



Maths at St. Andrew's

Updated November 2022

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ST. ANDREW'S CE (VA) JUNIOR SCHOOL

"Promoting Excellence Within a Caring Christian Community"

Mathematics Policy

1 Introduction

Maths provides pupils with a powerful set of tools with which to calculate, reason and solve problems. The National Curriculum for mathematics describes what must be taught in each year group. At St Andrew's Junior CE (VA), all year groups follow the National Curriculum (2014) using the school's long term plan that covers the objectives. Children need to master key mathematics skills, rather than striving to solely achieve the next objective year on year. The aim of the curriculum is to instill a deeper understanding of mathematics, such that it can be applied to different contexts within the field.

2 Rationale

It is important to create a whole school approach, of which staff, children, parents and governors have a clear understanding. This agreement reflects how essential mathematics is in the education of our pupils. Understanding the relationships and patterns that form between numbers is important for pupils to solve problems, within their education as well as their everyday life. Therefore it is imperative that a positive attitude towards maths is encouraged amongst all of our pupils, in order to nurture self-confidence and a sense of achievement. To help create this attitude, we will teach through a concrete, pictorial, abstract (CPA) approach that develops a deep and sustainable understanding of maths via a wide range of fluency, reasoning and problem-solving tasks.

3 Principles

We ensure that:

- policy and provision are evaluated and reviewed regularly
- resources of time, people and equipment are planned, budgeted for and detailed when appropriate
- the governing body fulfil their statutory responsibility with regard to maths
- cross curricular opportunities are planned for where appropriate
- the planning of maths ensures continuity and progression across all year groups and key stages

4 Aims

General

We aim to provide the pupils with a maths curriculum which will produce individuals who are numerate, literate, creative, independent, inquisitive, enquiring and confident. We aim to provide a stimulating environment, so that pupils can develop their mathematical skills to their full potential.

Specific

Our pupils should:

- enjoy learning through practical activity, exploration and discussion
- have a good number sense and understanding of the size of a number and where it fits into the number system
- recall key facts such as number bonds, multiplication tables and division facts, doubles and halves
- calculate accurately and efficiently, both mentally and in writing, using a range of calculation strategies
- make sense of number problems, recognising the operations required to solve them
- explain their methods and reasoning using the correct mathematical terms
- judge whether their answers are reasonable and have strategies for checking them where necessary
- suggest suitable units for measuring and make sensible estimates of measurement
- explain and make predictions from the numbers in graphs, diagrams, charts and tables
- develop spatial awareness and an understanding of the properties of 2D and 3D shapes

5 Teaching & Learning Style

Our school uses a variety of teaching and learning styles in maths lessons. Our main aim is to develop children's knowledge, skills and understanding in maths.

This is achieved by:

- a daily lesson that has a high proportion of whole class and group directed teaching.
- the use of mathematical equipment and the 'Hands on Maths' resource to encourage the use of CPA approach and to reinforce the curriculum objectives.
- the frequent use of My Mini Maths to consolidate learning and the four operations.
- a weekly 'Quick 6' to consolidate mathematical vocabulary, the skill of telling the time on an analogue clock as well as a geometry and statistic focus.
- a weekly focus on arithmetic and the teaching of strategies to approach such questions.
- extension and challenge tasks that move learning on and give children the opportunity to reason, explain why and find multiple solutions to questions.
- teaching in mixed ability classes, with the support of a teaching assistant in each classroom
- modelling and encouraging the children to use maths talk so that they are able to ask and answer questions whilst explaining their learning and understanding in a confident and coherent manner.
- the use of consistent working walls in the classroom environment, which will build on prior learning, showcase the current learning journey, include mathematical sentence stems and highlight key vocabulary.

- the use of consistent resources throughout school will ensure that the children learn through a CPA approach that develops a deep and sustainable understanding of maths.
- the consistent use of red, yellow and green assessment boxes so that children can reflect on their own understanding and sense of achievement in individual lessons
- the use of consistent AFL strategies throughout individual lessons such as: thumbs up/ thumbs down from children, the use of individual whiteboards and assessment boxes.
- using ICT to enhance learning, and to complete homework.
- encouraging the use and application of their learning in everyday situations, through real life problems and longer investigations.

In all classes, children have a wide range of mathematical abilities. In recognition of this, we provide suitable learning opportunities for all children; matching the challenge of the task to the ability of the child. We achieve this through a range of strategies; through differentiated questions, or mixed -ability paired work on tasks, problems or games. The support of teaching assistants helps to ensure that work is matched to the needs of individuals.

We follow a specific plan for teaching written calculations in maths. Our Written Calculations policy outlines progression in the four operation calculations; addition, subtraction, multiplication & division.

In all classes, in all lessons, we follow a structure of learning that incorporates the key strands of fluency, reasoning and problem solving. We colour code the resources to ensure consistency across the federation and strengthen the transition for our KS1 children as they progress to KS2.

DO	Fluency/ Do	Think Pink	Explain	Solve
Use concrete manipulatives	Simple calculations and questions	Varied fluency	Reasoning	Problem Solving

All classes adapt an 'I do, We do' approach throughout the teaching sequence to ensure there are opportunities to address marvellous mistakes and check key understanding. Mini-whiteboards are used alongside mathematical conversations with the children's learning partners. We celebrate mistakes and use them as a teaching tool in order to embrace a growth mindset and foster a positive, learning environment.

All children have a maths glossary in the back of their exercise books. Children record definitions and examples of mathematical terminology with the aim to have a personal bank of vocabulary that they can continue to refer to throughout their learning journey.

Classroom Environment

All classrooms have a maths working wall that is consistent throughout school. It is a squared whiteboard. The squares can aid presentation as this can be mirrored by the children in maths books. It can also be updated and edited regularly and showcase current mathematical learning. It links prior learning, shows a clear learning journey, includes the times table focus, sentence stems for verbal reasoning, key vocabulary and examples that children can refer to throughout the week/duration of the topic.

Consistently through school, we have access to maths dictionaries that contain definitions of key mathematical terminology. These are available in the environment so that children can become

independent learners and take ownership of their thought process when problem solving. It is important the understanding of language does not form a barrier to children being able to access the maths learning.

We also have Maths Toolboxes that contain key resources that will help aid learning for all and consolidate the concrete, pictorial and abstract way of learning.

All classrooms have a stadiometer measuring tool. It highlights appropriate units of measurement for height and provides a context for learning. The children have opportunity to convert units, draw comparisons with their peers and place measurement in a real-life context that is personal for the children.

All classrooms have a digital and analogue clock, which are placed together in the environment. This enables the children to see how the digital time is visually represented on a clock face, whilst promoting a further understanding of calculating time intervals. The school hall (communal area for all pupils) has four analogue clocks, which display various time zones from around the world to further all children's understanding of time zones around the world.

All classrooms are equipped with a visualiser to aid the modelling of concrete resources, drawing of pictorial strategies and emphasise standards of presentation and showcase WAGOLLS to children.

All classrooms have 3 large colour coded boxes (red, yellow and green) which are used as a formative assessment strategy. At the end of each lesson, children are asked to place their maths book in the box that they feel is most appropriate to them, dependant on their level of success and confidence for the maths objective on that specific day. Targeted same day intervention is then organised by the class teacher and teaching assistants through prioritising the red and yellow box.

Homework

Children are set weekly homework tasks which strengthen and consolidate their learning of times tables. Alongside this, all children in school have a log in and access to TT Rockstars (an online maths resource where children can complete games and activities related to times tables).

Times tables

We follow a specific plan for the teaching of times tables to ensure children are consistently using and revisiting their prior knowledge. It is important the children are taught the times tables in a progressive, systematic manner whilst having the opportunity to practise them independently.

In each classroom, we use a counting stick, the 'Talking Times Tables' resource pack as well as the resource sheets from TT Rockstars. Children have the opportunity to identify and discuss patterns as well as use their number sense and ability to calculate mentally. They also have the opportunity to use ICT to access TT Rockstars and URBrainy to aid preparation for the multiplication checker and to consolidate key multiplication and division facts.

To help motivate children we have a 'Mathematician of the Week', and also have 'Rockstar Battles' where children compete to earn the most points on TT Rockstars. This is then celebrated during Golden Book Assembly.

All classes, use a baseline assessment tool via TT Rockstars to establish individual starting points at the start of each year group. The heat map collated by TT Rockstars is used as an AFL strategy throughout the year and is regularly recorded in planners, so that all staff, adults at home and the children themselves can visibly see which facts they have rapid recall for and which should be targeted and prioritised.

Heat Map Heat maps show you how quickly children are responding to each fact.

	2	3	4	5	6	7	8	9	10	11	12
2	2 x 2	2 x 3	2 x 4	2 x 5	2 x 6	2 x 7	2 x 8	2 x 9	2 x 10	2 x 11	2 x 12
3	3 x 2	3 x 3	3 x 4	3 x 5	3 x 6	3 x 7	3 x 8	3 x 9	3 x 10	3 x 11	3 x 12
4	4 x 2	4 x 3	4 x 4	4 x 5	4 x 6	4 x 7	4 x 8	4 x 9	4 x 10	4 x 11	4 x 12
5	5 x 2	5 x 3	5 x 4	5 x 5	5 x 6	5 x 7	5 x 8	5 x 9	5 x 10	5 x 11	5 x 12
6	6 x 2	6 x 3	6 x 4	6 x 5	6 x 6	6 x 7	6 x 8	6 x 9	6 x 10	6 x 11	6 x 12
7	7 x 2	7 x 3	7 x 4	7 x 5	7 x 6	7 x 7	7 x 8	7 x 9	7 x 10	7 x 11	7 x 12
8	8 x 2	8 x 3	8 x 4	8 x 5	8 x 6	8 x 7	8 x 8	8 x 9	8 x 10	8 x 11	8 x 12
9	9 x 2	9 x 3	9 x 4	9 x 5	9 x 6	9 x 7	9 x 8	9 x 9	9 x 10	9 x 11	9 x 12
10	10 x 2	10 x 3	10 x 4	10 x 5	10 x 6	10 x 7	10 x 8	10 x 9	10 x 10	10 x 11	10 x 12
11	11 x 2	11 x 3	11 x 4	11 x 5	11 x 6	11 x 7	11 x 8	11 x 9	11 x 10	11 x 11	11 x 12
12	12 x 2	12 x 3	12 x 4	12 x 5	12 x 6	12 x 7	12 x 8	12 x 9	12 x 10	12 x 11	12 x 12

This resource enables personalised learning and the opportunity for children to take ownership through identifying their own strengths and areas for development.

Adults at home have communicated that it is useful to visually see which facts can be prioritised. It establishes a starting point and clear guide as both school and home collaboratively work together with the overall aim that all children will have rapid recall of all times tables.

0-1s	1-2s	2-3s	3-4s	4-5s	5-6s	6-7s	7-8s	8-9s	9-10s	>10s
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Teaching of Times tables

Year 3: Prioritise and assess the children's knowledge of the 2's, 5' and 10's (Ks1 learning)

Discretely teach the 3 x, 4 x and 8 x table

- Children are encouraged to use their knowledge of doubling
- 5 x and 10 x are referred to as key facts when teaching a new table on the counting stick enforcing the concept that multiplication is commutative.

For instance, if 5 x 8 is not secure can the children solve 8 x 5?

Resources: Counting Stick, Talking Times tables, TT Rockstars

Year 4: Prioritise and assess the children's knowledge of the 2's, 5's and 10's as well as the times tables taught in the previous year group. (3x, 4 x and 8 x)

The expectation for the end of Year 4 is that all children will have rapid recall of all times tables and will need to be prepared for the multiplication checker towards the end of the year.

Children are encouraged to spot patterns and use their knowledge of doubling

2 x ... 5x ...10x (consistently referred to throughout the teaching of new tables as supportive strategies to enforce multiplication is commutative and facts we already know)

-Revisit 3 x - Teach 6 x - Teach 12 x

- Revisit 4x -8 x

- Teach 7 x

-Revisit 10 x -Teach 9 x -Teach 11 x

Resources: Counting stick, Talking Times tables, TT Rockstars, URBrainy

Year 5 Prioritise and assess the children's knowledge of the 2's, 5's and 10's

Adults to be aware of class data regarding the multiplication checker the previous year

Assess the children's prior knowledge of all tables through the use of a baseline assessment and TT Rockstar Heatmap

Continue to revisit and teach all times tables in the agreed order to promote patterns and number sense. 2 x ... 5x ...10x (consistently referred to throughout the teaching of new tables as supportive strategies to enforce multiplication is commutative and facts we already know)

-Revisit 3 x -Teach 6 x -Teach 12 x

-Revisit 4x -8 x

- Teach 7 x

-Revisit 10 x -Teach 9 x - Teach 11 x

Resources: Counting stick, Talking Times tables, TT Rockstars, URBrainy

Year 6

Assess the children's prior knowledge of all tables through the use of a baseline assessment and TT Rockstar Heatmap

Continue to revisit and teach all times tables in the agreed order to promote patterns and number sense

2 x ... 5x ...10x (consistently referred to throughout the teaching of new tables as supportive strategies to enforce multiplication is commutative and facts we already know)

-Revisit 3 x - Teach 6 x - Teach 12 x

-4x -8 x

- Teach 7 x

-Revisit 10 x -Teach 9 x - Teach 11 x

Resources: Counting stick, Talking Times tables, TT Rockstars, URBrainy

6 Planning

Maths is a core subject in the National Curriculum. We use the Curriculum 2014 and the White Rose Maths scheme of learning as the basis for implementing the statutory requirements. We carry out curriculum planning in mathematics in three phases; long-term, medium-term and daily lesson plans. Our long-term plans identify the key strands which we teach throughout the year. Our medium-term plans, adapted from the small steps from the White Rose Maths scheme show the order throughout the year, that objectives should be taught to ensure progression through the curriculum that builds on prior learning. The weekly plans list the specific learning objective for each lesson, how the lesson is to be taught and the steps to success. These plans are written by and adapted by the class teacher whilst being shared with teaching assistants who are supporting children in lessons.

The daily lesson plan proforma has been adapted to ensure consistency of the agreed teaching and learning sequence. It requires teachers to:

- Identify relevant prior knowledge
- Consider key mathematical language
- Pre-empt marvellous misconceptions
- Include key questioning and sentence stems
- Identify the times table, mini-maths and quick 6 focus
- Opportunities for concrete and pictorial strategies in the teaching sequence
- The progression of fluency, reasoning and problem solving for each objective

7 Maths across the curriculum

Throughout the whole curriculum, opportunities to extend and promote maths should be sought. Links are made with other subjects when relevant, and part of the topic (see Maths across the

curriculum document) Maths contributes to a variety of subjects in the primary curriculum, often in practical ways. For example, science makes use of key maths skills such as counting, calculating, estimating and recording information in tables and graphs. Furthermore, skills such as measuring and understanding shape and symmetry often cross curricular in to art, and design and technology. The study of maps in geography relies upon knowledge of co-ordinates, angles, direction, position and scale. Mathematical skills are applied in computing and ICT to enable data handling and the use of spreadsheets and number programmes.

Maths also contributes to the teaching of personal, social and health education. Working outside their normal lessons encourages independent study and encourages them to become increasingly responsible for their own learning. Encouraging the children to work together in lessons, as pairs or teams, encourages discussion of ideas and results, furthering their understanding of mathematics. However, this group work also contributes to their social development and interaction.

Nevertheless, the prime focus should be on ensuring '*mathematical progress*' delivered discretely or otherwise.

8 Special Educational Needs and Inclusion

Our aim is to provide a broad and balanced education for all pupils. Children with SEN are taught within the daily maths lesson and differentiated for appropriately (e.g. suitable learning style, level of work, numerous small activities to aid concentration, apparatus, adult support).

Children who have been identified as continually achieving below age-related expectations will receive, when needed, individual or small group sessions with a teaching assistant for pre - teaching or targeted work.

How we cater for children who are above age-related expectations

The most able children in maths will be taught with their own class and stretched through differentiated work and extra challenges to deepen their learning. Children will be encouraged to find more than one solution where appropriate, use different methods and strategy of approach when problem solving and use a wide range of explicit terminology when reasoning whilst simultaneously being expected to use diagrams and drawings to represent their understanding. When working with the whole class, teachers will direct questions towards these children (at their ability level) to maintain their involvement and extend their thinking.

9 Resources

Each classroom has: an analogue and digital clock, a stadiometer, a selection of maths dictionaries, a counting stick, Talking Times tables pack and supply of concrete and pictorial resources that are accessible to children if needed. Those resources which are not used or required regularly are stored centrally and accessed by teachers at the beginning of a topic.

Online resources:

- White Rose Maths
- Classroom Secrets
- Testbase Questions
- Diagnostic Questions
- Mini Maths

- NTS tests
- SATs tests
- TT Rockstar analysis tools
- URBrainy
- Maths.co.uk

10 Assessment

The ethos of the curriculum is one where we are embedding a depth and mastery of the learning objectives. Assessing children's depth of knowledge and ability to apply this into other contexts is our priority. We currently use a variety of ways to assess the children in maths throughout the year. Some of the formative assessment tools and materials we use are:

- Prior-learning quizzes
- Daily use of mini-maths
- Weekly use of quick 6
- Glossaries
- Diagnostic questions specific to objectives
- The colour coded assessment boxes in each classroom
- Use of mini-whiteboards (I do. We do)
- Pupil voice- thumbs up/ thumbs down
- TT Rockstar Heat maps
- TT Rockstar sheets
- UR Brainy
- Live marking and circulation of the classroom in lessons
- End of unit assessments

The levels the children are working at are entered on to Target Tracker on a termly basis and those are analysed by SLT.

Children are legally required to be assessed formally by the multiplication checker in Year 4 and by SATS at the end of the Key Stage 2. The results of these assessments will be collected and analysed by the subject leader, and the resulting information will be given to staff to improve the future teaching of maths. It will be communicated specifically with Year 5 teachers which children did not 'pass' the multiplication checker so that appropriate catch-up interventions can be organised.

Assessment is regarded as an integral part of teaching and learning and is a continual process. It is the responsibility of the class teacher to assess all pupils in their class.

At St Andrew's Junior CE (VA) school, we strive to make our assessment purposeful, allowing us to match the correct level of work to the needs of the pupils. Information for assessment is gathered in various ways: talking to children, observing their work, marking etc. These assessments will be used to plan future work, to ensure pupils are both challenged and supported. Teachers will indicate to children their next steps and learning targets on a regular basis through live marking and written feedback.

Children who receive intervention programmes will be highlighted on the pupil tracker and passed up to the next teacher. This will enable their progress to be tracked and a decision made as to the impact of the intervention programme.

11 Monitoring and Evaluation

The Maths co-ordinator, alongside the Senior Leadership Team, is responsible for monitoring and evaluating curriculum progress. This is done through book looks, analysis of planning, learning walks, pupil interviews, staff discussions and audit of resources.

11 Review

The mathematics policy will be continuously updated and reflected upon in our practice throughout the school year.

Quality of Education

Intent

At St. Andrew's, we want every child to be a confident, fluent mathematician. When the children join us from KS1 we continue to develop their mathematical learning in a way that helps them have good number sense. We build upon the principal focus of mathematics teaching in KS1 where pupils have developed confidence and mental fluency with whole numbers, counting and place value. This enables them to continue to confidently reason and approach problem solving in a resilient, positive manner with a range of approaches to assist them.

Our mathematics learning is developed and delivered through a 'spiral curriculum', where skills and knowledge are revisited throughout the year and throughout school. Children have access to concrete materials that help them develop both skills and knowledge. As they grow in confidence, they are able to communicate their mathematical thinking in pictorial and abstract forms.

Maths learning is differentiated to ensure inclusion of all our children. In this way, we give our children the opportunity to flourish not only in education but in life. We teach a broad and balanced curriculum, one that incorporates real life problems and show how maths is used in the world on a day to day basis.

The mathematical learning the children undertake at St. Andrew's enables them to flourish in life and prepares them well, not just for their KS3 education, but for life. We give the children number and mathematical skills that will help them through their adult life and in their future careers.

Implementation

The school follows the White Rose maths long-term plan that meets the needs of the children in our school. The maths leads checks the short and long term plans to ensure coverage of the National Curriculum content and to ensure that fluency, reasoning and problem solving runs through all learning. To embed mathematics learning and knowledge we use concrete and pictorial representations before moving on to the abstract methods- this is something that is also monitored. We re-visit key concepts and topics throughout the year encouraging the children to build on their prior knowledge and use what they already know. By doing this we are developing confident mathematicians who have a good number sense who can achieve depth in their learning.

Lessons are planned to allow all children to access the maths curriculum. Teachers use a variety of resources to ensure all children are challenged, including those working at greater depth. SEND pupils are supported through differentiated learning activities. This may include the children working from a different year groups curriculum, differentiating through outcome, support or through simplifying the learning objective. We are careful to ensure that children do not always have to demonstrate learning through written work in books to ensure we can assess their mathematical skills in ways that are appropriate to children's needs. Where possible, maths learning is practical and active.

As with all subjects, there is much information to take in. In order to help children retain key information we revisit topics in different ways. On a daily basis, children are discretely taught their times tables and complete tasks that allow them to re-visit and practise using the four operations

as well as other areas of maths. Flashback 4 Quick 6 resources are also used to promote knowledge recall.

Children will either complete a weekly arithmetic test or targeted maths learning as well as taking part in regular problem solving lessons. All of this helps to embed key information and gives children confidence to apply their knowledge.

Assessment is ongoing throughout each maths topic. Teachers ensure they use the Small Steps and the Ready to Progress documents outlined by White Rose Maths to assess learning and understanding. Target Tracker is updated on a termly basis. AfL is used regularly in lessons and misconceptions quickly clarified. Summative assessment takes different forms but may include a knowledge based test, a maths reasoning or problem solving activity where children demonstrate their learning.

Impact

Each child's individual maths books show that maths is taught regularly and learning recorded in a variety of ways. Outcomes of work are monitored to ensure that they reflect a sound understanding of the key identified knowledge. Teachers can then intervene in a timely manner to clarify misconceptions and revisit areas of learning if necessary.

We know the importance of children learning at a level that is appropriate to their needs. This helps them become confident learners who have a good number sense with a range of strategies to draw upon. Through the teaching at St. Andrews we ensure children have a positive growth mindset and this, along with their number sense means that the children can tackle new learning with confidence. They are able to communicate their understanding and reasoning using mathematical language. Our learners are not phased by new learning, but instead embrace the challenge and have a resilient attitude that helps them persevere and enjoy their learning.

The outcomes of pupils will be monitored by the class teacher, subject lead and SLT through assessment and marking, tracking, book scrutiny and pupil interviews.

Maths Overview

Developments

Teaching of timestables- The use of a counting stick, Talking Timestables, URBrainy and TT Rockstars

Weekly Quick 6 with a vocabulary focus

Sentence stems on WW

Maths dictionaries being available

Telling the time on an analogue clock

White Rose Maths LTP and use of small steps as a planning tool

Monitoring

Data

Planning

Scrutiny

Pupil interviews

Deep dives

Strengths

Impact of arithmetic tests on a weekly basis

Wide range of resources used

Clear evidence of a wide range of tasks- fluency, reasoning and PS.

Provision for SEND children

Y4 targeted intervention

TT Rockstars

Teaching across school shows differentiation and progress/challenge.

Work with the infant school

Children enjoy their maths lessons

Use of vocabulary

Working Walls

Assessment boxes

Glossaries

Focus Areas

Y4 -Multiplication checker

Use of manipulatives

GD data/results at end of KS2 and across all year groups

Progression and teaching of times tables

Mental strategies

References to external reports/ findings

School Effectiveness Visit: June 2019

Talking to pupils it is apparent that they enjoy their mathematics lessons, often saying it is their favourite subject. Pupils are having opportunities to reason and problem solve; explaining and justifying their answers with increased confidence, using accurate vocabulary. They are keen to talk about their work and how they have tackled a problem, confident to use a wide range of strategies and methods to solve problems, not afraid to make mistakes and try again. From evidence observed and in books there is a focus on meeting the needs of pupils, providing challenge and supporting if more help is needed. There is evidence that their mathematics skills are being applied in other subjects.

Building upon prior learning

Key Stage One (KS1)

The aims of the NC in Maths for KS1 state:

The principal focus of mathematics teaching in KS1 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.

During KS1, pupils should have developed their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching will have involved 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 the number bonds to 20 and be precise in using and understanding place value. Pupils should be able read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at KS1.

At St Andrew's Infant School we deliver a broad and balanced curriculum that allows each child to reach their fullest potential. We aim to provide children with a powerful set of tools with which to calculate, reason and solve problems, not just at school but in everyday life.

The National Curriculum for Mathematics describes what must be taught in each year group. At St Andrew's Infant School, Years 1 and 2 follow the National Curriculum using the school's long term plan that covers the objectives. Our Curriculum in our Reception Classes ensures that all children receive their entitlement to the Early Years Foundation Stage (EYFS) Framework. Children need to master key mathematics skills, rather than striving to solely achieve the next objective year on year. The children use the AET scheme where they have their core teaching followed by fluency, reasoning and problem solving challenges.

Key Stage Two (KS2)

When children enter KS2 we re-visit and build upon the children's KS1 knowledge by continuing to follow the National Curriculum. We build upon the pre-existing knowledge in small steps. We begin this by using the first half term as a time to teach the children the place value knowledge that is applicable in their year group. We believe that this is incredibly important as this helps build the children's 'number sense' and helps them recall key facts and increase fluency.

Throughout the year, we ensure that the maths objectives are taught in small steps ensuring that we are covering and re-visiting objectives as part of our spiral curriculum. The NC says:

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	Do children have rapid recall of number bonds? Do children know and have rapid recall of 2's, 5's and 10's?
Year 4	Prioritise 2's, 5's and 10's Do children know and have rapid recall of 3's 4's and 8's?
Year 5	Do children have rapid recall of all times tables?
Year 6	Do children have rapid recall of all times tables?

Planning and assessment

When planning for your maths lessons you should refer to the National Curriculum 2014 and the year group's small steps outlined by the White Rose Maths Scheme.

Calculation Policy: At school we all follow the calculation policy to ensure that there is a consistent approach to mathematics and methods used across the school. The policy shows progression through each operation and offers concrete, pictorial and abstract ways to answer questions that relate to the NC strands. If children are not ready for pictorial or abstract ways of learning maths then it is important that the concrete stage is covered again to help them achieve the objectives, regardless of their age.

Main teaching/activities/resources: Staff follow the White Rose Maths LTP to ensure coverage of the curriculum across each year group. Teachers use a variety of resources to teach the maths curriculum, differentiate and create challenges for children. Teaching in school follows the concrete, pictorial and abstract model and children have access to practical resources to help aid their learning and understanding.

DO	Fluency/ Do	Think Pink	Explain	Solve
Use concrete manipulatives	Simple calculations and questions	Varied fluency	Reasoning	Problem Solving

Teachers discretely teach the different times tables in each maths lesson through the use of: a counting stick, Talking Times tables and the TT Rockstar resource sheets. UR Brainy and TT Rock stars can be used to practise the taught tables.

Maths talk: When planning there must be opportunities for children to talk and to experience a rich diet of spoken language with their learning partners in order to open up their thinking and learning. By using talk in maths, it will improve children's confidence in maths, promote a positive risk-taking ethos, promote the use of the precise and correct mathematical vocabulary and help children with their growth mindset. Questions should be asked that require detailed answers. In lessons, teachers will model this and give children sentence stems/prompts to help them articulate their thinking and explanations. The sentence stems will be included on the working wall and regularly referenced in lessons.

My Mini Maths: A website with different weekly focus activities as well as daily 4 operations questions. Children are completing these on a daily basis.

Hands On Maths: Each year group has a book that has key objectives from the year group to cover during starter activities. These are activities using manipulatives to help embed key concepts. You do not need to go in the order of the book, you can choose appropriate objectives for where you are in the main lessons. These activities will be differentiated appropriately for children who are not working at their year group level.

Quick 6: A quick 6 is completed weekly alongside the arithmetic. It has a vocabulary, time, statistic and geometry focus.

Arithmetic test: A full test is completed weekly in class. Each child must track their scores in their planners. The children should aim to improve their score each week by at least 1 mark. If pupil/s are not meeting the current year group objectives then they should have the arithmetic test for the appropriate level that they are working at. For some pupils, instead of completing the arithmetic tests they may need to complete tasks that are building on their number sense, PPP maths targets or mathematics knowledge. Teachers should keep a record of scores and this should also be out in the children's individual planner. Children should also have a target for their next test and be aware of this.

Working Wall: Working walls are used in each classroom and should have the following information on:

- What the children are learning that week
- Prior learning that will assist children in their learning (what do we already know?)
- Key vocabulary (can be added to as the topic progresses/could use the maths dictionaries)
- Marvellous Mistakes
- Times Table focus



Assessment

Target Tracker needs to be updated on a termly basis for maths.

TT Rockstars: Teachers will be sent a link to set up your own password and account. You can set up groups and specific tables for children to work on. You can also see statistical information for your class. There are also paper tests that the children can complete under timed conditions.

White Rose Maths (WRM): Each teacher has their own username/password to access resources on the site. These can be used in lessons and when planning. As well as this, the site has assessment booklets that can be used to assess at the end of a term. It looks at reasoning and problem solving learning. There is also an arithmetic test for each term. These are on staff share along with the answer booklets. If using these resources as a way of assessment ensure that you have covered all that is on the assessment.

Classroom Secrets: Each teacher has their own username/password to access resources on the site. These can be used in lessons and when planning. As well as this, the site has assessment booklets that can be used to assess at the end of a term. It looks at reasoning and problem-solving learning.

Testbase: Each teacher has the school username/password to access resources on the site. These can be used in lessons and when planning. As well as this, the site enables practitioners to produce assessment booklets that can be used to assess individual objectives.

Ideas for pre-assessment tasks: Basic skills sheets, My Mini Maths, CGP books, key ideas sheets, working walls/mind maps, Rising Stars diagnostic pages, Kangaroo Maths, Diagnostic Questions.

Summative Assessment

NTS: used at the end of the year to assess children's learning.

KS1 SATs: used as a baseline in year 3 when the children start the year.

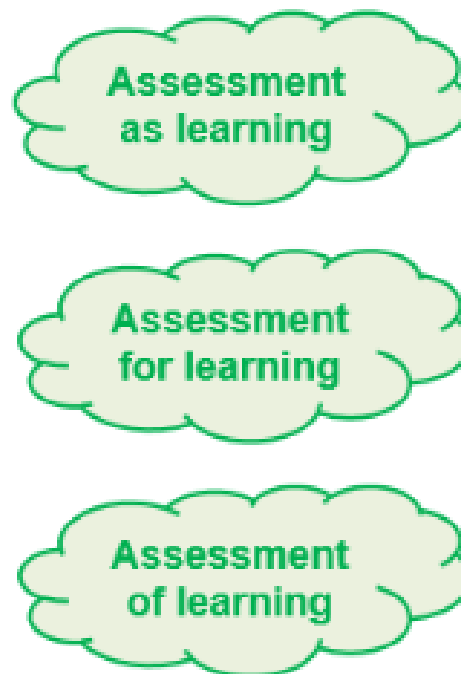
Previous KS2 SATs papers: are used throughout the year during year 6 as ongoing assessments in preparation for SATs and to aid teacher assessment.

Formative Assessment

All classes adapt an 'I do, We do' approach throughout the teaching sequence to ensure there are opportunities to address marvellous mistakes and check key understanding. Mini-whiteboards are used alongside mathematical conversations with the children's learning partners. We celebrate mistakes and use them as a teaching tool in order to embrace a growth mindset and foster a positive, learning environment. Some other formative assessment tools and materials we use are:

- Prior-learning quizzes
- Daily use of mini-maths
- Weekly use of quick 6
- Glossaries
- Diagnostic questions specific to objectives

- The colour coded assessment boxes in each classroom
- Use of mini-whiteboards and thumbs up/ thumbs down (I do. We do)
- TT Rockstar Heat maps
- TT Rockstar sheets
- Live marking and circulation of the classroom in lessons
- End of unit assessments
- Testbase



Long Term Plans

Year 3

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW			Number Addition and subtraction VIEW				Number Multiplication and division A VIEW				
Spring term	Number Multiplication and division B VIEW			Measurement Length and perimeter VIEW		Number Fractions A VIEW			Measurement Mass and capacity VIEW			
Summer term	Number Fractions B VIEW		Measurement Money VIEW		Measurement Time VIEW			Geometry Shape VIEW		Statistics VIEW		Consolidation

Year 4

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW				Number Addition and subtraction VIEW			Measurement Area VIEW	Number Multiplication and division A VIEW			Consolidation
Spring term	Number Multiplication and division B VIEW			Measurement Length and perimeter VIEW	Number Fractions VIEW				Number Decimals A VIEW			
Summer term	Number Decimals B VIEW	Measurement Money VIEW	Measurement Time VIEW	Consolidation	Geometry Shape VIEW			Statistics VIEW	Geometry Position and direction VIEW			

Year 5

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	
Autumn term	<div>Number</div> <div>Place value</div> <div>VIEW</div>			<div>Number</div> <div>Addition and subtraction</div> <div>VIEW</div>		<div>Number</div> <div>Multiplication and division A</div> <div>VIEW</div>			<div>Number</div> <div>Fractions A</div> <div>VIEW</div>				
Spring term	<div>Number</div> <div>Multiplication and division B</div> <div>VIEW</div>			<div>Number</div> <div>Fractions B</div> <div>VIEW</div>		<div>Number</div> <div>Decimals and percentages</div> <div>VIEW</div>			<div>Measurement</div> <div>Perimeter and area</div> <div>VIEW</div>		<div>Statistics</div> <div>VIEW</div>		
Summer term	<div>Geometry</div> <div>Shape</div>			<div>Geometry</div> <div>Position and direction</div>		<div>Number</div> <div>Decimals</div>			<div>Number</div> <div>Negative numbers</div>	<div>Measurement</div> <div>Converting units</div>		<div>Measurement</div> <div>Volume</div>	

Year 6

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	<div>Number</div> <div>Place value</div> <div>VIEW</div>		<div>Number</div> <div>Addition, subtraction, multiplication and division</div> <div>VIEW</div>				<div>Number</div> <div>Fractions A</div> <div>VIEW</div>		<div>Number</div> <div>Fractions B</div> <div>VIEW</div>		<div>Measurement</div> <div>Converting units</div> <div>VIEW</div>	
Spring term	<div>Number</div> <div>Ratio</div> <div>VIEW</div>		<div>Number</div> <div>Algebra</div> <div>VIEW</div>		<div>Number</div> <div>Decimals</div> <div>VIEW</div>		<div>Number</div> <div>Fractions decimals and percentages</div> <div>VIEW</div>		<div>Measurement</div> <div>Area, perimeter and volume</div> <div>VIEW</div>		<div>Statistics</div> <div>VIEW</div>	
Summer term	<div>Geometry</div> <div>Shape</div> <div>VIEW</div>		<div>Geometry</div> <div>Position and direction</div> <div>VIEW</div>		<div>Themed projects, consolidation and problem solving</div>							

Maths Across the Curriculum

Year	Subjects										
	Science	History	Geography	ICT	Art	DT	RE	French	Music	PSHE	P.E
3	Tables Graphs Measuring Timing	Timelines	Tables Graphs Compass points Coordinates	Tables Charts Timing		Measuring Tables	Emotions graph		Tally chart	Emotions scale	Measure Timing
4	Tables Graphs Measuring Timing Venn and Carroll diagrams	Timelines	Tables Graphs Data collection Tally charts Compass points Coordinates Measuring/conversion	Measuring	3-D shapes 2-D shapes	Measuring	Bar chart	Tally chart Bar chart	Tally chart	Tally chart	Measure Timing Tally charts
5	Tables Graphs Measuring with various resources and different scales Timing Venn and Carroll diagrams Statistics	Timelines	Tables Graphs Flow charts Data collection Tally charts Compass points Coordinates Measuring/conversion Statistics	Measuring 2D Shapes Tessellations Nets	Using a ruler Measurement Scaling 3D shapes	Measuring Pattern cutting 3D shapes Nets Scaling / adapt recipes	Bar chart	Bar chart	Tally chart	Bar Chart Tally Chart	Measure Timing
6	Tables Graphs Measuring with various resources and different scales Timing Venn and Carroll diagrams Statistics	Timelines Calculating time intervals between periods/events	Tables Graphs Flow charts Data collection Tally charts Compass points Coordinates Measuring/conversion Statistics	Measuring Timing	Scale	Measuring Timing Measuring Data collection Conversion Scaling/adapting recipes Measure timing	Charts and graphs		Tally chart		Measure Timing

Mastery in Maths at St Andrew's Junior School

Children who strive for greater depth in maths should be working towards a deeper understanding of the maths curriculum. They should be able to apply the year group expectations to a variety of problems and investigations. They should be able to confidently and coherently represent and explain their reasoning using correct mathematical vocabulary. The way we teach maths at St. Andrew's allows children to do this

The NCETM's definition of mastery includes having a "sufficient depth of knowledge and understanding to reason and explain mathematical concepts and procedures and use them to solve a variety of problems" and that greater depth means to then go on and "independently explore and investigate mathematical contexts and structures, communicate results clearly and systematically explain and generalise the mathematics."

The NCETM also state that a pupil really understands a mathematical concept, idea or technique if they can:

- describe it in their own words;
- represent it in a variety of ways (e.g. using concrete materials, pictures and symbols – the CPA approach);
- explain it to someone else;
- make up their own examples (and non-examples) of it;
- see connections between it and other facts or ideas;
- recognise it in new situations and contexts;
- make use of it in various ways, including in new situations.

Developing mastery with greater depth is characterised by pupils' ability to:

- solve problems of greater complexity (i.e. where the approach is not immediately obvious), demonstrating creativity and imagination;
- independently explore and investigate mathematical contexts and structures, communicate results clearly and systematically explain and generalise the mathematics

In order to help children achieve greater depth in maths there are different things to take into account. These are ideas below are based on three 'R's in maths: reflecting, representing and reporting. Many of these ideas cement the NCETM definition of mastery and how we can develop mastery with greater depth.

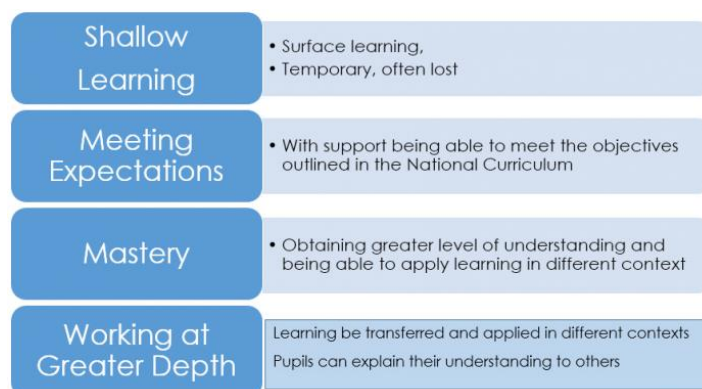
Reflecting: Children need the breathing space to reflect on an experience when deepening their knowledge and understanding. Pausing, probing and pondering all happen when children are not rushed or pressured. Slowing down allows children to take control of their learning and become aware of their own learning too.

Representing: Children need plenty of opportunities to represent their learning in an active way so deepening becomes memorable. This might be constructing a model, drawing a mathematical picture, using manipulatives or writing down their thoughts.

Reporting: Children have to engage in meaningful maths talk with others – maths has to involve lots of verbal back and forth. Pupils refine, consolidate and develop their understanding by entering into learning conversations with their peers and teacher(s). This type of reporting helps children to realise that their thoughts are valuable and by talking together they can clarify their understanding.

All children should have a deep learning of key ideas/constructs and opportunities for even deeper learning (growth mindset). For some learners they will be able to access, within a construct, even greater challenge to deepen their thinking further. Mastery learning is deep learning that sticks, can be recalled over time etc. It is necessary to have deep learning in order to meet the key objectives. In essence, in order to meet the objectives securely children need to have mastered them.

This diagram helps us to understand concept of mastery and greater depth in the national curriculum:



Information taken from:

<https://thirdspacelearning.com/blog/greater-depth-maths-ks2/>

<https://www.focus-education.co.uk/blog/weaving-mastery-and-greater-depth-in-the-national-curriculum/>

<https://www.ncetm.org.uk/resources/47851>

At St Andrews, we have ambition for all pupils. We expose all learners to multiple methods so that children can experiment, foster understanding and then independently choose their preferred strategy. This enables children to understand which method is most efficient and which is the most appropriate to use for the chosen task.

We ensure children are exposed to and become familiar with various representations of questions through the use of concrete resources and pictorial representations such as: bar models and part-whole models. We also encourage deeper thinking through scenarios such as 'My answer is.... What could my question be?'

We model different methods of reasoning. Verbal reasoning is scaffolded through the use of sentence stems and the children's individual glossaries promote the accurate use of mathematical terminology. Diagrams and drawings are an alternative that removes the language barrier from a child's mathematical understanding.

Most importantly, at St Andrew's, we ensure that each and every child has the opportunity to become fluent mathematicians with multiple opportunities to reason and problem solve in order to not limit any learning of mathematical concepts.

Resources

Maths boxes: practical, concrete resources are used regularly. Ensure that you think about resources you could use when you are planning and have the boxes easily accessible for children.

Classroom Secrets: <https://classroomsecrets.co.uk/>

This website is full of learning resources that are differentiated and have teaching powerpoints. Each set of resources has fluency, reasoning and problem solving questions. The website also has discussion questions that can be used in problem solving lessons. There are homework and extension questions also that can be used as an extension or assessment. You may want to check and ensure there is clear differentiation on the resources and not just, for example, 'bigger' numbers used in questions.

White Rose Maths: <https://resources.whiterosemaths.com/>

This website has the learning objectives set out in steps with great fluency, problem solving and mastery questions that can be used in learning or as challenges/moved on tasks. Also, there are good planning ideas and good termly assessments that cover the objectives. In addition, you can access practice questions for students that run alongside exemplar questions for teachers to use in class that can be used to consolidate learning.

I See Reasoning: PDF documents available on Staff Share for LKS2 and UKS2. **It is** written to provide rich, open contexts for mathematical discussion and enquiry. Children build on their current understanding when solving '**I know... so...**' questions. Concepts are represented visually in '**Read the picture**' tasks. Children can also work systematically to find all possible solutions for the '**How many ways?**' challenges.

I See Problem Solving: PDF documents available on Staff Share for LKS2 and UKS2. This helps all children to learn how to solve multi-step maths questions. Tasks start with a **Build** prompt, which leads into the main **Task** question. Each page can be printed and given to the children. There are also **Support**, **Explain** and **Extend** prompts for most tasks –these provide additional support for the main task or extra challenge to take the learning deeper.

I See Maths: www.iseemaths.com

This is the website created by the same people who created 'I See Reasoning' and 'I See Problem Solving'. It has good resources on the website including:

- Times table resources that are visually represented (could be used for subitising activities etc)
- 3 Act Tasks- resources for problem solving that could also help maths talk within the classroom. It has a video and question prompts that set the context of the problem, solving of the problem and the answers.
- Games and resources

BBC Bitesize: <https://www.bbc.co.uk/bitesize>

Mastery Maths (Chris Quigley): practical activities that support fluency, reasoning and problem solving. It has examples of activities that are inter connected and give specific advice for developing subject knowledge. The activities can all be found on the server. (The master copy of the paper folder is kept by the maths lead)

Target Your Maths (text books)

Abacus resources (text books) In school we have the books from Y3 to Y6. There are three books for each year group.

Testbase: SATs style questions that test understanding and can be used for pre-assessment or at the end of a topic of work. Questions can be searched for by stand or age range.

Twinkl: lots of mastery and challenge resources available as well as pre assessment and bar modelling examples. Also have morning work challenge powerpoints with good open ended maths questions on.

Third Space learning: an organisation that has released 'fluent in 5' and 'rapid reasoning' resources to help with fluency and reasoning. They also have good lesson resources and slides that can be used. These are saved in staff share.

Nrich/NCETM(you will need to set up a username/password to use this site): problem solving resources that have different levels and encourage problem solving and the use of mathematical language. Also, NCETM is very good for your own pedagogical knowledge/subject knowledge if you feel you need to brush up on any areas.

Negotiating meaning sheets: these can be used to assess understanding of an area in maths and can be added to as the week/topic goes on.

BAM (Building A Mathematician) (www.kangaroomaths.com)

Maths Everyday: www.mathseveryday.com: a website that has many maths problems on, apparently there is a new one everyday.

Numeracy/mathematics Shed (<http://www.mathematicshed.com>): a variety of resources for teaching and for children to use.

Badger Maths: on staff share there are a variety of problem solving resources that can be used.

Diagnostic Questions: <https://diagnosticquestions.com/> the website has different diagnostic questions for different areas of the maths curriculum for each year group. These could be used for pre/post assessment, challenges and reasoning activities. You will need to sign up for this website.

Maths.co.uk: <https://www.maths.co.uk/>