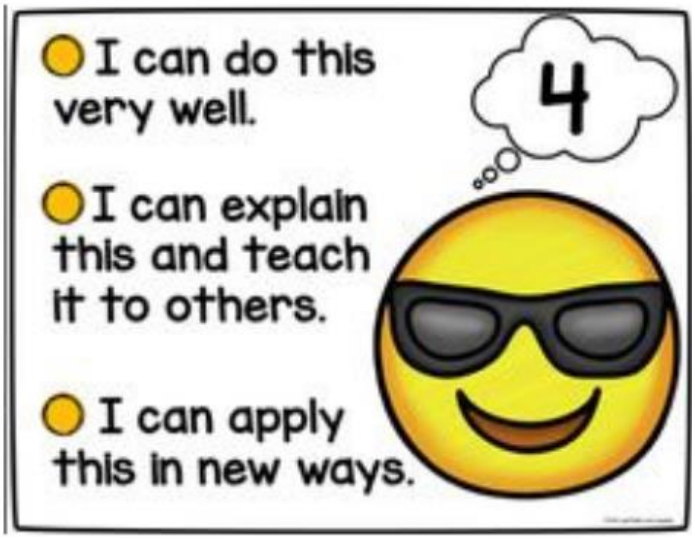
Success Criteria.

Appendix 3- Emoji Self Evaluation and Sentence Stems









I know that ..... because	It is always true because	It cannot be correct because .....
I think that ..... because	I chose this method because	I estimate it to be ..... because .....
If ..... , then	My conjecture is..... because	I have noticed that .....
I know ..... so I also know	I am certain because	This happens because .....

This links to my work on	This is my preferred method because	Here is another example of .....
I have spotted that	I used this strategy because	This does not follow the rule because .....
The pattern continues like this because	I found this work challenging because	
This is easy to solve because	It is sometimes true because