Maths at

St Andrew's CE (VA)

Infant School

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Maths Policy

Intent

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.

Aims

At St Andrew's we aim to:

- promote enjoyment and enthusiasm for learning through practical activity, cross-curricular learning, exploration and discussion
- develop mathematical skills and knowledge and quick recall of basic facts in line with the National Curriculum Mathematics Programmes of Study
- promote confidence and competence with numbers and the number system
- develop the ability to think mathematically: solve problems by applying their mathematical knowledge and reasoning in a range of contexts
- develop a practical understanding of the ways in which information is gathered and presented
- explore features of shape and space, and develop measuring skills in a range of contexts,
- develop communication skills,
- develop both independence and co-operation,
- leave primary school with an efficient, reliable, compact written method of calculation for each operation
- understand the importance of mathematics in everyday life and promote mathematical thinking as a life skill

Mathematics is an interconnected subject in which pupils need to be able to move fluently between mathematical ideas. The programmes of study are, by necessity, organised into distinct areas, but pupils will make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They will 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 will always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems that encourage them to apply their knowledge horizontally. We aim to teach a mastery curriculum with some revisiting and consolidation of skills. Those who are not sufficiently fluent with earlier material will consolidate their understanding, including additional practice, before moving on. We will not teach the curriculum for the year above.

Organisation

In the Foundation Stage, we teach mathematics guided by the requirements and recommendations in the Early Years Foundation Stage framework and 'Development Matters' document. We teach maths following the White Rose Maths scheme in EYFS. All children are given ample opportunity to develop their understanding of mathematics in both the classroom and outside area. Learning happens through varied activities and challenges that allow children to use, enjoy, explore, practise, problem solve and talk confidently about maths.

In Key Stage 1, there is a daily maths lesson usually lasting for 45 minutes to 1 hour. Each lesson usually contains the elements of fluency, reasoning and problem solving. These lessons are planned in blocks using the AET Mathematics Scheme. Teachers use a variety of quality resources to ensure

lessons provide each child with an equal opportunity to develop their mastery, reasoning and problem solving skills.

In addition to the maths lesson, children complete fluency activities based on the Snappy Maths programme for all children in school. Children also complete Lego Targets, which are designed to provide a clear structure and support to help embed children's counting and number bond recall. More information can be found on page 11.

Mathematical language and vocabulary

Teachers will refer to the New National Curriculum and the glossary of terms when planning, to ensure that they are teaching the children the correct mathematical terms and language. The relevant vocabulary will be clearly displayed within the classroom so that the children can see and refer to it. Children will be encouraged to use the correct mathematical language and terminology to discuss their mathematics and to explain their reasoning.

Resources

Every classroom has a variety of resources available and children are encouraged to choose independently the relevant equipment, depending on their needs. Additional Mathematics resources are kept centrally in the curriculum store next to the Treetops.

Assessment

The children are assessed at the beginning of a new topic using the AET 'Show me what you know' documents. Teachers analyse the children's individual scores against each statement. This provides a clear baseline assessment. At the end of every topic, the children are reassessed based on teacher judgement which is influenced by the work produced in Maths books. Furthermore, the children complete PUMA assessments each term. These assessments then help staff to see which children need interventions following the SHINE programme. Teachers complete end of year judgements based on the Age Related Expectations (ARE); children are judged to be 'below ARE', 'working at ARE' or 'exceeding ARE'. Year 2 assessments will be made by referring to the 'Teacher Assessment Frameworks'.

Calculation Policy

As a school, it is very important that all staff follow the calculation policy (which shows progression through KS1 and KS2) 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.

Intent, Implementation and Impact

Intent

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.

Implementation

In Key Stage One, the school follows the AET planning documents but had adapted the long-term plan so that it meets the needs of the children in our school. The maths lead 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.

Our Curriculum in our Reception classes follows the White Rose Maths scheme and ensures that all children receive their entitlement to the Early Years Foundation Stage (EYFS) Framework.

We believe 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 instil a deeper understanding of mathematics, such that it can be applied to different contexts.

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.

Assessment is ongoing throughout each maths topic. 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 and the big books in EYFS 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 Andrew's 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 leaning, 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 Lessons in KS1

Lessons are taught following the AET Mathematics scheme. Each lesson begins with a starter (that could be taken from Snappy Maths or could be a year group objective such as counting in multiples of 5, then the teacher models the days learning. Children are then given the opportunity to answer a number of questions as given by the teacher to show their understanding. Children that are confident are then sent to their tables to begin the days task(s). Children that are less confident stay on the carpet for further input from the teacher. The children then complete their work independently, following the 'do', 'think', 'explain' and 'solve' stickers.

Snappy Maths

To develop pupil fluency in Mathematics, the whole school must do daily Snappy Maths. This is a 5-minute quick recall programme that is aimed at raising children's rapid recall of number bonds and times tables facts. The repetition aids the children's recall of basic facts.

Marking:

Teachers are expected to provide live marking to ensure children are given constant and up to date feedback. This impacts positively on their learning and addresses any misconceptions.

Assessment

Target Tracker needs to be updated on a half termly basis for maths. Children are to be baselined at the start of a new unit using the 'Show Me What You Know' assessment. Teachers are to record this data onto the stickers in maths books. Once the unit has been taught, teachers are to re-assess the children's knowledge based on the work that has been produced in books and teacher judgement. This must be recorded onto the stickers in maths books. Teachers should then complete the end of unit assessment and identify those that have not met the statements (1) and those that have confidently met the statements (3). Teachers must use this data to identify those who have not met the statements (1) and implement any gaps identified into future planning and teaching. Teachers will also use the PUMA assessments that are carried out termly to assess children and the level they are working at.

Lego Targets

Lego targets have been set based upon key statements from the National Curriculum that help children progress with their fluency in Maths. Lego Targets have been designed to provide a clear structure and support to help embed children's counting and number bond recall. Each child should have a current Lego target that they are working on at home. Once confident on their current target, children can ask to be 'challenged' in school. Once the child can confidently recite their current target, e.g. number bonds to 10, they progress to the next Lego brick and the teacher or TA will give them their new Lego target to practise at home.

Maths in EYFS

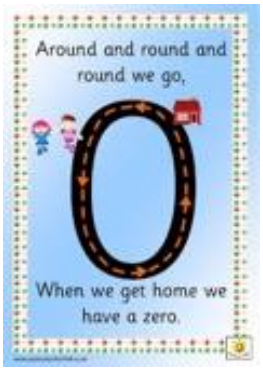
Children are baselined on entry following the NFER government baseline and our own baseline. We assess the children's counting (rote and 1:1 correspondence), ability to recognise more/ fewer, can they get a given amount? numeral recognition, subitising, pattern and shape knowledge.

Planning

The WRM EYFS is used as our main scheme. This is added to ensure children experience a focused teaching session and learning activity (indoor and outdoor) as well as practical activities in continuous provision. Maths is embedded everywhere in the learning environments and through our daily routines.

Assessment for learning

Each week, EYFS staff meet to reflect on the previous weeks learning and discuss what went well, what may need recapping, repeating and discuss any follow up steps to deepen learning. At the start of the week, teachers introduce a skill/concept to the class, it is then differentiated for groups of pupils determined on their understanding. The weekly planning is a working document and EYFS staff will indicate on a n assessment sheet who has understood the concept, who has exceeded the objective and who has needed support and may need to revisit. Revisiting and extending of different skills may happen through questioning, continuous/enhanced provision, a revisit or repeat of the concept or a small group activity led by an adult. Teachers also use the '**Communication4all'** number formation rhymes to help children know how to correctly form their numbers when beginning to formally record. This gives children meaningful and concrete opportunities to apply their skills and knowledge about number. Although it is not part of the EYFS curriculum to record numerals, we feel it is good practice to ensure the children are ready for Year 1.



Continuous and enhanced provision

In both EYFS classrooms, they have a dedicated maths provision area and working wall. It is set out in an organised and clear way displaying relevant maths equipment. Mathematical opportunities are also added to other continuous provision areas e.g. weighing scales in the home corner, measuring cups in the water areas. Each half term, provision is enhanced with games, activities

books and characters for children to embed essential mathematical knowledge. Weekly challenges are set to challenge children whilst in continuous provision this might be to recap, embed and inform future skills.

Children are able to access meaningful maths opportunities in the outdoor area on a much larger scale. These are adapted through children's interests and adult interaction. This includes collecting and sorting natural objects, measuring huge areas using non-standard measures such as strides, moving really heavy objects together or playing hunting games for escaped dinosaurs or missing mini-beasts, large water play to develop mathematical language linked to capacity, shape hunts and much more! Outdoor maths should offer DIFFERENT skills and experiences to what indoor learning is. They may follow a similar learning intention e.g. repeating patterns with beads and pegs indoors, the outdoor focus might be rubbing leaves to make patterns, creating obstacle courses – e.g. tyre, crate, tyre, crate.

Natural resources help children to learn maths through all their senses, including touch, smell, sound and taste.

- Explore empty and full using big containers – use wet sand, pebbles, branches and boulders.
- Investigate measures – look at tiny seeds, then measure the height of runner bean plants or tall sunflowers or balance leeks, marrows, potatoes and tomatoes.
- Collect, sort and count natural objects outdoors – leaves, twigs, stones, pebbles, fir cones and flowers.

Playing games outdoors offers numerous opportunities for teachers and children to explore elements of mathematics together. Teachers plan and introduce a small number of games initially, and spend a long time modelling them. Once children become familiar and confident, they can take some of those ideas and 'rules' to develop their own games.

- Hopscotch
- Duck, duck, goose
- What's the time, Mr Wolf?

Maths mark making outdoors

The outdoor area offers unique opportunities for children to explore mark making in ways that are less threatening and more appealing than indoors – with chalks on paving slabs, with buckets of water and huge brushes or sticks in mud. Scoring offers a 'real purpose' for recording numbers that is sometimes lacking indoors, and can attract children who avoid pencil and paper activities. Teachers' are able to support children's mathematical graphics and recording outdoors:

● Modelling tallying – drawing four lines and a fifth line through to show a group of five; or with younger children, using symbols to record scores – three circles to represent three beanbags in a bucket

● Providing a 'have a go' environment where all children's mathematical graphics are valued and children have opportunities to experiment and practise recording in a variety of ways. Give children lots of time to explore recording so that they can become increasingly familiar and confident with mark making. Use encouragements to record: "How can we remember that?"

● Encourage children to talk about what they are doing and why – they need lots of time to talk about their recordings and think through how effective they are.

Maths LTP

Reception Long Term Plan

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	Getting to Know You			Just Like Me!			It's Me 1 2 3!			Light and Dark			Consolidation	
Spring	Alive in 5!			Growing 6, 7, 8			Building 9 and 10			Consolidation				
Summer	To 20 and Beyond			First Then Now			Find My Pattern			On The Move				

Y1 Overview of Maths Topics

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Phase 1 Number and Algebra Numbers 1-10 12h			Phase 2 Number and Algebra Numbers 1-20 12h				4. Exploring Shape 8h		Phase 2 wk 3 complete	5. Generalising Arithmetic 8h (MISSING NUMBERS)			
inc Investigating Number Systems Pattern Sniffing Solving Calculation Problems													

1	2	3	4	5	6	8	9	10	11	12	13
Phase 3 Number and Algebra Numbers 1-100 10h			6. Reasoning with Measure. **Money** 8h		7/8 Discovering Equivalences **Fractions** 8h Recognise, find and name a half and a quarter of an object, shape or quantity Represent half and quarter using different objects and pictures		9. Solving Number Problems 6h Solve simple **multiplication** problems, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher			10 Investigating statistics - Length and Height 4h+	

1	2	3	4	5	6	1	2	3	4	5	6	7
13 Proportional Reasoning 8hrs Solve simple **division** problems, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher		Multiplication and Division Assessment Shape show me what you know.	12 Exploring Change Time 8hrs Sequence events Use the language of dates Tell/show the **time** to the hour and half hour11		Time Assessment Show me what you know	Visualising Shape 8hrs Recognise and name common **2D and 3D shapes** Begin to describe the properties		Assess Shape Show me what you know	14 Describing Position 7hrs Describe position, direction and movement Describe whole, half, quarter and three-quarter turns		Assessment of Position	Measuring Weight and Volume

Year 2 Maths Overview

Autumn Term		**Number and Algebra**			**Geometry and Measures**
	1. Investigating Number Systems	2. Pattern Sniffing	3. Solving Calculation Problems	4. Generalising Arithmetic	5. Exploring Shape 11. Visualising Shape

Spring Term	**WB Number and Algebra**		**Number and Algebra**	**Units so far**	**Statistics**
	7. Discovering Equivalence 8. Reasoning with Fractions	9. Solving Number Problems	12. Exploring Change	CONSOLIDATION	10. Investigating Statistics

Summer Term	**Geometry and Measures**	**Number and Algebra**	**Geometry and Measures**	
	6. Reasoning with Measures	13. Proportional Reasoning	14. Describing Position	15. Measuring and Estimating

What does Greater Depth look like at St Andrew's Infant School?

In the last few years, mathematics teaching and learning has changed. Mastery approaches, higher standards and depth (rather than coverage) are paving way for greater conceptual understanding in mathematics for children of all ages.

Traditional differentiation, based on levels is out. Now mathematics focuses on challenge which provides pupils with opportunities to demonstrate depth of understanding. There are many ways differentiation can be achieved including access to concrete, pictorial and abstract resources. This offers all children the same starting point and subsequently varying tasks as the lesson progresses.

What do we mean by 'Greater Depth' in maths?

It is important to understand that working at greater depth doesn't mean that children are fluent in their mathematics ability and that they should be able to solve problems and reason well. The National Curriculum states that those are the aims for all pupils:

Aims

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.

Whilst children working at greater depth will be fluent and will solve problems and reason mathematically, those indicators shouldn't define 'Greater Depth' in maths. The National Curriculum also states that 'pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content'. For children working at greater depth, we should provide 'rich and sophisticated problems' and we shouldn't just be getting the children to move onto the next year group's work.

The best way to increase complexity of maths but continuing to work within the expectations for the year group is to present the problems differently and in as many ways as possible. The AET planning supports this well. The more children are exposed to problems presented in new ways, the more confidently they will approach maths problems in general.

Early Years

When it comes to maths teaching in the early years, it's important that children begin to develop a sense of the underlying concepts and structures of maths. Some children may come to school already fluently counting to 10 and beyond - but do they really, deeply understand what these numbers mean? Children should be challenged to show a variety of representations for each number, using real-life objects, maths equipment, drawings, sound and movement. EYFS planning should focus on developing reasoning and problem-solving skills, which helps to ensure children in EYFS gain mastery of these early concepts.

Concrete, Pictorial, Abstract

Using concrete resources in maths comes naturally in the EYFS. Being able to touch, feel and manipulate in maths is a good way to develop an understanding of the underlying concepts.

The next step is to move children from that solid starting point to a pictorial approach. Teaching children how to represent objects is a good starting point. For example, asking the children to represent the number 3 using 3 toy cows. Moving from a representation with a clear link (such as toy versions of the animals) to representation with something less obviously linked (such as counters or part-whole model) ensures children develop an understanding of representation, building a firm foundation for later success in maths. In order to really achieve mastery, children should begin to develop an abstract way of thinking. For example, clapping and asking the children how many claps they heard. Activities like this ensure children are not relying solely on visual cues.

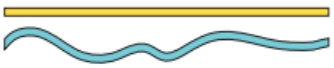
Mastery through play

Setting up mathematical activities for children to explore independently is a great way to reinforce concepts during free-flow time. Every time maths is built into an everyday activity, it helps embed and reinforce understanding of the concept:

- Create displays of seasonal objects for children to count, sort and explore.
- Try setting some mathematical rules, such as allowing only three children to play with sand at a time. This can lead to opportunities for discussion such as, how many children are there now? Is there room for one more? Are there enough spades for each child?
- Suggest activities such as setting the table for four teddy bears in the home corner.

NCETM Teaching for Mastery

The NCETM Teaching for Mastery documents contain a wide range of complex problems under the heading 'Primary Assessment Materials'. These provide a great starting point for teachers to begin thinking outside the box with their maths questioning. Here's an example from the Year 1 document:

Mastery	Mastery with Greater Depth
LENGTH Which line is longer? Explain your reasoning. 	A long brick is twice the length of a short brick. Which is longer: 2 long bricks or 3 short bricks? 3 long bricks or 5 short bricks? 

Here's an example of the Year 2 document:

Mastery	Mastery with Greater Depth
Holly uses a £1 coin to buy a pack of stickers. Here is the change she was given.  How much did the pack of stickers cost?	I spend £2 on a drink and sandwich. The sandwich costs 80p more than the drink. How much does the sandwich cost?

In Summary

Children who are working at greater depth would confidently and independently:

- Access maths problems presented in a wide range of different, complex ways.
- Be able to justify and prove their conjectures when reasoning.
- Ask their own mathematical questions and follow their own lines of enquiry when exploring an open-ended maths problem.

In order to make provision for children working at greater depth we must:

- Model higher-level reasoning skills and encourage children to use them.
- Model mathematical questioning during open-ended maths problems and encourage children to ask them.
- Provide complex maths problems (open and closed) with a variety of contexts and support children initially to access these, until they can do them independently.
- Motivate children to be confident and resilient enough to do the above.

Lesson Resources

Classroom equipment: use as practical, concrete resources and ensure that you think about resources you could use when you are planning.

Classroom Secrets: a website full of learning resources that are differentiated, have teaching/learning powerpoints and interactive activities . 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.

Twinkl: lots of mastery and challenge resources available as well as pre assessment and bar modelling examples.

White Rose Hub: great fluency, problem solving and mastery questions that can be used in learning or as think pink, explain or solve challenges. Also good planning ideas and good termly assessments that cover the objectives.

Nrich/NCETM): these sites are useful for helping to understand maths terminology and how maths is taught. There are also problem solving resources that have different levels and encourage problem solving and the use of mathematical language.

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.

Topmarks (https://www.topmarks.co.uk/maths-games): a website with a variety of maths games aimed at children of different ages.

I See Reasoning: PDF documents available on P Drive. **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 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.