

## **AQUINAS Church of England Education Trust**

"Life - Transforming - Learning"

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Policy Title:	Mathematics
Responsibility:	Academy Improvement Director
Review Body:	Education Scrutiny Committee
Date:	November 2017
Review:	November 2018

### **CONTEXT**

Mathematics and numeracy are key life skills. The mathematics curriculum teaches and develops pupils' understanding of a network of concepts and relationships which provide a way of viewing and making sense of the world. The numeracy skills taught formally within mathematics are used to analyse and communicate information and ideas. Through numeracy acquisition pupils have the skills to learn, think, explore and organise. They learn to tackle a range of practical tasks and real life problems. The provision of a high-quality mathematics education expands pupils' understanding of the world. They are shown how to solve problems and reason. Through engaging teaching, they develop a sense of enjoyment and curiosity about mathematics. This policy sets out the principles and expectations for numeracy and the mathematics curriculum for all the academies in the Trust and for all ages and abilities.

### **POLICIES RELATING TO NUMERACY**

**This policy is part of a suite of curriculum policies and should be read in relation to these.**

### **PRINCIPLES**

#### **Numeracy**

Numeracy is a proficiency which is developed mainly in mathematics but also in other subjects. Through numeracy teaching, pupils develop confidence and competence with numbers and measures. Numeracy acquisition enables pupils to understand the number system and develop a repertoire of mathematical techniques. They gain an interest and an ability to solve quantitative or spatial problems in different subjects or contexts. Numeracy also demands understanding of the ways in which data are gathered by counting and measuring, and presented in graphs, diagrams, charts and tables.

#### **Mathematics Curriculum**

The mathematics curriculum is designed to provide pupils with the skills to become: numerate; creative; independent; inquisitive; enquiring; resilient and confident to take risks. Through their growing knowledge and understanding, pupils acquire greater fluency. They work within a stimulating and well-resourced environment so that they can develop mathematical skills and achieve their full potential. They will learn to appreciate the contribution made by many cultures to the development and application of mathematics.

**Through mathematics and numeracy teaching pupils will:**

- have a sense of the size of a number and where it fits in the number system;
- recall number facts confidently;
- calculate accurately and efficiently, both mentally and in writing and paper, drawing on a range of calculation strategies;
- make sense of number problems and recognise the operations needed to solve them, as well as selecting the most efficient methods to solve them;
- explain their methods and reasoning using correct mathematical terminology;
- judge whether their answers are reasonable and have strategies for checking them;
- develop spatial awareness and an understanding of geometry and geometric properties;
- collect data, and draw, interpret and predict from graphs, diagrams, charts and tables;
- have some understanding of the measurement of probability and risk;
- become fluent in the fundamentals of mathematics;
- 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;
- 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 simple steps and persevering in seeking solutions.
- use a wide range of mathematical skills in other areas of the curriculum.
- learn the correct mathematical language, notation, conventions and techniques, relating to the different subjects they study.

**Mastery Approaches to Mathematics**

Academies are increasingly making use of mastery approaches to the teaching of mathematics. These approaches improve pupils' enjoyment and engagement with mathematics. Teachers focus on broadening more able pupil's conceptual understanding, rather than moving them on to new topics.

An approach based on mastery principles:

- has the highest expectations for all children in which all children can achieve and most can achieve highly;
- exposes almost all pupils to the same curriculum content at the same pace;
- provides full access to the curriculum by focusing on developing deep understanding;
- secures fluency with facts and procedures;
- uses a careful sequence of small steps;
- scaffolds learning from concrete, to pictorial and then abstract;
- develops conceptual understanding;
- promotes reasoning and problem solving;
- makes use of mathematical representations that expose the underlying structure of the mathematics;

- helps pupils to make sense of concepts and achieve fluency through carefully structured questions, exercises and problems that use conceptual and procedural variation;
- uses intelligent practice and variation to develop conceptual understanding hand in hand with reasoning, problem solving and fluency
- uses correct mathematical vocabulary and high quality mathematical talk;
- blends whole class discussion and precise questioning with intelligent practice and, where necessary, individual support;
- provides differentiation by offering rapid support and intervention to address each individual pupil's needs.

## **RESPONSIBILITIES**

### **Trust Board and Academies Improvement Team**

The Trust Board works through the academies improvement team and Education Scrutiny Committee to provide a strategic direction and to make sure the policy is implemented effectively in all academies. Where schools have an executive head, he or she will hold the overall responsibility and accountability for the quality of provision.

### **Senior Leaders**

The headteacher/head of school is accountable for the performance and training of staff, the quality of teaching and the progress made by pupils. The leadership team provides appropriate support, training and resources for teams and individuals in line with their portfolio of responsibility. They make sure that classroom practitioners, pupils and parents understand the expectations for good teaching and learning. They oversee processes for reporting to parents and to the Trust Board. The leadership team will establish a programme for quality assurance including: reviews of planning; visits to lessons; scrutiny of written work; analysis of data; pupil progress meetings; discussions with pupils and feedback from parents.

### **Mathematics and Numeracy Leaders**

Mathematics subject leaders will work together through the Trust network to implement strategies, organise training and share resources. They collaborate with leaders in other academies to develop good practice, including moderation and assessment standards. They are responsible for the development of subject knowledge for those they lead. They will make sure that policy is being followed and are accountable for the quality of planning, in their own academies. They monitor and evaluate consistent delivery of the policy at team level, and provide appropriate support to team members through training and coaching.

Mathematics leaders will be aware of the mathematical techniques used in other subjects and provide assistance and advice to other departments, so that a correct and consistent approach is used in all subjects. They will provide information to other subject teachers on appropriate expectations of students and difficulties likely to be experienced in various age and ability groups. Through liaison with other teachers, they will attempt to ensure that students have appropriate numeracy skills by the time they are needed for work in other

subject areas. Where appropriate they will seek opportunities to use topics and examination questions from other subjects in mathematics lessons.

### **Middle Leaders**

All middle leaders are accountable for the quality of the learning environment, the quality of teaching and the progress of pupils in their area of responsibility. They are expected to undertake regular quality assurance and monitoring activities and take effective action where improvements are needed. When evaluating pupils' progress in numeracy via work scrutiny the focus is to ensure that work shows improvement in the development of numeracy skills by each pupil over a period of time. They check the regularity of assessment and the quality of assessment information and challenge teachers when pupils do not make enough progress.

They will know the correct mathematical language, notation, conventions and techniques, relating to their own subject, and make sure teachers encourage students to use these correctly. They will promote the appropriate expectations of students and provide support for difficulties that might be experienced with numeracy skills. They will provide information for mathematics teachers on the stage at which specific numeracy skills will be required for particular groups. They will provide resources for mathematics teachers to enable them to use examples of applications of numeracy relating to other subjects in mathematics lessons.

### **Teachers**

Teachers contribute to planning, using the agreed plans to structure and sequence the teaching programme. They must continue to develop their subject knowledge and pedagogical skills. They provide a well organised and stimulating environment which has a direct impact on the quality of teaching and learning. They set high expectations for attitudes to work and behaviour for learning. They are responsible for the accurate assessment of pupils they teach and their practice is in line with the policy so that all pupils make good or better progress. All staff have a responsibility to reflect on their own practice in the teaching, marking and assessment of numeracy within their own subject.

## **REVIEW AND REPORTING**

In recognition of the Trust Board's responsibility:

- The quality of numeracy provision will be reviewed through Education Scrutiny Committee meetings.
- The Trust Board will receive reports on the quality of numeracy teaching and the progress of pupils.
- The policy and procedures will be reviewed annually.
- The Academies Improvement Team will oversee the work of networks.
- Termly Monitoring Visits will take place.

- Standardisation and moderation meetings will be held both across the Trust and through external bodies. Recommendations will be sent to the Academies Improvement Team.

## **MONITORING**

The Trust Board through the Education Scrutiny Committee will as a part of its internal monitoring processes, audit each academy in order to ensure that the academy has complied with the requirements of this policy and the responsibilities delegated to it.

**signed**  
**Role**

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**Role**

## Appendix 1

### AIMS AND OBJECTIVES AT CUDHAM CE PRIMARY

At Cudham we aim to educate children to:

- Explore, explain and appreciate mathematical patterns and relationships in their world.
- Develop a creative and flexible approach, using mathematical skills with enjoyment and confidence.
- Develop a secure understanding of numbers and the number system.
- Develop the ability to use and apply mathematical skills in everyday situations.
- Understand and relate mathematical skills across the curriculum with effective use of ICT.
- Develop a positive attitude to Mathematics and encourage parental involvement.

#### Foundation Stage

It is widely appreciated that a child's mathematical understanding is greatly influenced during their early years of life. At Cudham, we strive to ensure that children's first experiences of mathematics within school are both positive and practical. During these early years, children are given opportunities to explore the number system, develop mathematical vocabulary through exploration and imitation, learn to represent groups and numbers, and develop early reasoning skills.

Children work towards the following Early Learning Goals:

**Early Learning Goal 11** - Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

**Early Learning Goal 12** - Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.

#### The New National Curriculum.

Under the new curriculum, each year group has a set of attainment statements. From these, we at Cudham have selected 20 Key Performance Indicators (KPI's) for each year. While not all-encompassing, they form a set of 'non-negotiables', which the children *must* attain in order to progress further.

#### By the end of KS1

By the end of Year 2 most children will have attained the following objectives:

- Count forward and backwards in jumps of 2, 3 and 5 from 0 and in 10s from any number.
- Compare and order numbers from 0 to 100 using  $<$ ,  $>$  and  $=$ .
- Solve problems with addition and subtraction, including those involving numbers, quantities and measures by using objects or pictures.
- Answer simple addition and subtraction questions in my head as well as by writing them down.
- Use addition and subtraction facts to 20 quickly and work out similar facts to 100.
- Remember and use multiplication and division facts for the 2, 5 and 10 times tables and recognise odd and even numbers.
- Answer questions involving multiplication and division mentally and with objects.
- Answer questions involving multiplication and division using arrays and repeated addition.
- Find, name and write fractions of a length, shape, set of objects or amount, including  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{2}{4}$ , and  $\frac{3}{4}$ .
- Compare and sort common 2-D and 3-D shapes and everyday objects.
- Use mathematical vocabulary to describe position, direction and movement.
- Add and subtract money and give change.
- Ask and answer questions about totalling and comparing grouped data.

### **By the end of KS2**

By the end of Year 6 most children will have attained the following objectives:

- Compare & order numbers up to 10,000,000.
- Round any number to a required degree of accuracy.
- Use negative numbers in context when looking at temperature or money.
- Solve problems with more than one step and operation and explain why I used them
- Use estimation to check answers to calculations and determine an appropriate degree of accuracy
- Multiply numbers of up to 4 digits by a two-digit number using a formal written method.
- Divide numbers of up to 4 digits by a two-digit number using a formal written method of short division.
- Use estimating to check answers and problem solving.
- Solve problems which require answers to be rounded to specified degrees of accuracy.
- Use written division methods for numbers with up to two decimal places.
- Use equivalences between simple fractions, decimals and percentages to help me solve problems.
- Use, read, write and convert between standard units.
- Convert measurement of length, mass, volume and time from a smaller unit to a larger unit and vice versa.
- Compare and classify geometric shapes based on their properties and sizes.
- Draw and translate simple shapes on the coordinate plane and reflect these in the axis.
- Interpret and construct pie charts and line graph and use these to solve problems.

- Calculate and interpret the mean as an average.
- Solve problems involving the calculation of percentages.
- Use percentages for comparisons.
- Solve problems involving unequal sharing and grouping.
- Use my knowledge of fractions and multiples to do this.
- Use simple formulae.

### **TEACHING & LEARNING**

#### **Inspire Maths**

From September 2017, the school has implemented Inspire Maths to support the teaching of maths from Year 1 to Year 6.

Inspire Maths is a detailed textbook scheme of work based upon the Singapore approach to teaching mathematics which ensures a deep understanding of mathematical concepts and understanding which underpins mastery. Inspire Maths uses a spiral progression to develop fluency, reasoning, problem solving and conceptual understanding

of mathematics through a concrete - pictorial - abstract approach.

Children of all ages and abilities should be encouraged to use resources to develop and explain their mathematical understanding. Some examples of resources used across the school include: Numicon, Base 10, Counters and Cuisenaire Rods. Such resources support with the concrete representations and understanding of concepts throughout all key stages.

The textbooks are designed to support teaching through providing children with repetition and consolidation through variation and ensuring a seamless progression between concrete, pictorial and abstract models for maths.

Children are encouraged to challenge themselves and explain their mathematical thinking through teacher questioning and problem solving activities.

Teachers enhance the Inspire Maths programme with their own knowledge and expertise to further challenge the more able and to support children with SEND.

### **ASSESSMENT**

- Children are assessed termly across the school, with statutory SATs at the end of the year for Years 2 and 6.
- Short term teacher assessments are made on a regular basis. These are formative in nature, identified by exception and used to inform future planning.
- Individual progress is tracked using targets from the level descriptors.
- All year groups carry out summative assessments at the end of each unit, supported by the Inspire Maths assessment materials.
- Moderation activities are carried out in all year groups both internally and externally with the local authority and within the small schools cluster. These are assessed to identify levels and areas for development.

### **MONITORING**

- The Maths Co-ordinator, will monitor Maths teaching, planning, progress and attainment through observations, data analysis and book scrutinies in order to ensure effective and sustainable learning and progress.

- Maths books are monitored to ensure consistency of high standards and progression within and between year groups.
- Application of skills is monitored through termly moderation activities, which are monitored by the whole staff to ensure progression.
- Feedback from monitoring will be shared at staff meetings.

## INCLUSION

Teachers at Cudham are aware of the issues related to gender and numeracy learning. If boys and girls are to have equal access to mathematics learning, teachers need to consider these in all their complexity. We also consider all other aspects of inclusion (economic, physical, race, birth date, social background) to ensure every child has the best chance to succeed.

### How we cater for pupils who are more able

Pupils are taught within their own class and stretched through differentiated group work, guided work with a teacher or TA and extra challenges. Special arrangements may also be made for an exceptionally talented pupil, e.g. they may follow an individualised programme with more challenging problems to tackle.

### Pupils with special educational needs

Teachers will aim to include all pupils fully in their daily mathematics lessons. All children benefit from the emphasis on oral and mental work and participation in watching and listening to other children demonstrating and explaining their methods. Children will receive differentiated group work and focused group teaching with the teacher and TA most weeks. However, a pupil whose difficulties are severe or complex, may need to be supported with an individualised programme in the main part of the lesson.

## RESOURCES

- We use a variety of published resources across both Key Stages to support the delivery of the Maths curriculum.
- These include materials for testing, reinforcement, assessment, extension, and using and applying.
- Classroom resources are regularly reviewed and supplemented as necessary.
- ICT resources are incorporated including web based materials and networked software.

This appendix is to be reviewed in September 2019

Signed (Head of School):



Date: September 17