Sandy Hill Academy

Teaching and Learning Principles

Subject: Mathematics

Mission Statement:

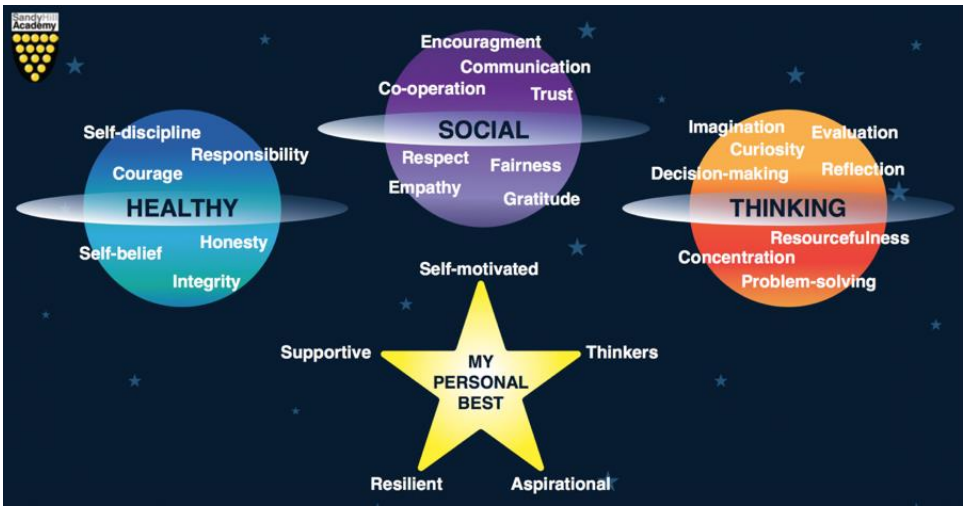
'Aspiring to achieve, determined to succeed'

Vision:

The mathematics curriculum at Sandy Hill has been designed to ensure that children possess the skills and knowledge that will affect them positively in their lives. Concepts have been carefully sequenced to enable learners to make connections, building upon prior knowledge. At the heart of the curriculum, driven throughout each academic year, will be fundamental fluency/arithmetic skills.

We aim to:

- Ensure that every child possesses key fluency skills to enhance their self-confidence and enjoyment of mathematics in order to develop their understanding of the world.
- Develop pupils' reasoning skills using precise mathematical vocabulary
- Build pupils' understanding through applying their skills to problem-solving activities and real-life links



Mathematics Expectations (National Curriculum 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.

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. The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

EYFS

Within the **EYFS Framework 2021**, Mathematics is known as a 'specific' area.

'Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep conceptual understanding of the numbers to 10, the relationships between them and the patterns therein. By providing frequent and varied opportunities to build and apply this understanding – such as using manipulatives – children will develop a secure base of knowledge from which mathematical mastery is built. In addition, children's curiosity about number, shape, space and measure should be encouraged and furthered through opportunities to apply their growing understanding of the mathematical world to the world around them.'

Area	***Early Learning Goals (ELG)***
Numbers	*Have a deep understanding of number to 10, including the composition of each number. *Subitise (recognise quantities without counting) up to 5. *Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.
Numerical Patterns	*Verbally count beyond 20, recognising the pattern of the counting system. *Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. *Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

In our Nursery and Reception classes, aspects of Mathematics are taught on a daily basis through: whole class/small group teaching, continuous provision areas and outdoor activities. Children have lots of opportunities to hear, discuss and explore mathematics- adults reflect upon learners' requirements, interests and the ways they learn best, to support effective planning and provision

We use Tapestry, our online learning journal, to record and track children's progress and achievements in Mathematics against the ELGs. Children who need additional support are identified and interventions are put in to place when appropriate. Children's progress within Mathematics is reported to parents through: settling in meetings, sharing learning journals and regular communication. In line with statutory requirements children are assessed against the Early Learning Goals for Mathematics at the end of the Reception year and this is reported to the LA and parents.

Planning

As a school we use a range of resources (including NCETM and Number Sense) to support effective planning of Mathematics. We use curriculum overviews and curriculum maps to ensure comprehensive and cohesive coverage of the curriculum, ensuring children's prior knowledge is built upon within a unit, year on year.

As part of every school day, a dedicated fluency session is timetabled where children have ample time to learn, practice, refine, rehearse and recall fundamental declarative and procedural skills. (OFSTED Research Review Series, Mathematics, May 2021). KS1 and Year 3 (Autumn Term only) use the Number Sense resource to secure declarative knowledge (number facts) and Year 4-6 employ an iterative approach to furthering pupils' declarative knowledge (including times tables) and developing procedural skills (e.g. long multiplication).

The main mathematics sessions enable children to delve deeply into specific units i.e., Place Value. Curriculum maps identify key areas within units (as outlined by the Ready to Progress Criteria documentation, NCETM) where teachers provide additional focus on these areas to support children's progress in their mathematics education. Teachers assess prior understanding and ensure that previous gaps in learning are addressed within their class' current unit.

Within planning, learning objectives are matched directly to the National Curriculum. Associated vocabulary is also included on marking ladders to support learners in reasoning with precision.

A typical lesson within KS1 and KS2 at Sandy Hill may look like this:

Fluency Session	Whole Class Teaching	Independent Activities	GDS All
Discrete of teaching declarative skills (number facts) Rehearsal of declarative skills. Teaching arithmetic (procedural) skill. Metacognition – I do, we do, you do. 15 minutes of procedural skills practice with immediate intervention where necessary. Sometimes, elements of this session could take the form of a game or a physical activity where learners complete, 5, 10 or 15 minute physical activities (30:30) e.g. squat you know, hoop games.	Learning objective is shared by the teacher with learners. Vocabulary is shared and opportunities to address knowledge gaps given. I do, we do, you do – metacognition modelling is provided for the children Children are given opportunity to reason about the learning they have just acquired. Challenge questions are provided for children to deepen their understanding	Children have ample time to practise their skills they have acquired. Fluency activities can be varied conceptually (images used) or procedurally (e.g. missing numbers) however sometimes it may be appropriate to solidify understanding in one way before further variation Challenges move forward coherently in small steps, allowing children to link their understanding. Reasoning and problem-solving activities can be built into any stage of the independent activity when appropriate. Mistakes are celebrated.	All children are given opportunity to apply their mathematical understanding to a question/activity or situation that requires deeper application of that concept. This can be done through whole class discussion, small group, paired work or independently.

Skills Progression:

At Sandy Hill, we use the objectives from the National Curriculum, alongside the Ready to Progress Criteria (NCETM, DfE) to ensure a full breadth of coverage, where the core mathematical concepts are at the heart of our curriculum. Each year, new learning builds upon prior knowledge and consolidates pupils' understanding. We track learner progress carefully and ensure gaps in pupil understanding are addressed accordingly.

Example of Ready to Progress Criteria Progression

An example of progression within Place Value

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NPV	1NPV–1 Count within 100, forwards and backwards, starting with any number.		3NPV–1 Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three-digit multiples of 10.	4NPV–1 Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100.	5NPV–1 Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.	6NPV–1 Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000).

Example of progression of Place Value on curriculum maps

Place Value Progression Overview
Objectives taken from National Curriculum
Objectives in bold taken from Ready to Progress Criteria document (see document links)

Year 1	***Count within 100, forwards and backwards, starting with any number.*** ***Reason about the location of numbers to 20 within the linear number system, including comparing using < >and =*** To 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 To read and write numbers from 1 to 20 in numerals and words. To given a number, identify 1 more and 1 less ***Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers***
Year 2	To count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward ***Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10.*** ***Recognise the place value of each digit in two-digit numbers, and compose and decompose two-digit numbers using standard and nonstandard partitioning*** To compare and order numbers from 0 up to 100; use <, > and = signs To read and write numbers to at least 100 in numerals and in words To identify, represent and estimate numbers using different representations, including the number line
Year 3	***Calculate complements to 100.*** ***Recognise the place value of each digit in three-digit numbers, and compose and decompose three-digit numbers using standard and non-standard partitioning*** ***Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three-digit multiples of 10.*** To compare and order numbers to 1000. To find 10 or 100 more or less than a number. To write numbers in numerals and words To count in multiples of 50 or 100. ***Reason about the location of any three-digit number in the linear number system, including identifying the previous and next multiple of 100 and 10.*** ***Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts.***
Year 4	To count in multiples of 25 and 1,000 To find 1,000 more or less than a given number To count backwards through 0 to include negative numbers ***Recognise the place value of each digit in four-digit numbers, and compose and decompose four-digit numbers using standard and nonstandard partitioning*** ***Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100.*** To order and compare numbers beyond 1,000 To identify, represent and estimate numbers using different representations ***Reason about the location of any fourdigit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each*** ***Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts*** To read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of 0 and place value.
Year 5	***Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and nonstandard partitioning*** To read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit To count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 To interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through 0 To round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000 ***Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01.*** ***Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.*** ***Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts*** ***Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.*** To read, write, order and compare numbers with up to 3 decimal places To solve problems involving number up to 3 decimal places To solve number problems and practical problems that involve all of the above To read Roman numerals to 1,000 (M) and recognise years written in Roman numerals.
Year 6	***Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and nonstandard partitioning.*** ***Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts.*** ***Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000)*** To round any whole number to a required degree of accuracy To use negative numbers in context, and calculate intervals across 0

Teaching and Learning Expectations:

- Mathematics will be taught five times a week: as a session each day or two sessions within a mathematics morning/afternoon.
- Every day, a fluency session will occur, even on an English morning.
- All children are able to access Mathematics. 'Pupils with SEND benefit hugely from explicit systematic instruction and rehearsal of declarative and procedural knowledge.' (OFSTED Research Review Series, Mathematics, May 2021.)
- All children have access to appropriate manipulatives and pictorial images if required but the teachers must plan for how children can move away from these as reliance upon these can hinder children's progression through the curriculum.
- Teachers to use curriculum maps to ensure comprehensive and cohesive coverage
- Teachers need to balance introducing new content with pupils' need to spend time revisiting content.
- Within a unit, learning is sequenced carefully to ensure content is embedded in pupils' long-term memory.
- Strategies for solving problems are best taught and learned once pupils can recall and deploy facts and methods at speed and accuracy
- All lessons will clear instruction and rehearsal
- Class blogs and social media to include examples of Mathematics

Working Walls/Displays:

All classes to display current Mathematics learning on working wall. They must include: key vocabulary, WAGOLL (What a good one looks like), children's work, reasoning sentence starters, key vocabulary and, when appropriate, 'juicy' mistakes.

- Corridor display (main building) showcasing effective mathematics across the school
- Hall display with levels of success for Numbots and Times tables Rockstars.
- Class leader boards in KS2 for Times Tables Rockstars.
- In classrooms, numbers/number lines are present in the classroom to support learners
- In classrooms, fixed display posters of new/hard to remember learning (see below) which remain throughout a term/for the year. E.g. parallel and perpendicular may be there all year to help pupils retain this knowledge.

Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Numbers 1-20 2D and 3D Shape Names Subitising numbers	Numbers 1-20 Subitising numbers Counting in 2,5,10 Shown pictorially and with digits Add and subtract number sentences 2D and 3D Shape Names Number bonds to 20	Numbers 1-100 Number bonds to 20 and 100 Place Value 10s and 1s Counting in 2,5,10 Shown pictorially and with digits and as times tables 2D and 3D Shape Names Half of objects, turn and shaded Quarter and Three Quarter of objects, turn and shaded	Numbers 1-100 Number bonds to 10, 20 and 100 Place value 100s, 10s and 1s 1/3, ¼, 2/4, ¾ of a shape, turn and shaded 2,3,4,5 and 10 times table and multiples More than, less than symbols £ and pence Vertices, faces, edges	All times tables to 12x12 Multiples of 50 and 100 (to 1000) Tenths as a decimal and as a fraction Place Value 1000s, 100s, 10s and 1s Clock times: to nearest minute including on a 24 Hour Clock Roman numeral date Equivalent fractions (small denominators)	All times tables to 12x12 Roman numeral date Place Value 1000s, 100s, 10s and 1s Clock times: to nearest minute including on a 24 Hour Clock Tenths and hundredths as fractions and decimals Decimal equivalence to ½, 1/3, ¼, ¾, Rounding numbers rules	All times tables to 12x12 Roman numeral date Place value to one million with 3dp Clock times: to nearest minute including on a 24 Hour Clock Rounding numbers rules Area/Perimeter or shapes Angles at a straight line or round a point Square/cube number sequences	Roman numeral date Place Value to ten million with 3dp Rounding numbers rules Area/Perimeter of shapes- formulas Circles – diameter, circumference, radius FDP equivalents Measures: conversions Including miles to Km 5=8 Pie Charts

		Clock times to hour and half past Day, month, week, year	Clock times to 5 minute intervals	Parallel and perpendicular Horizontal, vertical and diagonal lines Four types of angles	Finding co-ordinates, x then y axis Negative numbers on a numberline Quadrilateral Triangle types	FDP equivalents Measures: conversions Prime Numbers Factor Bugs with Prime Factors	Angles at a straight line or round a point or vertically opposite Prime Numbers Ratio and proportion table with total Year 6 Algebra – nth term or Identifying values

Classroom Resources:

Classroom resources are available for all learners to access. Children are taught how to use them and are guided towards what resources might be useful; children can also select and choose independently during lessons. Resources link with our school calculation policy. Teachers must plan for how children can move away from these as reliance upon these can hinder children's progression through the curriculum. (OFTED Review Series: Mathematics, May 2021.)

Below is a list of what resources are permanently found in classrooms to support learners' understanding.

EYFS

Various objects to count

Cubes

Numicon

Dice

Tens Frames

KS1 Classroom Resources

Base 10

Place Value Counters – Up to 100

Cubes

Numicon

Dice

Tens Frames

KS2 Classroom Resources

Base 10 – including 1000s

Place Value Counters – Up to 1,000,000

Cubes

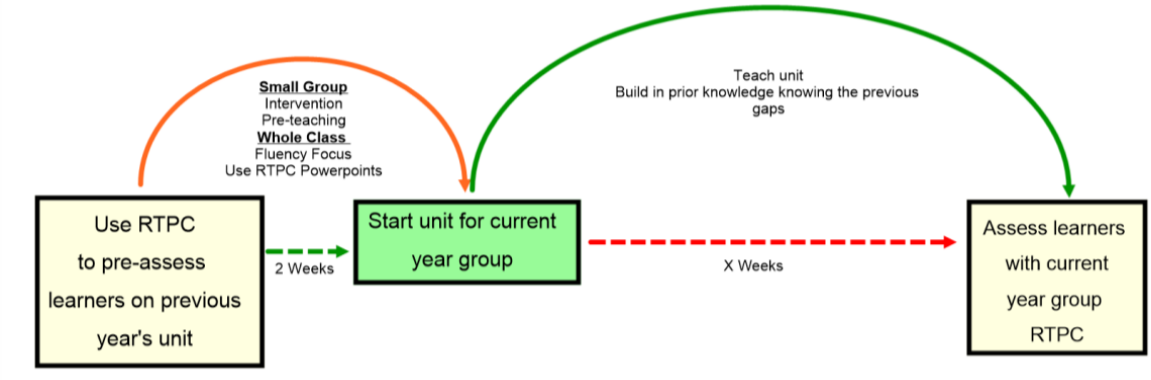
Arrow Cards

Dice

Cuisenaire Rods

Monitoring/Assessment:

- Summative assessment: Twinkl tests, end of unit assessments to identify children who are WTS, EXS and GDS.
- Use of Ready to Progress Criteria (RTPC) to ensure key concepts are developed.



- Formative assessment techniques within lessons
- Pupil Conferencing
- Learning Walk/Lesson Observations
- Work Scrutiny
- Progress review meetings