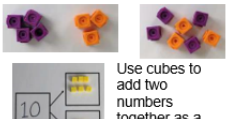
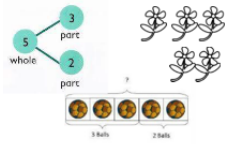
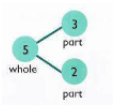
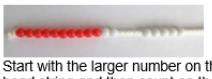
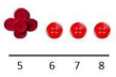
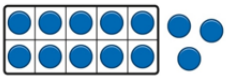
Millfields CE Primary School

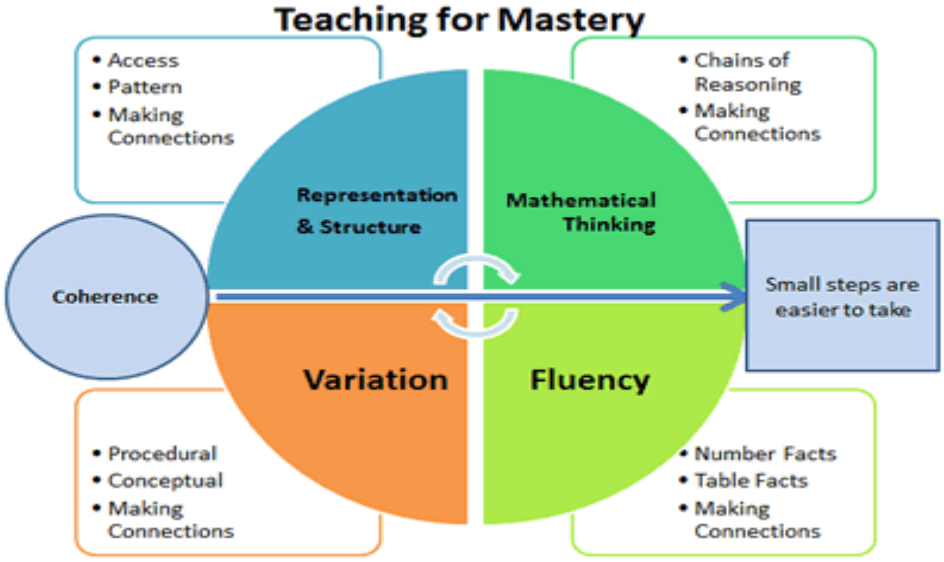
Maths Policy 2023

At Millfields, we adopt a mastery approach to maths in which children are given plenty of opportunities to develop their thinking using concrete, pictorial and abstract methods. All children within a year group should be working together (support adapted appropriately) on the same concept. Pre-teaching is used effectively to ensure that everybody can access the daily lesson and all children should be challenged appropriately; we set challenges that everybody has the opportunity to access.

Every classroom has an interactive maths learning wall and a maths resource station. These should be fully accessible to children and can be used to consolidate knowledge and understanding of the current learning outcome. Concrete and pictorial representations are used to support abstract concepts and mathematical language should also displayed.

	Objective	Concrete	Pictorial	Abstract
Year 1 Addition	Number bonds of 5, 6, 7, 8, 9 and 10	 Use cubes to add two numbers together as a group or in a bar.	 Use pictures to add two numbers together as a group or in a bar. 	2 + 3 = 5 3 + 2 = 5 5 = 3 + 2 5 = 2 + 3  Use the part-part-whole diagram (as shown above) to move into the abstract.
	Counting on	 Start with the larger number on the bead string and then count on the smaller number 1 by 1 to find the answer. 	Use a number line to count on in ones. 	5 + 3 = 8
	Understanding teen numbers as a complete 10 and some more	Complete a group of 10 objects and count more.  13 is 10 and 3 more.	Use a ten frame to support understanding of a complete 10 for teen numbers.  13 is 10 and 3 more.	1 ten and 3 ones equal 13. 10 + 3 = 13

What is teaching for mastery?



Based on "FIVE BIG IDEAS IN TEACHING FOR MASTERY" by NCETM

Fluency:

Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics. Developing automaticity in these aspects allows cognitive load to be devoted to higher order thinking.

Representation and Structure

Mathematical structures are the key patterns and generalisations that underpin sets of numbers – they are the laws and relationships that we want children to spot. Using different representations can help children to 'see' these laws and relationships. Representations used in lessons expose the mathematical structure taught, the aim being that students can do the maths without recourse to the representation.

Variation

Variation is twofold. It is firstly about how the teacher represents the concept, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

Mathematical Thinking

If children are to understand taught ideas deeply, they must have opportunities to work on them, think about them, reason with them and discuss them with others. Pupils must be encouraged to look for patterns, relationships and make connections.

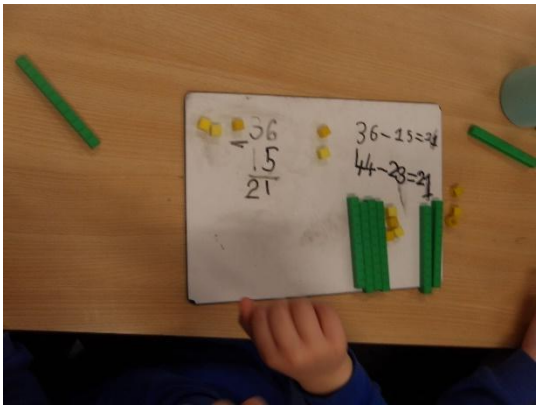
Coherence

Lessons are broken down into small, connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.

Concrete, Pictorial, Abstract CPA

CPA is a highly effective approach to teaching that develops a deep and sustainable understanding of maths in pupils. This is the vehicle that teachers at Millfields use in lessons to represent structures and expose them. It is not a "one size fits all" process and each step will not always be appropriate to the topic. The ultimate aim of this process will always be that children will internalise the representations and can access the maths on an abstract level.

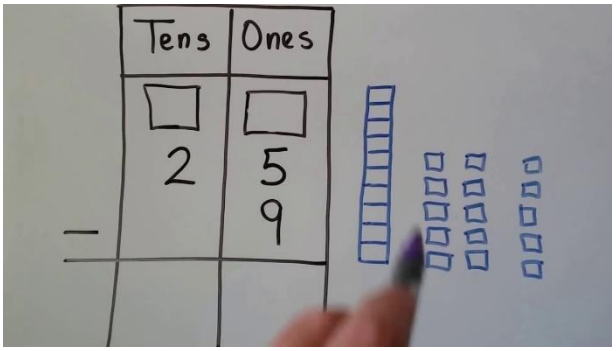
Concrete



Children are encouraged to solve problems each day through the use of concrete resources, pictorial representations and abstract thinking. Concrete is the '**doing**' stage, using concrete objects to solve problems. It brings concepts to life as children have the opportunity to be hands on and use physical objects to aid them in developing their understanding.

Pictorial

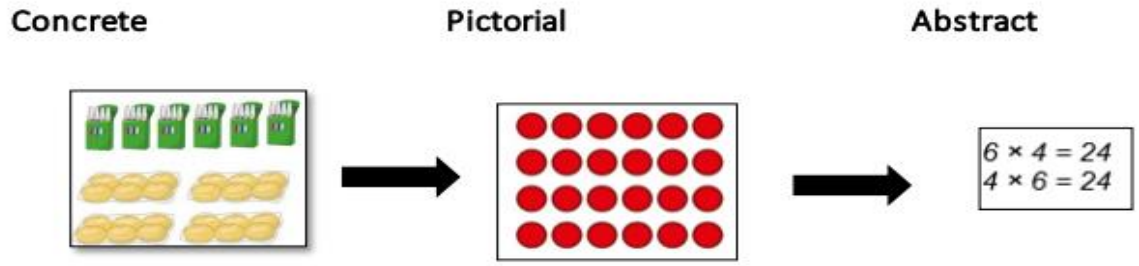
Pictorial is the '**seeing**' stage, where representations of the objects are used to support learning. This stage encourages children to make a mental connection between the physical object and abstract levels of understanding, by drawing or looking at pictures, circles, diagrams or models that represent the objects in the problem.



Abstract

38 -26	46 - 14
46 - 22	75 - 45

Abstract is the '**symbolic**' stage, where children are able to use abstract symbols to model and solve maths problems.



EYFS

All maths learning in EYFS is based on the document "*Development Matters*". In Nursey, a mixture of formal teaching and informal learning opportunities that follow the interest of the children are used. In Reception, teachers follow a combination of the NCETM's Mastering Number programme and White Rose schemes of learning – principally securing their knowledge of number facts within 10 and oral counting/recognising numbers to 20. Children are encouraged to spot patterns and identify differences through variation. EYFS practise is centred around exploration and discovery with songs and repetition to secure foundational knowledge

Key Stage 1

The principal focus of mathematics teaching in key stage 1 is to ensure pupils develop confidence and mental fluency. In addition to the daily maths lesson, children in Key Stage 1 access a 15-minute daily fluency session, using NCETM's Mastering Number programme. The essential idea behind the mastery approach is that all children have a deep understanding so that future learning continues to build on solid foundations. If the subject is represented using concrete materials, pictorial representations and abstract symbols, it will allow children to visualise maths in varied ways, see connections and to independently explore and investigate a topic. Practical

activities and resources offer the children a deeper mathematical understanding of more complex concepts. Providing children with visual representations also offers a scaffold when developing a more robust understanding of maths. Throughout Key Stage 1, it is important that children gain a secure knowledge of number and place value and become confident when using the four operations in both formal methods as well as problem solving where often the approach is not immediately evident. Alongside number work, pupils begin to identify fractions using shapes, objects and quantities and make connections to equal sharing and grouping. Pupils are taught to count to ten in fractions, recognise equivalent fractions and develop their understanding of fractions on a number line. At this stage, pupils will also develop their ability to recognise, describe, draw, compare and sort different shapes. Pupils have the opportunity to use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money and are expected to use related vocabulary for all topics. Other subjects may have strong links to some maths topics allowing cross-curricular teaching. For example, shape through art or computing, measures through science or coordinates in geography. This is to ensure we continually maximise learning opportunities for all pupils across an entire curriculum.

Key Stage 2

Lower Key Stage 2 – Years 3-4: The principal focus of mathematics teaching in lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they are able to use measuring instruments with accuracy and make connections between measure and number. By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Upper Key Stage 2 – Years 5-6: The principal focus of mathematics teaching in upper Key Stage 2 is to ensure that pupils 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, pupils

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, pupils 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, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Active Ingredients of Mathematics at Millfields CE Primary School

- Planning should start with the White Rose Scheme of Learning and the Calculation Policies, which can be found on the shared drive.
- Planning should take a Concrete, Pictorial and Abstract approach with all children having access to concrete resources (where appropriate) and the aim being to move them towards the abstract.
- White Rose Premium Resources should be used if appropriate; however, this is where a teacher's professional judgement come into play. **Fidelity to the scheme is key not to the resources.**
- Concrete and pictorial representations should be consistent with direct teacher modelling.
- Explicit teaching of key vocabulary with use of Stem sentences. Insistence on use of full sentences by both children and adults.
- Clear modelling by teacher with use of 'I do, we do, you do.'
- Use of mini whiteboards for AfL and teachers making judgements based on what they see.
- Scaffolding and support- Where possible all children should be doing the same activities with all children having access to fluency, reasoning and problem solving. These activities will typically have a low threshold but high ceiling in their learning.
- Teacher should use professional judgement to decide when children are ready for recording work in books. If their class needs a full day of concrete or pictorial learning in order to provide a firm foundation, then this is what should happen.
- Concrete and pictorial resources should provide the scaffold and the bridge in learning. If a child is two years or more behind, then, differentiation by task may be required. If a child is not at ARE but can access the lesson, they may need a "streamlined" version of an activity, which retains the core elements.
- When children have mastered a concept, they should be provided with activities that bring depth to their learning. Children should know

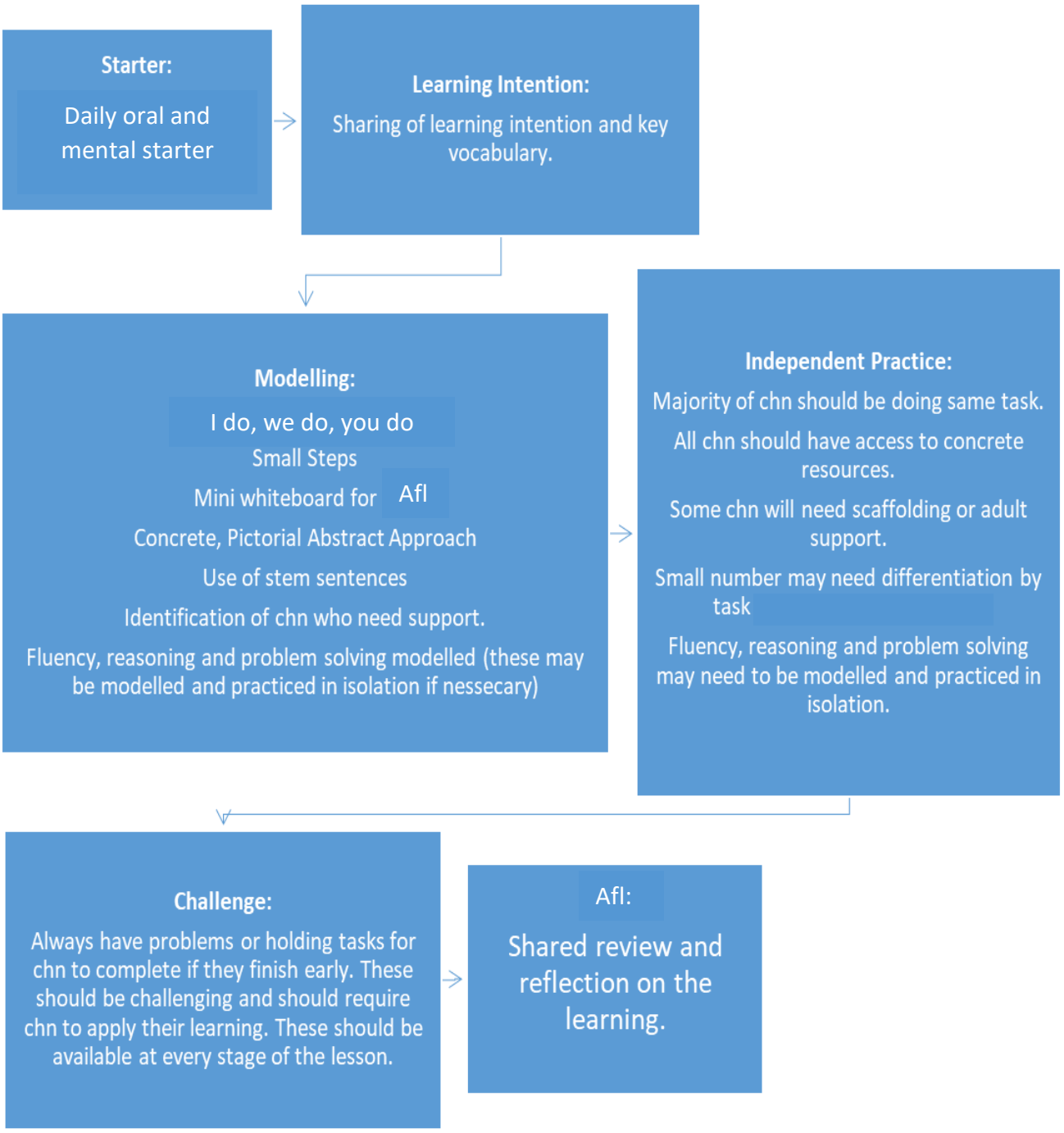
that if a task is completed there will always be a challenge to complete.

- Activities should be displayed on the board and children should write directly into books where appropriate with an emphasis on minimal printing. Children should be encouraged to show their work and include jottings to demonstrate their understanding. Children with SEN may need a personal, scaffolded version or a template in order to support their learning.
- The environment in their classroom should support children. The working wall should act as an "aide memoir" to support children. It should demonstrate the journey of the learning with clear modelling, mathematical vocabulary and stem sentences.

Presentation of Work and Marking:

- LI should be in any PPT and books.
- Short date should go at the top of page.
- There should be high expectations of presentation with children writing one digit in one square.
- The majority of feedback should be verbal and immediate when given to a focus group and the rest should be acknowledged with ticks for correct answers and dots next to incorrect answers.
- The teacher should indicate whether the LI has or has not been met according to the marking policy.
- Support should be identified accordingly using T/TA

Maths Lesson Structure:



Daily Fluency Lessons

At Millfields we expect all children to develop a good level of mathematical fluency. This requires 5 key skills, accuracy, flexibility and appropriate response, efficiency, automaticity and number sense. Mathematical fluency will only come from regular teaching, support and practice and the time dedicated to this must reflect that.

We dedicate 15-20 minutes every day to specific fluency lessons.

F2 – Y2: NCETM's Mastering Number (moving onto times table teaching in the summer term of Year 2)

Lower KS2: The focus is on teaching specific arithmetic skills, with a particular focus on multiplication tables.

Upper KS2: The focus is on teaching specific arithmetic skills

*Mastering Number can also be used as an additional intervention to support Y3 children who did not manage to secure a good level of fluency at KS1 level.

Interventions

As a school, we believe that interventions need to be consistent, effective and should help children to keep up with the day to day maths lessons. Therefore, we put the emphasis on 'pre-teaching' as opposed to 're-teaching.' This way, teachers are able to pre-empt difficulties and support children before they fall behind and experience failure (which often results in disengagement and lack of confidence).

Keep up: Pre-teach sessions take place every day prior to the daily maths lesson. Teachers personally deliver 1 x 5-10 minute session, which will prepare children for the day's main lesson. There is no need for in depth planning, however teachers must consider in advance what the session focus will be, what 1 thing will best prepare the children for the lesson? This should be identified on the short term plans.

Sessions could focus on:

- introducing new maths, new contexts and new contextual resources
- rehearsing prior learning
- rehearsing language
- allowing confusion to happen and supporting children with this
- using misconceptions
- using images/resources (especially for the first time)

The children in the group are identified by the class teacher and will vary depending on the focus of the daily lesson and the children's confidence.

The timetabling of session is up to class teacher, however we suggest straight after assembly/play time and it must take place before the main maths lesson.

Whilst the teacher works with the pre-teach group, the rest of the class will work on WRMH Flashback 4 which will be recorded in their Maths Journals.

Catch up: Number Stacks

Children who are making less than expected progress access the Number Stacks intervention. They complete a 1:1 assessment to determine their level of attainment for each unit in turn (initially place value). They then follow the programme, 1:1 or in a small group, with a trained TA until they meet ARE for that unit.

Where children are operating at a pre-key stage level, then they should have a personalised curriculum in place and tasks differentiated accordingly.

Maths Journals

All work recorded in maths journals must come from independent problem solving/reasoning tasks and must not be the result of direct teaching. In addition to the Flashback 4 problems, children should complete 1 keep-up skills grid and **1 maths journal task each week**. Teachers carefully select problem solving and reasoning tasks that will exemplify children's understanding and give them opportunities to demonstrate deeper thinking.

There are four basic types of journal entries;

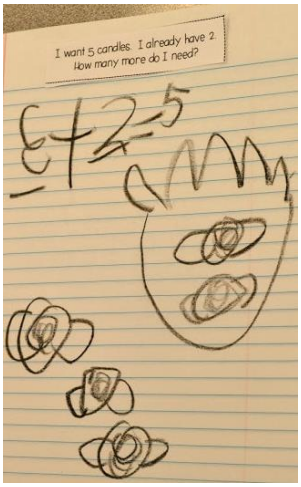
Investigative - Children explore a new concept, solve a problem and make connections to prior learning. *E.g. I want 5 candles. I already have 2. How many more do I need?*

Descriptive - Children describe or explain a concept or mathematical vocabulary. *E.g. Use pictures, numbers and/or words to explain what they know about area.*

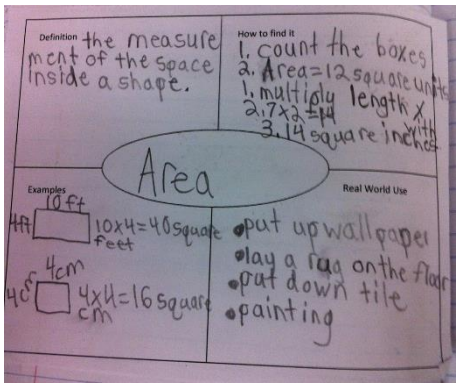
Evaluative - Children argue for or against a strategy or solution to explain why they think an answer is right or wrong, explain their choice of strategies or justify the most efficient strategy. *E.g. which of the strategies discussed in class would you use to solve 245 – 97? Why?*

Creative - Children write their own word problem or create their own number puzzle/story. *E.g. The answer is 465 lbs. What's the question?*

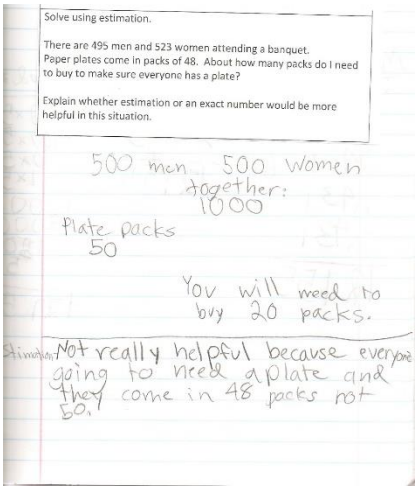
Draw/write a story to match the number sentence…



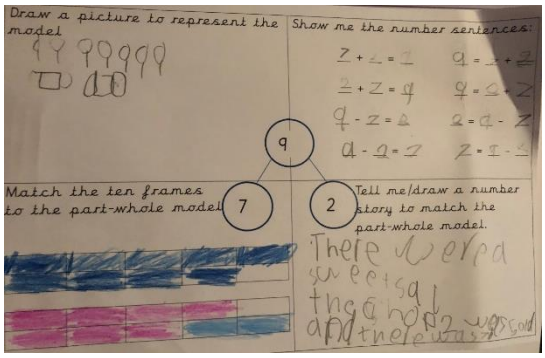
Investigative



Descriptive



Evaluative



Creative

Assessment

Formative Assessment: AfI strategies are used effectively to determine children's prior knowledge and understanding at all stages of the learning journey. Before beginning a new unit, teachers should use the prioritisation materials to familiarise themselves with the learning outcomes that are required (from previous year groups) to access the current outcomes. AfI should be used to assess whether children need to recap prior learning (assessment tasks should be recorded in maths journals as an investigative task). Unit planning should be adapted to include any necessary learning outcomes from the ready to progress criteria.

Summative Assessment: At the end of each term, White Rose assessments should be used to assess the children's understanding of the concepts and strategies taught. These tests are to be used diagnostically, the tracker should be used to identify strengths and weaknesses so that teachers can plan accordingly.