Maths Policy

Rationale

At Shiremoor Primary School we envisage a culture of high achievement in Maths. There needs to be a belief by all that high achievement is possible and all children should aim to maximise their potential and that any potential barriers to learning in Maths are overcome. We want to deliver a high-quality mathematics education founded upon the three aims of the 2014 National Curriculum. These are to achieve fluency with regards to calculation, to be able to reason about the maths content children have learned, and to apply these skills to solve increasingly more complicated problems. Most important of all, children leave Shiremoor Primary School equipped with the Mathematical Skills required to successfully apply these to future studies and eventually in the work place.

Aims

The school aims to ensure that all pupils:
- Develop a thorough knowledge and understanding of numbers and the number system in line with National Curriculum recommendations.
- To ensure clear progression and continuity appropriate to individual needs.
- To promote confidence and competence in all forms of calculation.
- To develop logical thinking and reasoning skills through questioning and an investigative approach.
- To develop the ability to solve problems through decision making and reasoning in a range of contexts.
- To understand the importance of mathematical skills in everyday life.
- To promote enjoyment and enthusiasm for learning through practical activities, exploration and discussion.
- To encourage pupils to take responsibility for their own learning.

Our aims will be met by providing pupils with a wide range of rich learning opportunities which include incorporating concrete apparatus where appropriate. Lessons will be well structured and appropriately differentiated to meet the needs of all individual pupils.

Implementation of the Policy

At Shiremoor Primary School the National Curriculum should be fully implemented across school with each child receiving a daily mathematics lesson. Although the structure of the lessons may be rearranged, they should be planned to include opportunities for children to become fluent in the fundamentals of mathematics through varied and frequent practice, the reinforcement of key skills and times table recall. Lessons should reflect the opportunity for each child to be challenged.

At Shiremoor Primary School we develop children's mathematical knowledge, skills and understanding through careful planning and preparation, ensuring that throughout the school:

- Children are given opportunities for practical activities, role play and mathematical games.
- We develop children's mental and oral strategies with an emphasis on speed recall of number bonds and multiplication tables.
- We develop mathematical vocabulary.
- We encourage problem solving.
- We facilitate individual, group and whole class discussions and activities.
- We provide open and closed tasks.

- We encourage a range of methods of calculating e.g. mental, pencil and paper and using a calculator.
- We understand mathematics through a process of enquiry and experiment.
- We regularly use ICT games to reinforce, develop and enthuse learning.

Staff refer to the school Calculation Policy in order to secure progression throughout school. A copy of this is attached as an appendix.

Shiremoor Primary School Approach to Maths

Foundation Stage
At Shiremoor Primary School children follow the Early Years Foundation Stage Curriculum. We give all children the opportunity to talk and communicate in a widening range of situations and to practise and extend their range of vocabulary and numeracy skills. They have the opportunity to explore, enjoy, learn about, and use mathematics in a range of situations. Mathematics is planned on a half-termly basis and assessed using the criteria from the Early Learning Goals. Mathematics is taught both as a discrete subject and within the whole Early Years Curriculum to give children opportunities to use their numeracy skills in real life situations.

Key Stage 1- Years 1 and 2

The programmes of study for mathematics are set out year-by-year for Key Stage 1 and 2, in accordance with the National Curriculum 2014 and will form the basis of the medium term planning in school.
As outlined in the National Curriculum, the principle focus in Key Stage 1 is to ensure that children develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and four operations, including practical resources. Children should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money. In Year 2 teaching ensures that the content provided in exemplification materials is also covered.

Lower Key Stage 2- Years 3 and 4

In Lower Key Stage 2 it is expected that children become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that children develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage children develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that children 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 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.

Upper key stage 2 – Years 5 and 6
The principal focus at this stage is to ensure children have the opportunity to extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.
At this stage, children should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, children are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of Year 6, children should be fluent in written methods for all four operations, including long multiplication and division, and working with fractions, decimals and percentages.

Assessment

At Shiremoor Primary School ongoing assessment is a crucial part of effective teaching. We are continually assessing our pupils and recording their progress. We strive to make assessment purposeful and robust allowing us to match the correct level of work to the needs of the children, thus benefiting the pupils and ensuring progress. Daily assessment takes place through marking. This involves a red teacher's comment which feeds forward to the next day. These comments should allow children to consolidate their understanding of a topic or in cases where they are confident, provide further challenge. At the beginning of a lesson children have the opportunity to respond to the teacher comments and be aware of their next stage of learning. In addition to teacher marking there are opportunities for the children to carry out self and peer assessment.

For formative assessment, teachers assess children's work against Target Tracker statements in particular the Key Performance Indicators. Children can be recorded as working towards the target, achieving the target or mastering the target. The Target Tracker programme uses these statements to assess how the children are working compared to their year group's expected level.

In Shiremoor Primary School during 'assessment week' all children are assessed on their progress. From Year 1 up to Year 6 children complete a year group specific Progress in Understanding Maths Assessment (PUMA) standardised test paper. This assessment gives the child a 'Maths age' which provides further evidence towards identifying those children who are working below, at or above the expected level across year groups.

In addition, children on the SEND register will also be assessed in relation to their individual targets recorded on their Provision Map. Children not able to access age related assessment material for Year 1 have a set of PIVAT statements completed.

All assessment data from Target Tracker is analysed by the senior management team and the subject manager. Children not making expected progress are identified and intervention strategies planned to support.

SMSC

At Shiremoor Primary School Mathematics contributes to our SMSC development through helping children obtain an insight into the infinite, and through explaining the underlying mathematical principles behind natural forms and patterns. It also evident as we help children recognise how logical reasoning can be used to consider the consequences of particular decisions and choices and helping them learn the value of mathematical truth. Through our Maths curriculum children work together productively on complex mathematical tasks often recognizing that the result is often better than any of them could achieve separately. At Shiremoor Primary School children appreciate that mathematical thought contributes to the development of our culture and is becoming increasingly central to our highly technological future, and they learn that mathematicians from many cultures have contributed to the development of modern day mathematics.

Differentiation

At Shiremoor Primary School we aim to encourage all children to reach their full potential through the provision of varied opportunities. We recognise that our curriculum planning must allow children to gain a progressively deeper understanding and competency as they move through our school.

More Able Learners

More able learners will be identified as part of our formative and summative assessment procedures. We will provide for their needs through a framework of high quality first teaching which focuses on ensuring the children are challenged appropriately. In addition, we will focus on developing their learning behaviours, including, greater reflection, problem solving and enquiry, making connections, higher order thinking skills and independent learning. The progress of more able learners will be rigorously tracked to ensure more able children reach their full potential. Teachers have supporting materials to help provide these children with activities that encourage a greater depth of understanding these include the Focus and White Rose Math's Hub schemes along with the NCETM Mastery documentation.

SEND/Inclusion

Children who are identified as being on the SEND register will be given support as identified on their Individual Provision Map. A variety of support materials are available from SENDCo, Mrs A Irving. Children are supported in the first instance through quality first teaching. Lessons will be differentiated in line with the individual needs of the children. All provision for pupils with SEND is in line with the school's SEND policy.

Interventions

Intervention programmes that take place out of the classroom like 'First Class @ Number' will also be used with targeted children that require further support in their maths work. All pupils will have equal rights and access to high quality mathematics teaching. Interventions are evaluated half termly to ensure impact and cost-effectiveness.

Equal Opportunities

At Shiremoor Primary School the curriculum for Maths will develop enjoyment of and commitment to stimulating the best possible progress and the highest attainment for all our pupils irrespective of social background, culture, race, gender, differences in ability and disabilities. All of our pupils have a secured entitlement to participate in the Maths Curriculum and our teaching approaches ensure the avoidance of stereotyping when planning work or organising groups. All the teaching staff agree that when using reference materials, they should reflect social and cultural diversity and provide positive images of race, gender and disability.

Homework

Children from Year 1 to Year 6 have CGP mathematics homework books with pages set for each week. If children want to complete more than a page for each week they are welcome to. Homework will not be marked by teachers as this is not the best use of time. In addition, children have a times table which reflects the individual needs of the child and optional tasks to support the enjoyment of mathematics through a range of cross curriculum challenges. All tasks have a strong emphasis on the application of basic skills.

In year 4 children use MP3 players to support the learning of times tables. To help children learn their times tables, teachers are responsible for testing individual times tables. If a child is able to learn their times table and answer a number of questions in a mixed up order, they are rewarded with a times table badge for that times table. These can then be attached to their 'Award Sash'.

In preparation for SATs the Year 6 teacher offers an after school revision club to help the children consolidate skills learnt in the classroom and to provide a further opportunity to provide more challenging work for more able pupils.

Monitoring and Evaluation

At Shiremoor Primary School the Maths Coordinator monitors planning and assessments – evaluating medium term plans and taking note of annotations, amendments and suggestions made by class teachers. They ensure that the curriculum has been covered and that there are no gaps.

Photographs of completed work and displays are kept digitally by the Coordinator as a portfolio, in order to monitor and support the raising of standards in Maths within the school. The coordinator takes responsibility for addressing any needs or concerns that arise as a result of this monitoring.

To monitor and evaluate Maths the Maths subject co-ordinator does the following:
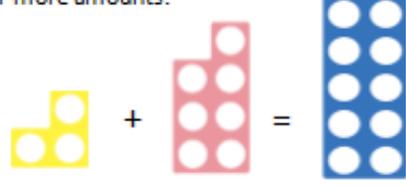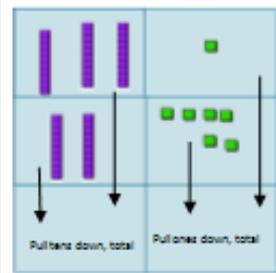
- Purchases and organises the appropriate resources.

- Supports colleagues in the teaching of Maths.

- Keeps up-to-date on the use of Maths in the curriculum and regularly attends training for subject leaders held by the LA and feedback new information and ideas to staff.

- Conducts Maths scrutiny to assess the standards of Teaching and Learning through the children's work.

- Regularly reviews and updates the Maths Policy and contribute to the school's self evaluation programme.

- Analyses cross school summative assessment data.

Appendix: Calculation policy

Mission Statement for Calculation Policy
The aim of this calculation policy is to ensure that teachers and pupils understand the ability and age appropriate methods required when teaching each of the four operations (addition, subtraction, multiplication and division).

This document ensures a consistency across year groups as well as ensuring even and well planned progression to logically build on a child's current understanding and how best to extend their learning. The children should apply each of these skills to problems in a variety of forms to ensure a deeper and more well-rounded understanding of maths.

+ Addition +

Stage 1

Children understand the concept of addition as the combining of two or more groups. Children use + and = symbols accurately. Calculations should be written on either side of the equal sign so that = is not just interpreted as the answer.

$$6 + 2 = 8 \qquad 8 = 6 + 2$$

Children use Numicon and other practical representations to add 2 or more amounts.

Children begin to find missing numbers.

$$5 + \boxed{} = 9$$

$$3 \quad + \quad 7 \quad = \quad 10$$

Stage 2

Use Numicon and Dienes to develop addition of 1 and 2-digit numbers in a grid. No exchanging across tens barrier.

Written method starts by focusing on partitioning and recombining.

$31 + 26 = \underline{}$

$30 + 20 = 50$

$1 + 6 = 7$

$50 + 7 = 57$

Progresses to...

```
  T O
  3 1
+ 2 6
-----
  5 7
```

When introducing column method, ensure ones pulled down first.

Ensure children have opportunity to work with 100 square to practise adding by counting in tens and ones.

Recommended method by end of Year 2

Stage 3

Progress from Dienes to place value counters. Introduce exchanging across the tens boundary.

Combine ones   Exchange ten ones for one ten   Pull down each column in turn and total.
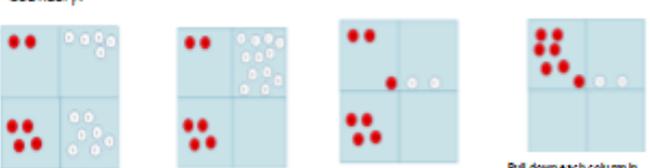
Continue with column method as formal written method. Ensure 1 is placed on the doorstep for continuity in later years. Progress to 3-digit and two 3-digit numbers resulting in adding 4-digit and 2-digit numbers.

```
  T O
  2 5
+ 4₁7
-----
  7 2
```

Introduce adding decimals in context of money. Use coins/decimal place value counters with grid.

```
  £ U . t h
  £ 3 . 5 0
+ £ 4 . 6 3
-----------
  £ 8 . 1 3
```

Recommended method by end of Year 4

Stage 4

Continue with column method of more than 4 digits progressing to larger numbers and decimal numbers with different numbers of places, when expanded method is secure.

Place value counters can be used to develop understanding of addition with decimal numbers, alongside formal written method.

Ensure that there is the opportunity to apply knowledge in a variety of contexts through multi-step problems. Children decide on which method to use and why.

Children will have the opportunity to use rounding to check answers to calculations and determine levels of accuracy in the context of the problem.

Aim for both conceptual understanding and procedural fluency with formal written method by the end of Year 6.

```
   47. 8
+ 2 3 6. 5 7
----------
  2 8 4. 3 7
```

- Subtraction -

Stage 1

Children understand the concept of subtraction as the taking away from one another. They use the takeaway (—) and equals (=) signs accurately. Calculations should be written on either side of the equals sign so that = is not just interpreted as the answer. 6 - 4 = 2   2 = 6 - 4

Children use multilink, Numicon and other visual representations to subtract amounts.

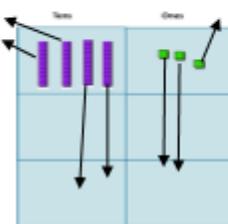Children physically take cubes away.

$3 - 2 = 1$

Numicon subtracted by covering.

$7 - 4 = 3$

Children begin to find missing numbers.

$2 = 4 - \boxed{}$

Stage 2

Use Dienes to physically take away amounts. Develop subtraction of 1 and 2-digit numbers in a grid. No exchanging across tens barrier.

Written method starts by focusing on partitioning and recombining.

43 - 21 = ____

40 - 20 = 20

3 - 1 = 2

20 + 2 = 22

Progresses to...

```
    T   O
    4   3
-   2   1
    2   2
```

When introducing column method, ensure ones pulled down first.

Pull remaining tens down, total.   Pull remaining ones down, total.

Ensure children have opportunity to work with 100 square to practise subtraction by counting back in tens and ones.

Recommended method by end of Year 2

Stage 3

Progress from Diennes to place value counters. Introduce exchanging across the tens boundary.
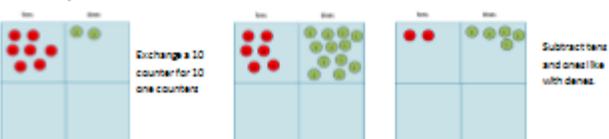
Exchange a 10 counter for 10 one counters

Subtract tens and ones like with dienes.

Continue with column method as formal written method. Ensure when exchanging number is crossed out and new number written for continuity in later years. Progress to 3-digit and 2-digit and two 3-digit numbers resulting in subtracting 4-digit numbers.

```
    T   O
  6  ₁  2
-   4   7
    2   5
```

Introduce subtracting decimals in context of money.
Use coins/decimal place value counters with grid.
Exchanging included.

```
  £   U . t   h
  £   8 . 9   7
- £   3 . 6   3
  £   5 . 3   4
```

Recommended method by end of Year 4

Stage 4

Progress to integers with more than 4 digits and calculations with decimals, including with different numbers of decimal places.

Ensure that there is the opportunity to apply knowledge in a variety of contexts through multi-step problems. Children decide on which method to use and why.

Children will have the opportunity to use rounding to check answers to calculations and determine levels of accuracy in the context of the problem.

Ensure that children are given the opportunity to solve missing number/ digit problems:

and ☐ each stand for a different number. # = 34. # + # = ☐ + ☐ + # . What is the value ☐ of ? 12,000,000 = 11,000,100 +

Aim for both conceptual understanding and procedural fluency with formal written method by the end of Year 6.

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x Multiplication x

Stage 1

Count in 1s, 2s, 5s, 10,s and 100s. Use rhyme/rote/objects.
Begin to understand the concept of 'multiplication' and recognise the' x' symbol.
Children use Numicon and visual representations to show groupings of amounts as repeated addition.

3 lots of 2 $3 \times 2 = 2$

4 groups of 3
$4 \times 3 = 12$
$3 + 3 + 3 + 3$
$3 + 3 + 3 + 3$ repeated addition

Stage 2

Children to recall and use x facts for 2, 5 and 10.
To continue to use Numicon to show multiplication as repeated addition.

$4 \times 3 = 12$ $3 + 3 + 3 + 3$

To use an array using PVC/multilink cubes to represent multiplication and know multiplication can be done in any order. Use x symbol with confidence. Introducing simple, single digit x single digit grid method. Progress onto drawing own arrays.

$2 \times 3 = 6$

$3 \times 2 = 6$

```
        3 x 3
  x  |  3
  3  |
```

Recommended by the end of year 2.

Stage 3

Children to recall and use x facts for the remaining times tables.
To use 'grid method' as an informal method to carry out multiplication calculations.
Begin by using PVC/ Base 10 to help with process of partitioning, multiplying and recombining. Progress from Multiplying 2 digit numbers to 3 digit numbers multiplied

Begin with visual representations   Leading to...   Leading to...
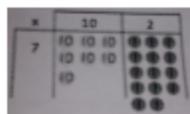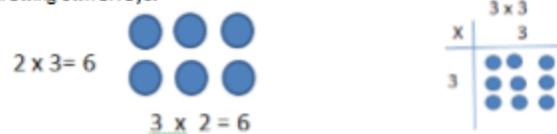
```
          132 x 4
      x  100   30   2
      4  400  120   8

          H  T  O
          4  0  0
          1  2  0
        + 0  0  8
          5  2  8
```

Stage 4

Children should understand long multiplication 2D x 2D with the initial use of place value counters. Demonstrate how the partitioning method for multiplication progresses to the formal method using columns.

```
         10      8
    10 | 100 |  80
     3 |  30 |  24
```

```
      1  8
  x   1  3
      1  8  0
      5  4
      2  3  4
```
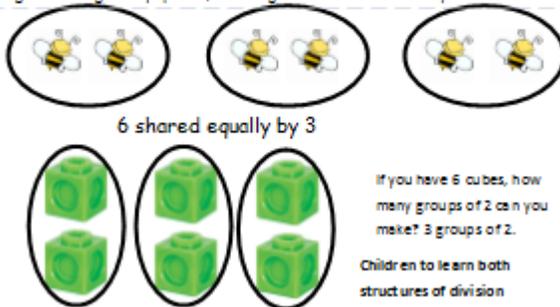
Continue to refine and deepen understanding of written methods including fluency for using long multiplication of up to 4 digit by 2 digit whole numbers.
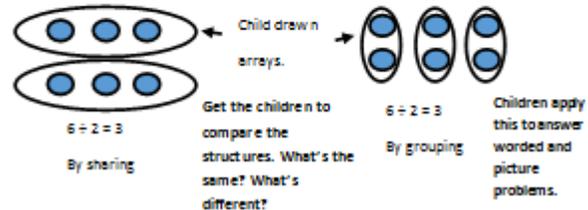
÷ Division ÷

Stage 1

Children begin to understand the concept of division as sharing using the '1 for you, 1 for you' method. When confident, they then start to investigate the concept of division by grouping. Use a range of equipment, and images to show division as equal.

6 shared equally by 3

If you have 6 cubes, how many groups of 2 can you make? 3 groups of 2.

Children to learn both structures of division

Stage 2

Children continue to learn to understand division in both 'sharing' and 'grouping' structures. The ÷ symbol is introduced. Continue with concrete apparatus e.g. 12 ÷ 3. Make 12 from Numicon 10 + 2. Cover with 3 tiles to see how many groups of 3 are in 12. Also use PVC. Children move to a written method where they draw arrays to replicate the process of sharing and grouping.

Child drawn arrays.

$6 \div 2 = 3$
By sharing

$6 \div 2 = 3$
By grouping

Get the children to compare the structures. What's the same? What's different?

Children apply this to answer worded and picture problems.

Recommended by end of Year 2.

Stage 3

To use short division method to divide numbers including decimals and with the possibility of remainders. Show as sharing first but quickly move onto grouping. Place Value Counters absolutely key here.

$9 \div 3 = 3$

Sharing and grouping

$36 \div 3$
leading to grouping

$42 \div 3$

$137 \div 3$
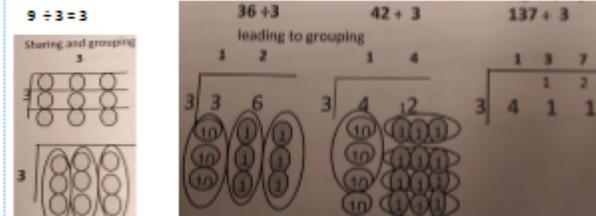
How many groups of 3 can we make using 3 tens counters? Initially using place value counters to group and exchange. Children begin to work without once understanding is secure. Recommended in Years 3 and 4.

Stage 4

Children continue to divide whole numbers mentally using times tables knowledge and inverse operations. Keep using a range of mathematical terms for division.

Progress to division of numbers up to 4 digits by a one-digit number using the formal short written method, including decimals, then by two—digit numbers using the formal written method of short division interpreting remainders appropriately ie. as fractions, decimals, whole number remainders, or rounded numbers.

$0 \, 8 \, 1 \, 2 \cdot 1 \, 2 \, 5$
$8) 6 \, 4 \, 9 \, 7 \cdot 0 \, 0 \, 0$

Progress to divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Initially limit the choice of "Can we use 10 lots? Can we use 100 lots? As the children become more confident encourage more efficient chunks to get to the answer more quickly e.g. 20 x: 5x.

$$36) \overline{972}$$
$- 720$ (20x)
252
$- 252$ (7x)
0

Answer : 27