Brighter Futures Academy Trust

Mathematics Policy

Name of Policy Writer/Amendments	Date Written/Amended	Next Review Date
R Denham	Nov 2014	Nov 2017
R Denham	April 2018	Sept 2021

Luddendenfoot Academy
Mathematics Policy

Introduction:

This policy affects all year groups in the school. It takes into account the National Curriculum 2014 for mathematics.

Vision statement.

'A good mathematician at Field lane Primary School will….
· Have a positive attitude towards mathematics and an awareness of the fascination of mathematics
· Be able to identify mathematical relationships, both spatial, numerical and logical, and see their relevance to everyday life.
· Be able to carry out practical activities involving measurement, estimation and calculation.
· Be able to use money in everyday situations.
· Be able to read and record mathematical statements using correct terminology and symbols.
· Be able to use and interpret diagrams, charts, graphs and tables.
· Have an ability to solve problems, to reason, to think logically and to work systematically and accurately.
· Have developed an ability to use and apply mathematics across the curriculum and in real life
· Have developed an understanding of mathematics through a process of enquiry and experiment
Have developed an ability to calculate mentally drawing on a range of strategies and knowledge of number facts

Aims:

The aim of the National Curriculum 2014 for mathematics is to support and increase all children's access to excellent teaching, leading to exciting and successful learning.

Children deserve:

· to be set appropriate learning challenges
· to be taught well and be given the opportunity to learn in ways that maximise the chances of success
· to have adults working with them to tackle the specific barriers to progress they face.
The National Curriculum 2014 for mathematics is designed to help practitioners, teachers, schools and settings achieve this ambition.

Curriculum Development and Organisation:

At Field lane Primary School we follow our own scheme of work for Mathematics, based on the new National Curriculum (2014), which ensures continuity and progression in the teaching of mathematics. The SOW identifies the order the content is covered. Lessons will

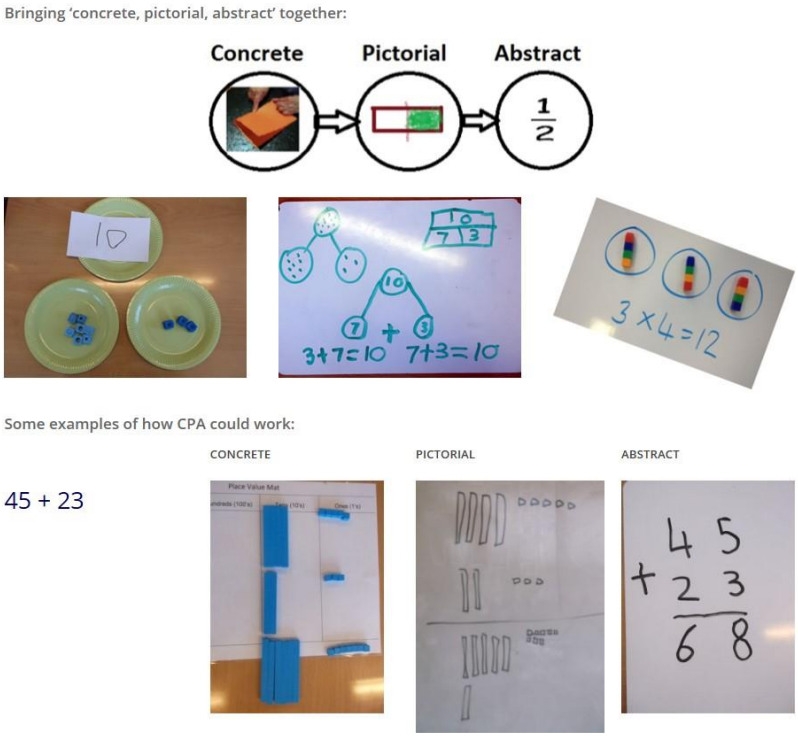
also focus on deepen understanding before accelerating content coverage. We use the abacus maths books to dip in and out off not to follow as a scheme.

All pupils benefit from deepening their conceptual understanding of mathematics, regardless of whether they've previously struggled or excelled. Pupils must be given time to fully understand, explore and apply ideas, rather than accelerate through new topics. This approach enables pupils to truly grasp a concept, and the challenge comes from investigating it in new, alternative and more complex ways. It enables pupils to develop a deep understanding of mathematical concepts which they can then apply, with confidence, speed, and accuracy, in different situations.

<u>Teaching and Learning:</u>

Maths mastery encourages pupils to visualise mathematical concepts, with the aid of objects and pictures alongside numbers and symbols.

Concrete, pictorial, abstract



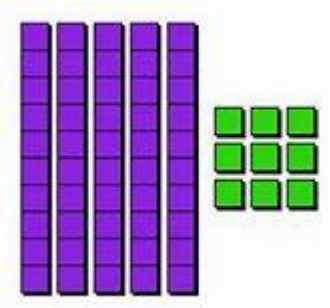
Objects, pictures, words, numbers and symbols are everywhere. The mastery approach incorporates all of these to help pupils explore and demonstrate mathematical ideas, enrich

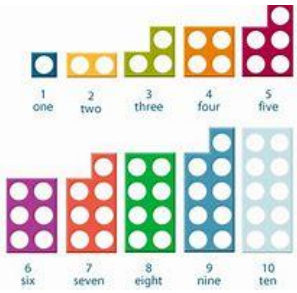
their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they've learnt.

All pupils, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking this approach. Pupils are encouraged to physically represent mathematical concepts. Objects and pictures are used to demonstrate and visualise abstract ideas, alongside numbers and symbols.

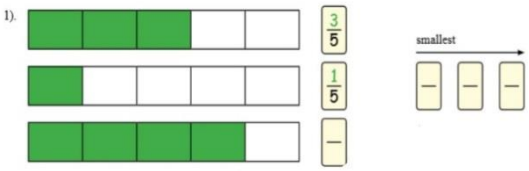
Concrete – Students should have the opportunity to use concrete objects and manipulatives to help them understand and explain what they are doing.

At Field lane Primary School we use a variety of resources including deans and rods and numicom. Children are introduced to diennes and rods as soon as they are working on numbers beyond 10.





Pictorial – Students should then build on this concrete approach by using pictorial representations. These representations can then be used to reason and solve problems.



Abstract – With the foundations firmly laid, students should be able to move to an abstract approach using numbers and key concepts with confidence.

Types of mastery

See Appendix 1 for examples of the different types of mastery.

Mastery websites –

In Appendix2 contains examples of websites that have mastery problems linked to the curriculum.

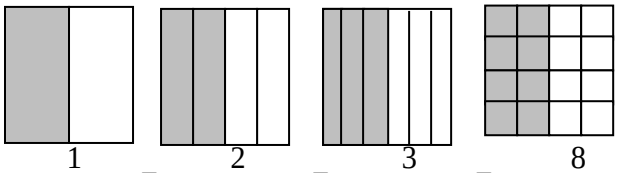
Assertive Mentoring Prompts are also stuck in the children's books as an aid to learning and for children to refer back to in future learning. These prompts can be found on the school server in the assertive mentoring file.

An example of a prompt can be found below.

4/13 Common equivalent fractions

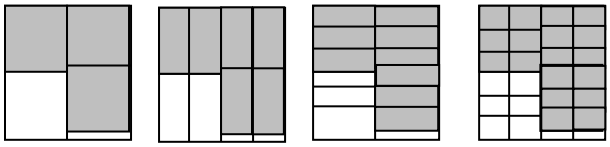
- The same fraction can be expressed in different ways

ALL THESE ARE $\frac{1}{2}$



$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{8}{16}$

ALL THESE ARE $\frac{3}{4}$



$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{18}{24}$

Inclusion and Equal Opportunities:

Maths mastery adopts a whole class approach. The whole class works together on the same topic. There is still plenty of opportunity for differentiation, through greater depth of understanding and proficiency, rather than acceleration onto new content, for high-attaining pupils.

All children are provided with equal access to the Mathematics curriculum. We aim to provide suitable learning opportunities regardless of gender, ethnicity or home background.

The curriculum is delivered by class teachers. In all classes children are taught in a variety of groupings and work is differentiated in order to give appropriate levels of challenge for each ability group. Where children are struggling with maths a 1:1, or small group, intervention programme will be implemented based upon individual needs. These interventions will be delivered by teaching assistants under the guidance of class teachers.

Subject Monitoring / Evaluation of provision:

The subject leader is responsible for monitoring and evaluating curriculum progress. This is carried out through: analysis of data; books and planning scrutinises; lesson observations; staff and pupil discussions and audits of resources.

Pupil Assessment:

· The Early Years Foundation Stage Profile (EYFSP) is put on the computer on a half termly basis in Reception and progress can be shown through graphs to show progress. Children's achievements are tracked on an ongoing paper-based system. Early Essence can also demonstrate this.

· Each class teacher is responsible for monitoring and evaluating the progress of their pupils Mathematics skills.

· Children are also formally assessed at Year 2 and Year 6 according to SATs tests and tasks.
The year 2 test results being based on teacher assessment and not on the results of the actual test.
· Years 3, 4 and 5 may also undertake optional SATs tests in mathematics.
· Simms tracking system is used to closely monitor children's progress throughout the school. Teachers record children's attainment against each learning objective as it is taught. Teacher assessments are moderated 3 times a year and are closely analysed by the subject leader and Senior Leadership Team.

Marking

Books will be marked after every lesson and then used to plan the following days lesson. Misconceptions will be addressed in future lessons. Children will be given the opportunity to correct any mistakes or address teacher comments in daily RAR time. Children complete RAR time in green pen. This is then acknowledged by the teacher with a RAR stamp. Marking and feedback must be informative to be of any value. Marking can be used to check children's understanding and/or challenge their knowledge and thinking. (Please refer to the marking policy) (Appendix 3)

Marking can also be used to re-enforce previous learning.
eg. Place Value
Add 1000 to your answer
Choose 3 answers and put them in order of size
Choose 1 answer and write all the factor pairs.
Fractions
Find an equivalent fraction for your answer
Write the answer as a mixed number

Roles and Responsibilities:

The subject leader for maths is responsible for the following areas:
· Ensuring understanding of the National Curriculum (2014) amongst teachers and teaching assistants
· Keeping up to date with developments in maths teaching.
· Observing colleagues and monitoring planning and quality of teaching.
· Leading by example in the way of teaching in own classroom.
· Preparing policy documents.
· Advising colleagues and helping to develop expertise.
· Encouraging the development of maths activities that are appropriately differentiated and enable progress.
· Liaising with the Head of schools and SLT across the trust and working with the maths team for the trust.
· Making purchasing decisions.

Home / school links:

We see the relationship with parents very important in supporting their children's mathematics skills. We involve the parents in their children's learning by:-
· Providing regular parent's meetings which give them verbal and written information on their child's progress and their targets for the future.
· Providing half termly curriculum letters informing the parents about the areas of the curriculum that are being covered.

· Providing an end of term report which outlines progress and attainment.
· Providing meetings to inform parents on how we teach mathematics and how they can help.
· Providing mathletics homework to be completed online..

Appendix One

Teaching of mastery problems

Mathematical problem solving plays a central role in the mastery approach. This builds the confidence, resilience and skills required by pupils in order to tackle new problems, as well as giving them a deeper learning experience. Equally important are mathematical language and reasoning skills. Maths mastery encourages pupils to increase their depth of understanding by using the correct mathematical language in order to justify or explain their mathematical reasoning.

Types of Mastery

Reasoning

Reasoning about what is already known in order to work out what is unknown will improve fluency; for example if I know what 12 × 12 is, I can apply reasoning to work out 12 × 13. The ability to reason also supports the application of mathematics and an ability to solve problems set in unfamiliar contexts.

Research by Nunes (2009) identified the ability to reason mathematically as the most important factor in a pupil's success in mathematics. It is therefore crucial that opportunities to develop mathematical reasoning skills are integrated fully into the curriculum. Such skills support deep and sustainable learning and enable pupils to make connections in mathematics.

https://www.ncetm.org.uk/resources/44672 gives examples of how reasoning can be incorporated into each learning objective.

Word Problems and Story Problems

In word problems or story problems a child is given a 'real-life' situation and asked to solve it, for example:
I have 56 apples. I need to divide them equally into eight different boxes. How many apples will be in each box?
Children need to work out that the number sentence they need to work out for this is:

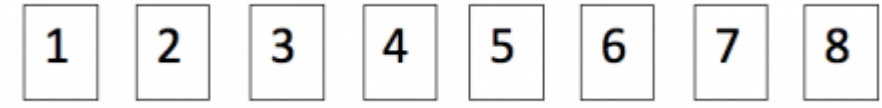
56 ÷ 8 = 7

Investigations

Investigations differ from word problems in that there is not necessarily one way of working them out and often the method of trial and improvement needs to be applied. Often, there is not just one answer; there could be several.

An example of an investigation that children in Key Stage 1 might carry out, is as follows:

Amy picks three of these cards and gets a total of 9. Which three cards might Amy have picked?



A teacher might give children number cards to help them with this. They might allow them to carry out the investigation randomly, allowing them to choose any three cards and see if they add up to 9. They might allow them to stop when they have found one combination, or they may ask them to find all the combinations.

Using a systematic approach to investigations helps us to make sure we have worked out every combination. A teacher might go through each number in turn, saying: 'What could we add to 8?' Then when it is clear you could not add two numbers to 8 to make 9, turn next to 7: 'What could be add to 7?' Again, it is not possible to add two of the other numbers to make 9, so then you would need to try with 6, and so on. This way, the teacher is modelling that an ordered approach to the investigation means that you are trying every possibility.

Here is an example of a Key Stage 2 investigation:

I have two letters. One weighs double the other. Together, they weigh 135g. How much does each letter weigh?
I have 4 coins in a row on a table. The first and second coins add up to 30p. The second and third coins add up to 25p. The total of all four coins is 40p. What are the four coins?

I am thinking of a number. The number has two digits which add up to 8. The number is a multiple of 4 smaller than 50. What is the number?

Answers
Melissa baked 15 cupcakes on Monday.
The letters weighed 90g and 45g.
The coins were 10p, 20p, 5p and 5p.
The number was 44.

Investigations are a great way for children to practise various mathematical concepts such as money maths, measures, addition, subtraction, multiplication, division and the inverse. They also require them to recognise and understand various mathematical terms such as total, digits, multiple, factor, double and product.

1 step problems can be used to apply taught knowledge of a learning objective.
2 step problems need to be specifically taught and linked carefully.

Eg.

Put these in order of size

1/2 4/20 3/10 5/15

Teachers would need to ensure children are able to find equivalent fractions, lowest common denominator, and then able to order the fractions.

The schools subscribe to Testbase which is a valuable resource.

Joining learning objectives – Class teachers need to be mindful of how leaning objectives are taught and give children opportunities to apply knowledge from different strands of maths.
Looking at a clock, how many minutes of time could make a minute hand turn more than 90° but less than 180°?

End of unit problems – Mini projects

This gives children the chance to apply all the knowledge and understanding they have been taught over a unit. Data can be used that links to other areas of the curriculum.
Eg.

Rank	Name	2017 Population
1	California	39,849,872
2	Texas	28,449,186
3	Florida	21,002,678
4	New York	19,889,657
5	Pennsylvania	12,819,975
6	Illinois	12,815,607
7	Ohio	11,646,273
8	Georgia	10,450,316
9	North Carolina	10,247,632
10	Michigan	9,935,116
11	New Jersey	8,996,351

Which is the largest number?
Choose 3 numbers and put them in order of smallest to largest.
Round the numbers to the nearest …….
Add 10,100, 1000 to any of these numbers.
Draw a bar chart to represent this data
How many more people live in Texas than California

Appendix 2
Mastery website to support teaching and Learning

https://nrich.maths.org/ - nrich
https://www.ncetm.org.uk/resources/ - nctem
Testbase -SAT questions
White Rose maths hub
https://www.10ticks.co.uk/MathsMastery - 10 ticks maths
maths watch

Appendix 3
Marking in maths

What could feedback marking look like in mathematics...

Rewrite or remodel an example

52 – 38 =

50 – 30 = 20

8 – 2 = 6

52 – 38 = 26 — Child recorded

.....

52 - 38 =

52 - 30 = 22

22 - 2 - 6 = 14 — Corrected recording

Now you try this one...

Self-correcting

- ✓ Can you see where you have made your mistake?
- ✓ Check your 'place value in question 5'
- ✓ I make the answer to this question ... check that I'm right
- ✓ 2 of your answers are wrong, spot which ones they are and correct them

Remember...

- ✓ 'one hundred and two is 102 not 1002'
- ✓ 'to count on from the larger number'

Use the code

VF - verbal feedback

● - Incorrect

✓2 - Corrected work

G - Work completed during a guided session

S - Support given to a child

R - A differentiated resource given

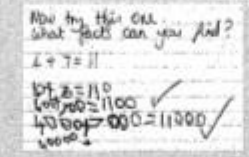
Ask a closed question...

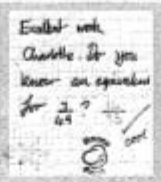
- ✓ If you start with 93 and count back in tens, what would be the smallest number you would reach on a 1-100 grid? Would 14 be one of the numbers you say?
- ✓ Put these numbers in order:
  635, 535, 538, 388, 508.
  What would the third number be?
- ✓ Which of these numbers is closest to the answer of 342 - 119?
  200 220 230 250 300
- ✓ I buy 6 books that cost £4.99 each. How much will I pay to the nearest pound?
- ✓ There are 28 children in the class. 3/7 are girls. How many girls is this?
- ✓ A film starts at 6.30 p.m and ends at 8.10 p.m. How many minutes does the film last?
- ✓ What is the difference between 1999 and 4003?
- ✓ What number is 30 less than 64?
- ✓ What is the missing digit?

  5 □
  × 8
  4 5 6
- ✓ Shade ¼ of this shape

- ✓ Fill in numbers on the 100 grid

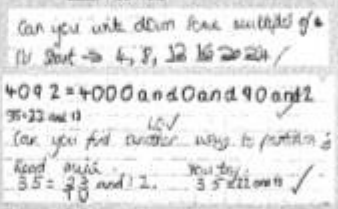
45		
		57





Ask an open question...

- ✓ Tell me two two-digit numbers with a difference of 12
- ✓ What even numbers lie between 10 and 20?
- ✓ Find 3 ways of completing: ...% of ... = 30
- ✓ □ × O = 20 What could the missing numbers be?
- ✓ These numbers are in order, largest to smallest: 56 □ 45 □ 37 □ 33 Think of a number that could go into each of the empty boxes.
- ✓ Draw a triangle with a line of symmetry that does not have a right angle
- ✓ If 7 × 8 = 56 what is 0.07 × 8? Give some other decimal facts that are linked to this fact
- ✓ Give me 3 division questions that have a remainder of 1
- ✓ Suggest sensible units you might use to measure the height of your table
- ✓ Tell me two lengths that together make 1 metre
- ✓ Write what the missing digits could be:
  □□ + 10 = 3□



Finishing a sentence...

- ✓ 36 can be partitioned into ... and ...
- ✓ Two numbers + 200 are .... and ....
- ✓ All multiples of 5 end in .... and ....
- ✓ Two fractions equivalent to a half are .... and ....
- ✓ Capacity can be measured in .... or ....
- ✓ Acute angles are .....
- ✓ A pencil weighs about ....
- ✓ Squares have ..... and .....
- ✓ 1.6 is between ..... and .....
- ✓ 3 of the factors of 24 are ...., ... and ....

Ask for an explanation

- ✓ Would a chocolate lover rather have 1/2 or 1/3 of a bar of chocolate? Explain your answer
- ✓ What tips would you give someone who is learning how to round numbers to the nearest 10 or 100?
- ✓ Explain why a number which ends in '3' cannot be a multiple of 4
- ✓ Explain why two of the three angles in my triangle can't be obtuse
- ✓ Explain why 16 is a square number
- ✓ How could you subtract 37 from 82?
- ✓ How could we test a number to see if it is divisible by 6?

Encouraging reflection

- ✓ Could there be a quicker way of doing this?
- ✓ Do you think that this would work with other numbers?
- ✓ When could you use this strategy?
- ✓ Have you thought of all the possibilities? How can you be sure?
- ✓ Why did you decide to use this method?
- ✓ Can you think of another method that might have worked?
- ✓ Why did you decide to use this method?