COLESHILL HEATH SCHOOL
EVERY CHILD, EVERY DAY

Maths Policy and Handbook

2019 - 2020

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Section One
National Curriculum Expectations

The New National Curriculum for mathematics aims to ensure that ***all pupils:***

- become ***fluent*** in the basics of mathematics (times tables, number facts etc.) through varied and frequent practice with **increasingly complex problems over time;**
- develop ***conceptual understanding*** and the ability to recall and apply knowledge **rapidly and accurately;**
- ***reason*** mathematically by following a line of enquiry, estimating relationships and generalisations, and developing an argument, justification or proof by confidently using a wide range of **mathematical language**;
- ***Solve problems*** by applying their mathematics to a variety of routine and non-routine problems with increasing difficulty, including breaking down problems into a series of simpler steps and **persevering in seeking solutions**.

Making Connections

Pupils should make rich connections across mathematical ideas to ***develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems***. They should also apply their mathematical knowledge to science and other subjects.

Readiness to Progress

The expectation is that the majority of pupils will move through the programmes of study at ***broadly the same pace***. However, decisions about when to progress should always be based on the ***security of pupils' understanding and their readiness to progress to the next stage***. Pupils, who grasp concepts rapidly, should be challenged through being offered ***rich and sophisticated problems before any acceleration through new content***. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

CHS Maths Policy and Practice

Maths Vision

To develop a deep conceptual understanding of mathematics, for all students through the use of concrete, pictorial and abstract resources.

Our Maths Aims

- To foster positive attitudes, a fascination and excitement of discovery through the teaching and learning of mathematical concepts.
- To develop a ***'can do'*** attitude in our children, especially when problem solving and pattern sniffing.
- To broaden children's knowledge and understanding of how mathematics is used in the wider world by making rich and varied real life connections.
- To enable our pupils to confidently reason about their mathematics, using a suitable range of mathematical language, recognising its importance for communication and deep thinking.
- To use a wide range of models, visual manipulatives and practical resources to develop a deep conceptual understanding alongside procedural fluency.

Key elements of our teaching and learning

At Coleshill Heath we strive for all teachers to deliver high quality, effective maths lessons based on a secure foundation of maths subject knowledge and pedagogy.

The Teaching and Learning of mathematics in Coleshill Heath should include all of the below in every lesson and/or over a series of lessons:

1. **Representation and Structure**

When introduced to a new concept, children should have the opportunity to build competency by taking this approach.

Concrete– This is the 'doing' stage, using concrete resources to model problems, to help children understand what they are learning. Children need the opportunity to experience and handle physical objects themselves.

Pictorial– This is the 'seeing' stage, using representations of the objects to model problems. 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 which represent the objects in the problem. Building or drawing a model makes it easier for children to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.
Abstract –This is the "symbolic" stage, where children are able to use abstract symbols to model problems.

2. **Language development**: The way that children speak and write about mathematics has been shown to have an impact on their success. We need to use a carefully sequenced, structured approach to introduce and reinforce mathematical vocabulary. Every lesson will include opportunities for children to explain or justify their mathematical reasoning.

3. **Fluency:** Children need to be given the opportunities to memorise single procedures, but also they need to know **why** they are doing what they are doing and **know when it is appropriate** to use different method.

4. **Reasoning and problem solving**: Mathematical problem solving is at the heart of our approach – it is both how children learn maths, and the reason why they learn maths. By accumulating knowledge of mathematics concepts, children can develop mastery and depth and test their problem solving in every lesson.

Fluency

Fluency covers a mixture of efficiency, accuracy and flexibility:

Efficiency - Children carrying out a problem, using previous understanding of a variety of problems to help solve the whole problem.

Accuracy - Children carefully recording knowledge of number facts and other important number relationships, and double-checking results.

Flexibility - Children using their knowledge of more than one approach to solve a particular kind of problem, such as two-digit multiplication. Children need to be flexible in order to choose an appropriate strategy for the numbers involved, and also be able to use one method to solve a problem and another method to check the results.

The key to fluency is in making connections, and making them at the right time in a child's learning. This can be done through:

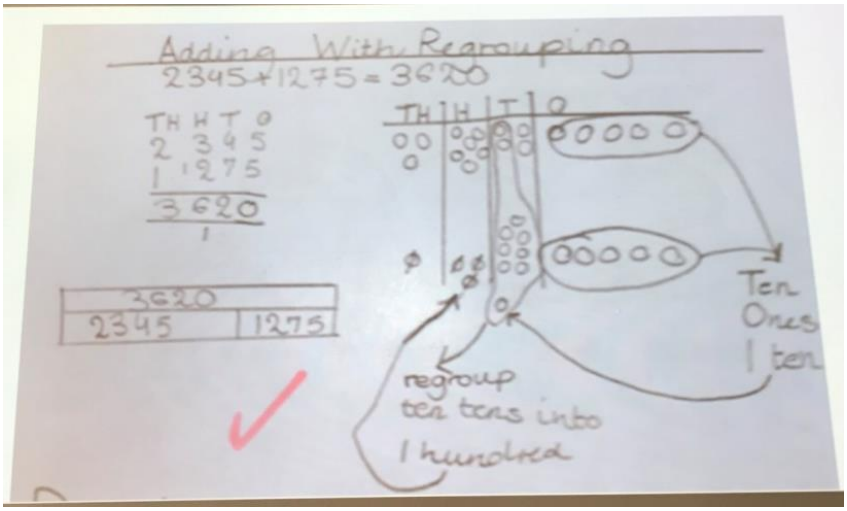
Manipulatives - We learn by moving from the concrete to the abstract. Structured apparatus such as Dienes can be helpful for learning about place value or number bonds. However the meaning isn't in the manipulatives themselves – it has to be constructed by children over a period of time, through playing around with them and connecting them directly to mental and recorded calculation.

Talking about their work - Allowing the children to have high quality conversations describing what has worked, why it has worked and how it worked, and how their method is the same or different to those of others.

Consolidation in meaningful contexts - Giving the children opportunities to practise in a context will help them to make links between the types of situations that a particular strategy might suit.

Questions to consider asking:

- Which operation have you used and why?
- What is the most efficient method? Why?
- Show me what you have learnt today in three different ways. Draw and explain your thinking.



Reasoning

Reasoning is fundamental to knowing and doing mathematics. Reasoning enables children to make use of all their mathematical skills and so reasoning could be thought of as the 'glue' which helps mathematics makes sense.

Reasoning skills will develop throughout Coleshill Heath School. A child could be reasoning when they:

- **Describe** what they have done.
- **Explain** reasons for what they did. These may or may not be correct.
- **Convince** others.
- **Justify** a correct logical argument that has a complete chain of reasoning to it and uses words such as ‘because’, ‘therefore’, ‘and so’, ‘that leads to’ …
- **Prove** by stating a watertight argument that is mathematically sound, often based on generalisations and underlying structure.

Children will reason when:

1. First encountering a new challenge
When faced with a mathematical challenge, reasoning helps the children to make use of relevant prior knowledge such as how to tackle this 'type' of problem or a particular calculation method that could prove useful.

2. When logical thinking is required

3. When a range of starting points is possible
If there is not one single, obvious starting point, reasoning is required before the children even begin the task. Children can draw on prior knowledge to decide where to begin. Once they have used reasoning to select a starting point and have placed at least one number to start to solve the problem, then reasoning might make use of the number/s already in position, drawing on their knowledge of patterns and relationships.

4. When there are different strategies to solve a problem

5. When there is missing information
Children will reason to recognise the information that is missing, to figure out what it is that they need to know and to draw on their existing knowledge and to work out that information.

6. When selecting a problem-solving skill
In order to solve a problem, we need to draw on one or more problem-solving skills, such as:

- Working systematically
- Trial and improvement
- Logical reasoning
- Spotting patterns
- Visualising
- Working backwards

7. When evaluating a solution in context
Having come to a solution our children need to reflect on whether the answer is 'sensible' in the context of the problem. Reasoning tells our children that these are meaningless answers. Further reasoning helps children take into account the contexts and therefore prompts them to interpret the solutions and tweak them.

8. When there is more than one solution
If the challenge is to find all possible solutions, then the reasoning might involve having a system which ensures none are left out.

Problem solving

A problem is something that the children do not immediately know how to solve. There is a gap between where they are and getting started on a path to a solution. This means that the children require thinking and playing with the problem time. They need to test out ideas, to go up 'dead ends' and adjust their thinking in the light of what they learn from this, discuss ideas with others and be comfortable to take risks. When the children are confident to behave in these ways they are then able to step into problems independently rather than immediately turning to us as teachers to ask what to do!

As teachers we can support our children to develop the skills they need to tackle problems by the classroom culture we create. It needs to be one where questioning and deep thinking are valued, mistakes are seen as useful, all children contribute and their suggestions are valued, being stuck is seen as positive and children learn from shared discussion with the teacher, support staff and peers.

The stages of the problem-solving process

The problem-solving process can usually be thought of as having four stages:

Stage 1: Getting started will mean offering children strategies to help them engage with the problem. These could be prompts such as:

- Tell me/a partner what you think the problem is about.
- What would help you understand the problem?

- You might like to draw a diagram, act it out or represent it with a model.
- What other problems have you seen that are 'a bit like' this one?
- What mathematical skills have you got that could be helpful here?

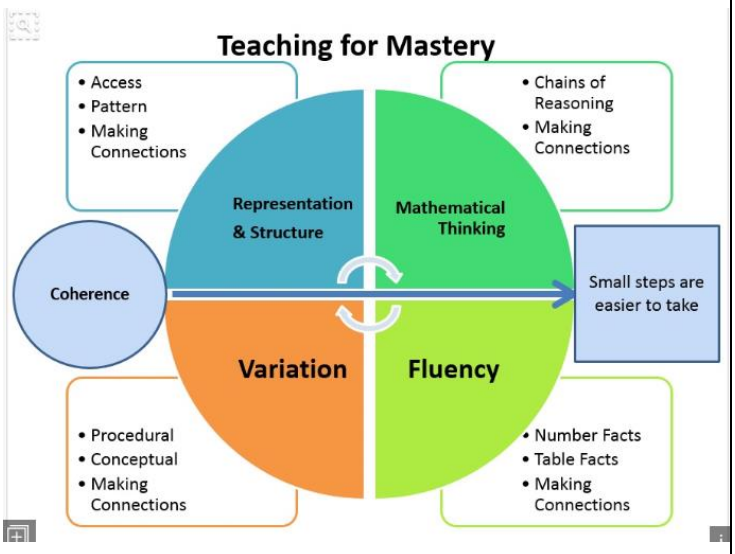
Stage 2: Working on the problem will usually involve using one or several problem-solving skills such as: Trial and improvement, working systematically (and remember there will be more than one way of doing this: not just the one that is obvious to you!), spotting patterns, working backwards, reasoning logically and visualising the problem.
Stage 3: Digging deeper usually happens when the problem has been explored and then it is possible to look for generalisations and proof.
Stage 4: Concluding is the part of the problem-solving process where we support the children to learn to explain their findings both verbally and in writing.

Section Two
Planning for progression in maths

Long Term Overview

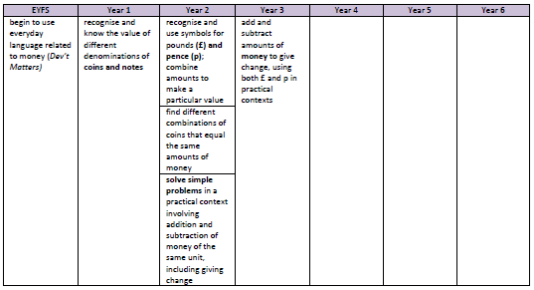
Planning from starting points
It is important to maintain high expectations and teachers should aim to teach the content from the age-related year group. However, teachers need to use a range of assessment information to ensure maths teaching builds from children's starting points and enables quality opportunity for them to deepen their level of understanding before moving on. For example: teachers will need to look at the objectives from previous year groups and in the cases where they know there is a clear gap, learning must be personalised for these groups of children.

Depth and Mastery
It is expected that all children will 'master' the curriculum related to their age. Those pupils with a good level of understanding and who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. It is therefore not appropriate for a child in Year 3 who can add three-digit numbers using the formal column method, to be moved onto the Year 4 expectation of adding four-digit numbers, until they have had the opportunity to apply their knowledge in different contexts, through problem solving activities and across other curriculum areas.



Knowing what is in your curriculum

The empty cells in the progression tables are also useful to teachers when planning for their class. They highlight where mathematical skills and concepts have been taught in previous year groups, yet do not have specific statements for later year groups. For example: 'Measurement' domain does not include statements beyond Year 3 for the addition and subtraction of money. Teachers in Years 4 to 6 are still likely to want to include this in their teaching.



EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
begin to use everyday language related to money (*Dev't Matters)*	recognise and know the value of different denominations of coins and notes	recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value	add and subtract amounts of money to give change, using both £ and p in practical contexts			
		find different combinations of coins that equal the same amounts of money				
		solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change				

Empty cells also reveal to teachers when concepts are first introduced to the children. For example: Empty cells in the 'Measurement' domain reveal that perimeter is taught for the first time in Year 3. If Year 3 children experience difficulty with the conceptual understanding of perimeter, then there are no similar statements from the previous year to track back to.

Long Term Overviews

Year 1

Autumn Term 1								Autumn Term 2						
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**
Number: Place Value (within 10)			Number: Addition and Subtraction (within 10)				Geometry: Shape	Number: Place Value (within 20)			Number: Addition and Subtraction (within 20)			

Spring Term 1						Spring Term 2					
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**
Place Value (within 50) (Multiples of 2, 5 and 10)				Measurement: Length and Height		Measurement: Weight and Volume		Number: Multiplication and Division (reinforce multiples of 2, 4 and 10)			

Summer Term 1					Summer Term 2						
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**
Number: Fractions		Geometry: Position and Direction		Number: Place Value (within 100)		Money			Time		

Year 2

Autumn Term 1								Autumn Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Number: Place Value			Number: Addition and Subtraction					Measurement: Money		Number: Multiplication and division				

Spring Term 1						Spring Term 2					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Statistics		Geometry: Properties of Shape			Number: Fractions			Length & Height	Measurement: Time		

Summer Term 1					Summer Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Mass, Capacity and Temperature	Geometry: Position and Direction	Revision		SATS Week	Consolidation: 4 operations (Multiplication, Division, Addition and Subtraction), Times table and division facts.						

Year 3

Autumn Term 1							
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Number – Place Value			Number – Addition and Subtraction				

Autumn Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Number- Multiplication and Division			Number- Multiplication and Division			Measurement- Money

Spring Term 1					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Statistics		Measurement: Length and Perimeter			

Spring Term 2					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Number- Fractions					

Summer Term 1				
Week 1	Week 2	Week 3	Week 4	Week 5
Measurement: Time			Geometry: Properties of Shapes	

Summer Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Measurement: Mass and Capacity						

Year 4

Autumn Term 1							
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Number: Place Value				Number: Addition and Subtraction			Length and Perimeter

Autumn Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Number: Multiplication and Division (Times Tables)			Number: Multiplication and Division			

Spring Term 1					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Area	Fractions			Decimals	

Spring Term 2					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Decimals			Money		Time

Summer Term 1				
Week 1	Week 2	Week 3	Week 4	Week 5
Time	Statistics		Geometry: Properties of Shape	

Summer Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Geometry: Position and Direction			Consolidation			

Year 5

Autumn Term 1								Autumn Term 2						
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**
Number: Place Value			Number: Addition and Subtraction		Statistics		Number: Multiplication and Division Facts				Perimeter and Area		Roman Numerals	Consolidation

Spring Term 1						Spring Term 2					
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**
Number: Multiplication and Division			Number: Fractions						Percentages		Decimals

Summer Term 1					Summer Term 2						
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**
Decimals			Geometry: Properties of Shapes			Position and Direction	Converting Units		Volume	Consolidation	

Year 6

Autumn Term 1							
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Number: Place Value			Number: Addition, Subtraction, Multiplication and Division				

Autumn Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Fractions				Geometry: Position and direction		Decimals

Spring Term 1					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Decimals	Percentages		Algebra		Converting Units

Spring Term 2					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Perimeter, Area and Volume		Ratio		Geometry: Properties of Shape	Statistics

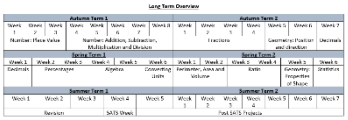
Summer Term 1				
Week 1	Week 2	Week 3	Week 4	Week 5
Revision			SATS Week	Post SATS Projects

Summer Term 2						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7

The maths planning process at CHS

Step 1: Long Term Overview **LOOK**

Which objectives are you teaching and for how long?

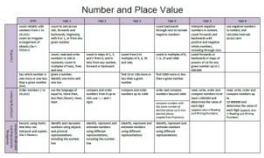


Step 2: Bright Pi Progression Overview **LOOK**

What skills and concepts are your children secure with from their previous years learning?

Are there any gaps in their previous years ARE? **These skills and concepts need to be addressed; this could be through your mental oral starters.**

What key skills and concepts are taught in your current year group?



Step 3: White Rose Hub Short Term Planning (Small steps)

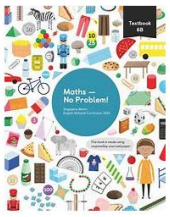
Once you have mapped out your coverage for the block, use the White Rose Hub documents to create your own short term plan.

CAUTION: This must be a progressive learning journey, not one off, stand-alone lessons.

White Rose Maths Hub Small Steps Progression - Autumn Year 6

Step 4: Maths No Problem Text Books and Pupil Books **REFER**

Refer to the appropriate skills and concepts from the Maths No Problem Text Books. Could you use the 'in focus' as an anchor task? Which questions can you use to deepen the children's learning? Could you adapt and deepen each question? Could you adapt a question to relate to a previously taught skill/concept?



Step 5: Plan on the CHS planning template **PLAN**

1. Outline objectives for the week.
2. Think through the problem that the children are going to work through. **How are you going to teach the maths skills?** How will you support children who are struggling? How will you challenge children who are ready to be extended?
3. State the intended outcome for each learning episode.
4. Differentiate questioning according to starting points, with high expectations for all groups.
5. Identify key vocabulary to be consistently embedded and reinforced over a series of lessons.
6. Across a learning journey, there needs to be evidence of the concrete, pictorial, abstract approach to maths teaching.

Maths Expectations at CHS
Learning Journey

Mental Oral Starters

As we follow a blocked curriculum, it is important that during the mental oral starter we teach previously taught skills to ensure these skills are consolidated and revised.

Autumn:	**Spring:**	**Summer:**
Revise skills from the previous year's curriculum. E.g: Children in Year 3, will recap Year 2 objectives.	Revise skills taught in Autumn term.	Revise skills taught in Autumn and Spring terms.

Teaching of Maths

The children should have access to resources to support their understanding. We need to make sure that the children are **trialling methods**, to develop their mathematical thinking, so they understand the mathematical concepts. It is important that there are elements of **concrete, pictorial** and **abstract** examples throughout a lesson or a series of lessons. This doesn't need to be in the order of concrete, then pictorial and finally abstract.

Every child, regardless of their ability, needs to be exposed to **challenge** throughout their learning journey. Additionally, every child needs to be given the chance to **reason** and **explain** their mathematical thinking through the choice of activities. When using the White Rose Mastery documents, the activities can be develop further, which will provide further opportunities for deeper understanding

Through **verbal feedback** and **hot marking**, children's misconceptions need to be addressed (group of children or whole class, if needed), children need to be challenged and their learning needs to be moved on accordingly.

Variation

As teachers, we need to ensure we use a **variety** of questions to secure understanding (pick and mix questions), but we also need to use **variation** of questions, understanding the skill that you want the children to develop.

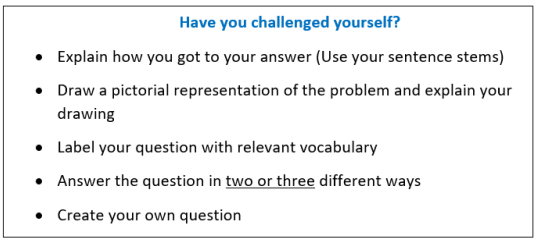
Links between questions:	**Carefully thought out questions:**	**Order of questions/ positioning of number in number sentence:**
21 x 43 21 x 35 21 x 36 **What would the children do to answer these questions? How would they approach these questions?**	23 + 10 = 23 + 11 = 23 + 12 = **What do you notice? How would you approach this question?**	23 + 9 = 12 + 23 = = 10 + 23 23 + 7 = 11 + 23 = = 8 + 23

Building connections

These types of questions give the children the opportunity to show their depth of understanding by **spotting** and **explaining patterns**, looking for **relationships** and **connecting ideas**.

The following elements should be visible over a series of maths lesson. This certainly doesn't describe a perfect lesson, but include elements when it is appropriate. Following the aims of the Mathematical National Curriculum fluency, reasoning and problem solving need to be included in every maths lesson/across a series of maths lesson.

Mental oral starter (15 minutes)
Monday: Introduce 5 times table facts with related division and fraction facts (teaching). **Tuesday – Friday :** Consolidation of previously taught skills – Challenge available for all learners.
Anchor Task (5 minutes)
Learning hook on the board at the beginning of the lesson, to ensure no learning time is lost and the children are challenged from beginning of the lesson. This could begin with **an anchor task from the 'Maths No Problem' Text book.** An anchor task could also include: a photo, an object, a true or false question, a can you convince me question, sometimes, always, never question, prove it or a spot the mistake question. Anchor question to be explored by the children using **concrete** and **pictorial** representations. Give the children the opportunity to show their mathematical thinking in as many different ways as possible. **Challenge cards** need to be available for all learners so that the children can independently challenge their own learning.
Main Teaching - Let's Learn
What are the children learning? Discuss and share learning objective (when appropriate). How are you going to break down the learning for the children to understand the skills? Which models and/or procedures are you going **to teach** the children to support their conceptual understanding? How are you going to challenge learners who are secure?



The teaching and consolidation of maths skills could be developed differently over a series of lessons Depending on the what you are teaching you may choose to teach the children in different ways.

Teaching type 1 (Whole Class Teaching):

Whole class teaching, keeping all of the children together deepening their learning throughout the lesson. Deepen the children's understanding through questioning and through a well thought out learning journey.

Teaching type 2 (Working with groups of pupils):

During the main teaching stage of your lesson, it may be necessary to allow children who have grasped the concept rapidly to complete the work independently work at this point.

Part 1: **Guided Activity (with adult support) with Group A:** Children to practice 3 questions with adult support. These questions should build upon the teaching in the 'Let's Learn' stage of your lesson. **Group B (Rapid-graspers)** could be completing their own challenge activity at this point.

Part 2: **Guided Activity (with adult support) with Group B:** Rapid graspers to have a session with the teacher taking their learning deeper through questioning and the types of activities given to really extend learners understanding of the concepts being taught. **Group A:** Completing independent activities consolidating learning with adult support. Ensure children are given challenges through reasoning and problem solving to show what they are capable of independently.

Plenary

- Recap of learning
- Opportunity to talk over class/group misconceptions
- Opportunity for the children to teach someone else what they have learnt

Challenge

Questions to consider:

1. What prior knowledge will you build upon?
2. Do you have a challenging learning objective?
3. Is the anchor task challenging for **all** learners?
4. How will you adapt the anchor task (Maths No Problem Book) to meet your challenging learning objective?
5. For every stage of your lesson, how will ensure you are challenging all children?
   - Challenge prompt questions
   - More cognitive demanding challenge questions
   - Clever grouping/pairing
6. How will you ensure all children enter the 'struggle' zone?

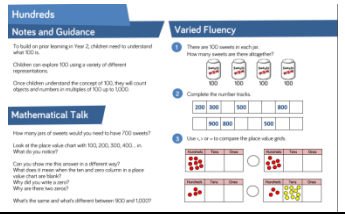
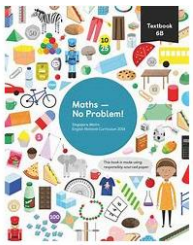
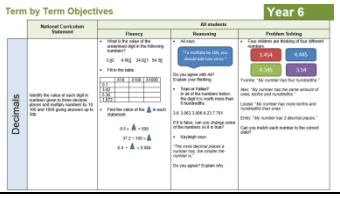
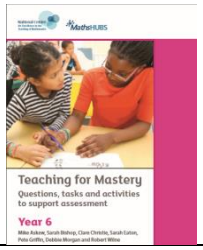
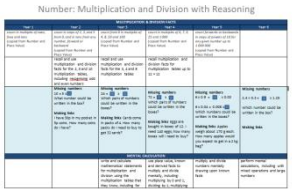
Comfort Zone	Struggle Zone	Panic Zone
Low challenge	High challenge	Very high challenge
Low stress	Low stress	High stress
Limited thinking	Thinking required	Cognitive overload
Limited learning	Effective learning	Limited learning

7. How will you support children to recognise when they need to persevere?
8. Have you incorporated your challenge questions or plan in opportunities for the 'challenge prompt questions' to be referred to, in the application section of your plan?

Clever grouping/pairing

- **Mixed ability groups:** Rapid graspers (higher attainers) are supporting struggling learners.
- **Mixed ability for anchor task:** Children solve and discuss the anchor task in their mixed ability pairs/groups. Practice in their ability groups.
- **Ability groups** from the beginning of the lessons based on AFL.

Documents to support planning:

White Rose Hub Small Steps 	Small steps guidance. For each small step the Maths Hub have provided some brief guidance to help teachers understand the key discussion and teaching points.
Maths No Problem text books 	Text Book A and B Work Book A and B Resources and ideas to support planning in Maths. These text books show how we can show variation when teaching different maths skills and concepts.
White Rose Hub (2016) Materials 	Fluency, reasoning and problem solving activities which can be developed further.
Oxford Owl greater depth materials 	The questions, tasks, and activities that are offered in the materials are intended to be a useful vehicle for assessing whether pupils have mastered the mathematics taught.
Can you convince me questions 	A resource to encourage pupil's thinking, reasoning and mathematical discussion.
NCTEM progression and start questions 	Linking to the objectives from the National Curriculum, this document gives reasoning questions to enable children to think deeper. Again, these types of questions can be developed further.

Arithmetic sessions (Year 1 to Year 6):

Year 1: Twice per week

Year 2 – Year 6: Twice per week for 20 minutes

Teachers should use the termly arithmetic assessments to identify gaps and misconceptions in children's understanding. Skills and concepts that the children are not secure with, will be focused on in these sessions. These sessions could include lots of repetition, chorusing and playing games which will support their understanding.

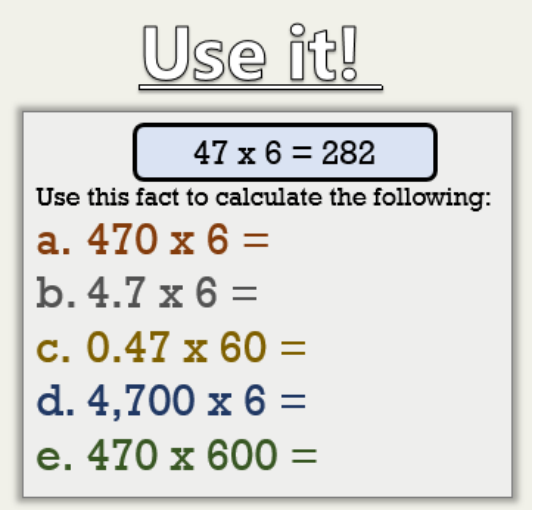
Throughout these sessions, use the children's understanding to move children on accordingly. Use gaps to inform starting points for the next week's learning. Evaluation could include using the Cornerstones arithmetic tests or test base. It may not be necessary to test the children each week.

Early Bird Maths

Start of the day activity should consist of the children revisiting and practising **at least 5** previously taught arithmetic skills. Please ensure you plan for variation within the questions.

E.g:

1. (23 +37) - 15 =
2. 20% of 520 =
3. 12 – 10.47 =
4. = 1,105 ÷ 85
5. 500,000+_____+40 = 530,040
6. $1\frac{3}{4} + 1\frac{1}{3} =$
7. = 2,400 ÷ 6
8. 5.35 x 7 =
9. $\frac{1}{6} \times \frac{3}{4} =$
10. = 747 ÷ 1



Expectations in Maths @ CHS

Curriculum

Pitch and Progression

Long / Medium Term Planning

Teaching sequence

Begin with the outcome and work backwards. For this to be successful, what is required?

Teacher subject knowledge

Pre-planned anchor task. Knowing how to move learning on and previous steps.

One challenging learning objective for all.

Scaffold for struggling learners (written or verbal).

Building upon prior knowledge, through knowing the curriculum. What were your children taught last year? How can I use this to move their learning on?

Practice

Mental oral starters

Recall

Over learn

Quizzes

APE- Answer it, Prove it, Explain it.

What went wrong?

Odd one out

Modelling and Explanation

Concrete, pictorial and abstract.

Modelling a variety of method that the children can draw upon to answer a question.

Modelling verbal reasoning for the children to practice and use independently.

Calculation policy (Four operations).

Meeting the needs of all groups of learners

All children, regardless of their starting point, need to be encouraged to aim for the highest standard possible.

How you respond to the needs of the children as they arise in class and support individuals will be different, but all should be encouraged to aspire to the same standard of excellence.

Children need to be working just above their comfort zones in order to make the most opportunities to develop their knowledge and skills.

Additional adult deployed to work with all groups of learners.

Knowing our children well helps us to keep them in the struggle zone, with the appropriate level of challenge.

Questioning

Stay with a child and further question them when they are unsure. It is equally important to stay with a pupil who answers our questions with ease. Follow up questioning beginning with 'why' to deepen their understanding.

Re-phrasing questions to check understanding. It is important to pitch a question in a way that the whole class understands in order to involve as many children as possible.

Break the questions into chunks.

Provide the children with options to select from.

Give the children the answer and ask them to explain why it is correct.

ABC feedback – Agree with, Build on or Challenge.

Feedback

Instant feedback within the lesson.

Whole class feedback using the visuliser.

Marking, informs planning, focused teaching groups for the next day.

Chances to shine

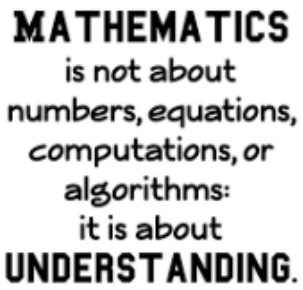
Knowing the curriculum and how to move the children's learning on.

Section Three
Talk for maths

Maths Vocabulary

Talk is essential in supporting and developing children's thinking and learning. High quality discussion can raise standards in mathematics. In order to engage in extended dialogue, pupils need to have a rich diet of mathematical vocabulary to draw upon.

Throughout every maths lesson, children need to be exposed and use **mathematical language**. At the beginning of a series of maths lessons, the children need to be reminded of and introduced to the maths vocabulary that is relevant to their learning journey. Children need to be able to **articulate** the meaning of the vocabulary and use it in their written and verbal responses. Additionally, children need to have the opportunity to **verbalise** their understanding of the maths skill, through **teacher modelling**. We need to involve the children in rich discussions, developing their understanding further of the mathematical skill.



Vocabulary that will support the children's learning needs to be displayed on the maths working wall, and used throughout every maths lesson.

Sentence Stems

To support our children in structuring explanations, simple sentence starters can be used. These should be modelled by the teacher initially, requesting additional responses from individuals or pairs and small groups after thinking time is provided.

The first thing I did was…
I already knew…so…
I noticed that…
Once I found out… I could then …
It didn't work when I … so I …

The part I found most difficult was … because…
The part I found easiest was...because…
It could be…because…
It couldn't be…because…

Questions to encourage dialogue and reasoning	**Questions to develop resilience**
What do you already know? How will this help you to find out….? Can you explain what you have done so far? What did you notice when….? What is the same/ different about…….? Do you agree that……? Why is that piece of information important? What could we try next? What would happen if we….? How can we be sure that……? Why do you think that…..? Can you explain why…..?	What do you think the problem is asking? Have you encountered this type of problem before? What other information is needed in order to answer the question? What have you tried already? What do you want to know now? How else could you represent the problem? Are you being systematic? Would anything else work? Can you reword the problem and explain it in a different way? What parts of the problem do you understand? Would a picture or a diagram help solve the problem? Would any specific resources help you such as counters, cubes, a number line etc?

Section Four
Multiplication and Related Number Facts

Year 1: 5 new addition and subtraction number bonds to be shared with parents through class dojo fortnightly

Year 2: 5 new multiplication and related division and fraction facts to be shared with parents through class dojo fortnightly

Year 3-6: 5 new multiplication and related division and fraction facts to be shared with parents through class dojo weekly

Monday: Introduce and teach new number facts.

Friday: Paper TTRS to be completed, focusing on previously taught times tables and current times tables that you are teaching. Record the children's raw score on the system.

Times Table Rock Stars (TTRS) (Year 2 – Year 6)

To support children practising their fluent recall of their multiplication and division facts, children are able to access TTRS within school and at home.

September: Baseline assessment
Autumn 2: Baseline assessment
Spring 2: Baseline assessment
Summer 2: Baseline assessment

Monthly: TTRS battles against year group class within school and at home

Times Tables

Below are the times tables each child should know as a minimum by the end of each academic year. This is in line with national expectations.

Reception: When counting objects, children should be able to group in twos, fives and tens and record the total.

Year 1: Record sequences of twos, fives and tens (e.g. 2, 4 6, 8 etc.) and identify any missing multiples. Know off by heart the doubles and halves of numbers to 12. Draw and use arrays to solve multiplication problems.

Termly Breakdown of Times Tables and Division Facts

Year 1	
Autumn 1	1 x tables (no division facts)
Autumn 2	10 x table to 6 (no division facts)
Spring 1	10 x tables to 12 (no division facts)
Spring 2	2 x table to 6 (no division facts)
Summer 1	2 x tables to 12 (no division facts)
Summer 2	5 x tables to 12 (no division facts)
Teaching methodologies **Count pairs of objects, count straw bundled in tens, sing counting songs, hundred square, number lines and pictorial representations on display.**	
Year 2	
Autumn 1	5 x tables to 12 including division facts
Autumn 2	Recap 2,5 and 10 x tables with the new inclusion of division facts
Spring 1	4 x tables to 12 including division facts
Spring 2	8 x tables to 12, making explicit links to 4 x tables and including division facts
Summer 1	3 x tables to 12, including division facts
Summer 2	6 x tables to 12, making explicit links to 3 x tables and including division facts
Teaching methodologies: **Count objects in groups, sing counting songs, hundred square, number lines, array with concrete resources and pictorial representations on display.**	
Year 3	
Autumn 1	3 and 6 x tables recap including division facts
Autumn 2	9 x tables to 12, making explicit links to 3 x tables and including division facts
Spring 1	7 x tables to 12 including division facts
Spring 2	11 x tables to 12 including division facts
Summer 1	12 x tables to 12, making explicit links to 6 times tables and including division facts
Summer 2	Recap of all times tables, plus the introduction of square numbers.
Teaching methodologies: **Count objects in groups, hundred squares, number lines, array with concrete resources and pictorial representations on display.**	

Year 4

The national curriculum expectation is that by the end of Year 4, children are able to recall all 12 tables up to 12 x 12. As a school, we are aiming that the children learn all the tables and division facts by the end of Year 3. If your children are working below, please track back to previous year groups and follow that structure.

Autumn 1	Recap 2, 5 and 10 x tables including division facts
Autumn 2	Recap 3, 6 and 12 x tables including division facts, making explicit links between the tables
Spring 1	Recap 4 and 8 x tables including division facts, making explicit links between the tables
Spring 2	Recap 7 x tables to 12 including division facts
Summer 1	Recap 9 x tables to 12, making explicit links to 3 x tables and including division facts
Summer 2	Recap of all times tables, plus square numbers.

Teaching methodologies:
Hundred square, number lines and pictorial representations on display.

Year 5

The national curriculum expectation is that by the end of Year 4, children are able to recall all 12 tables up to 12 x 12. As a school, we are aiming that the children learn all the tables and division facts by the end of Year 3. If your children are working below, please track back to previous year groups and follow that structure.

Additionally: Knowledge of prime numbers to 19.

Year 6

If your children are working below, please track back to previous year groups and follow that structure.

Additionally: Knowledge of prime numbers below 100.

Identify common factors and multiples.

Section Five
Formal Written Methods

The Written Calculation Guide provides teachers with a detailed supportive document, showing a suggested progression towards formal written calculation methods. The documents support the progression towards a formal WRITTEN method for each operation.

It is vital that we consolidate and build on children's developing mental calculation skills. We need to follow the written calculation guidance so we show progression with our formal written methods across the school and so that the children are secure with their understanding of a certain method, before moving onto a more complex written method.

Resource Boxes

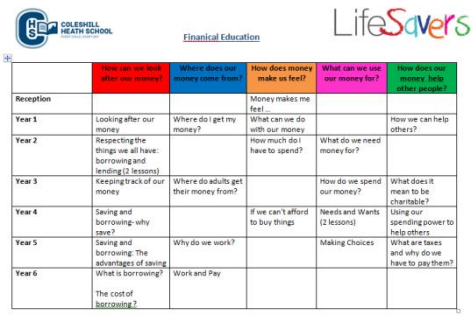
It is essential that practical apparatus are used throughout Key Stages 1 and 2. An ethos should be developed where children select their own mathematical equipment for themselves, to support them in their thinking. The use of all equipment needs to be modelled carefully, using appropriate mathematical language, and then be easily accessible for all.

Children especially in Key Stage 2 need to continue to be given the opportunity to 'see' the underlying concepts in the area of maths they are working with, through the use of concrete equipment and resources.

Key Stage 1	Key stage 2
Base ten equipment – e.g. Dienes or straws in bundles or Numicon Number fans Individual items to count (bears, conkers, shells etc.) Linkable cubes, counters Number lines to 50, and to 100 Bead strings Number grids 1-100 Multiplication grids (year group specific) A selection of coins	Number lines to 1000 Blank number lines Negative number lines (year group specific) Place value baseboards (year group specific) Base ten equipment – e.g. Dienes, Place value counters or Numicon Number fans (double digits) Linkable cubes Counters Bead strings Multiplication tables grid (2, 3, 5, 6, 8, 10) Multiplication grid up to 12x12 Number grids 1-100 Gattegno charts (year group specific) Coins & notes

Section Six
Financial Education- Life savers

LifeSavers is a financial education programme for primary schools, helping children manage money wisely now and in the future. The children will learn about money through the lens of: generosity, wisdom, thankfulness and justice.



Financial Education

	How can we look after our money?	Where does our money come from?	How does money make us feel?	What can we use our money for?	How does our money help other people?
Reception			Money makes me feel ...		
Year 1	Looking after our money	Where do I get my money?	What can we do with our money		How we can help others?
Year 2	Respecting the things we all have: borrowing and lending (2 lessons)		How much do I have to spend?	What do we need money for?	
Year 3	Keeping track of our money	Where do adults get their money from?		How do we spend our money?	What does it mean to be charitable?
Year 4	Saving and borrowing- why save?		If we can't afford to buy things	Needs and Wants (2 lessons)	Using our spending power to help others
Year 5	Saving and borrowing: The advantages of saving	Why do we work?		Making Choices	What are taxes and why do we have to pay them?
Year 6	What is borrowing? The cost of borrowing ?	Work and Pay			

Five big questions about money:

- How can we look after our money?
- Where does our money come from?
- How does money make us feel?
- What can we use our money for?
- How does our money help other people?

The questions have been designed to enable pupils to explore all the things we can do with our money – spend, save, give, lend, invest and borrow. The activities will enable children to acquire a range of financial skills and knowledge, whilst also exploring how the values of generosity, wisdom, thankfulness and justice can shape their attitudes to, and decisions about, money. Each Big Question contains a series of activities that addresses its theme.

We will teach up to four lessons over each academic year, which will be taught in the Summer Term, and will build upon the children's understanding of money from the previous year.

As well as teaching financial education, through lifesavers, it is important that financial education is fed into our maths teaching. Bright Pi has a variety of ideas to incorporate money into our teaching in the 'Suggested contexts for application of skills' section of the planning materials.

Section Seven
Assessment Practice in maths

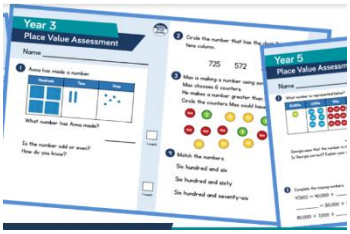
Standardised testing

Standardised tests will be used termly. These tests will provide you with a reliable range of information that will support and guide the management of effective learning in the classroom. They will support benchmarking and 'PIT' [Point in Time].

Insight

See Assessment Policy.

End of unit assessments



After you have taught a unit e.g: Fractions, you will give the children the Fraction 'End of unit assessment' after you have taught the next unit to see how much they have retained. These need to be stored in the children's test folder, not stuck in their exercise books.

Section Eight
Intervention in maths

Interventions at Coleshill Heath School should be planned to support children and target groups who are at risk of falling behind. However, it is important not to rule out intervention that might be necessary for other groups such as those who are identified as gifted and talented in maths, but are not making sufficient progress. It is important to tailor interventions to children's strengths and weaknesses, and focus on particular misconceptions and incorrect strategies that the children may have.

Teacher lead intervention

During assembly time, it is important that teachers have a focus group of children supporting those who need further support with a mathematical concept.

Support staff intervention

There are two types of intervention that support staff could lead:

1. Weekly support - working with a specific focus group of children on a specific skill, for a specified period of time, for example place value.
2. Supporting an individual child or group of children, addressing any misconceptions that the child/children have had during their maths lesson. This type of intervention could be at the beginning of the day during SODA, during assembly time or designated time during the day.

The following programmes could be used as an intervention to help support children's progress and understanding, as well as teacher direction:

- Tagtiv8
- Maths of the day
- Third Space Learning
- Times Table Rock Stars
- Every Child Counts (Year 5 and 6)
- Success at Arithmetic (Year 3 and 4)

Questions to consider:

What is the focus of the intervention?
How many weeks will the intervention last?
How often will the intervention take place?
How will you show progress?
What resources will you need?
How will you communicate with class teachers?

Evaluation

Teachers and support staff need to constantly evaluate their interventions. Thinking about the following questions:

How much progress have the children made?
Does the intervention need to be adapted? If so, how?
Do I need to re-visit this skill?
Do some children need to move on?

Section Nine
Home Learning in Maths

Maths Homework

Teachers need to set homework on a **Friday**, which will be expected to be completed and returned to school by **Wednesday**. If homework is not completed at home, then it needs to be completed at school on a Thursday or Friday. A class list must be ticket off to state who has and who has not completed the homework.

Homework can be set as either a baseline assessment to understand the children's starting points or as a way to develop and practise taught skills.

COLESHILL HEATH SCHOOL
EVERY CHILD, EVERY DAY

Policy Name:	**MATHS POLICY AND HANDBOOK 2019-2020**
Staff Responsible:	Miss H George
Governor Responsible:	Mr A Watson
Date for Review:	
Signed Headteacher:	Miss N Fowles
Signed Chair of Governors:	Mrs M Fitter
Date:	Scrutiny and Outcomes – 28th January 2020