CITY ACADEMY WHITEHAWK

Rationale for shared teacher guidance in Mathematics
This a guide to how we teach Mathematics at CAW, in this document you will find the lesson structure, task designs, documents and links to curriculum.

The Leadership of Mathematics	
Quality of Education Lead	Assistant Headteacher
Thomas McMorrin	James McAdam

The Teaching of Maths

We follow the teaching sequence outlined by the White Rose Maths Hub schemes of learning. This ensures that a coherent, consistent approach is adopted in **all** year groups. These provide teachers with notes and guidance on how to enhance their teaching of the subject along with key vocabulary, questions and discussion and teaching points. The White Rose Maths Hub schemes of learning reflect the content of the Foundation Stage Early Learning Goals and the National Curriculum for Maths. We choose to follow an adapted version of the White Rose Maths with support in further planning from Learning by Questions and draw on resources from PiXL and NCETM (and other appropriate sources). It may also be the case that assessment outcome trends may lead to temporary changes to the coverage map in consultation with Maths lead.

The curriculum is broken down into small manageable steps in order to ensure that each lesson has a clear focus and helps children understand concepts by following a carefully planned sequence of lessons. This avoids the cognitive overload that can occur when too many concepts are covered at once and ensures that each lesson contributes to the long-term goal. Within each lesson, children have the opportunity to acquire, practice, apply and deepen their knowledge and skills as appropriate. Pupils who understand concepts quickly are challenged by being offered rich and sophisticated problems to deepen their understanding. Concepts are revisited over time so that children can reinforce them and embed them into their long- term memory. Teachers have the flexibility to spend longer on specific skills or concepts if they feel it is necessary, in consultation with Maths lead referring to student outcomes.

We believe the majority of children can achieve success mathematics in line with national expectations by:

- Working in mixed ability groups
- Whole class teaching and split inputs
- Differentiation in task design, delivered through our self-selection model
- Relevant resources being readily available
- Considering next stage readiness

When introduced to a new concept, children have the opportunity to follow the concrete – pictorial - abstract approach. Concrete objects and manipulatives help them understand what they are doing. Alongside these, children use pictorial representations that can be used to help reason and solve problems. Concrete and pictorial representations then help support children's understanding of abstract methods.

To best meet the needs of children in Maths we adopt our Maths lessons to be taught as a whole class where our less confident learner's tasks are scaffolded effectively to access the same content and our more confident learners are provided with opportunities to expand and master their skillset.

Challenges are designed using the theory of 'Scaffold and Constraint' and we rigorously adopt the pedagogical approach of 'self-selection'. Children will be offered the opportunity to develop fluency, reason and problem solving, in all levels of chilli challenge every day.

<table>
<tr><th colspan="3">When Medium Term Planning for Maths consider</th></tr>
<tr><th>Resources</th><th>Planning support</th><th>Content/Time</th></tr>
<tr>
<td>National Centre for Excellence in the Teaching of Mathematics
https://www.ncetm.org.uk/

Learning by Questions
www.lbq.org
Email James McAdam for login credentials.

MathsFrame
www.mathsframe.com
Email James McAdam for login credentials.</td>
<td>In each year group Folder there is a lesson-by-lesson overview, which will guide the sequence of lessons.

Every lesson has a link to a 10 minute video, which can be used to support planning (see below). The small steps are only a guide in which we can base our planning.

<table>
<tr><td rowspan="5">3
21/09/2020</td><td>Monday</td><td>Tens and ones using addition</td><td>NPV-1</td></tr>
<tr><td>Tuesday</td><td>Use a place value chart</td><td>NPV-1</td></tr>
<tr><td>Wednesday</td><td>Compare objects</td><td>NPV-2</td></tr>
<tr><td>Thursday</td><td>Compare numbers</td><td>NPV-2</td></tr>
<tr><td>Friday</td><td>Order objects and numbers</td><td>NPV-2</td></tr>
</table>

Any additional planning resources and guides can be found in the ‘Primary Resources’ portion of the White Maths Website (see below).

https://whiterosemaths.com/resources/primary-resources/primary-sols/

Further resources may be taken from other places, where appropriate.</td>
<td>We offer daily maths lesson (1 hour each) and one extra 30 minute session.

Total 5.5 hours per week.</td>
</tr>
<tr>
<td>SEND Support</td>
<td colspan="2">When medium term planning for Mathematics teachers consider how to best support all children regardless of attainment. This is done through carefully thought out task design and appropriate scaffolds in challenges.

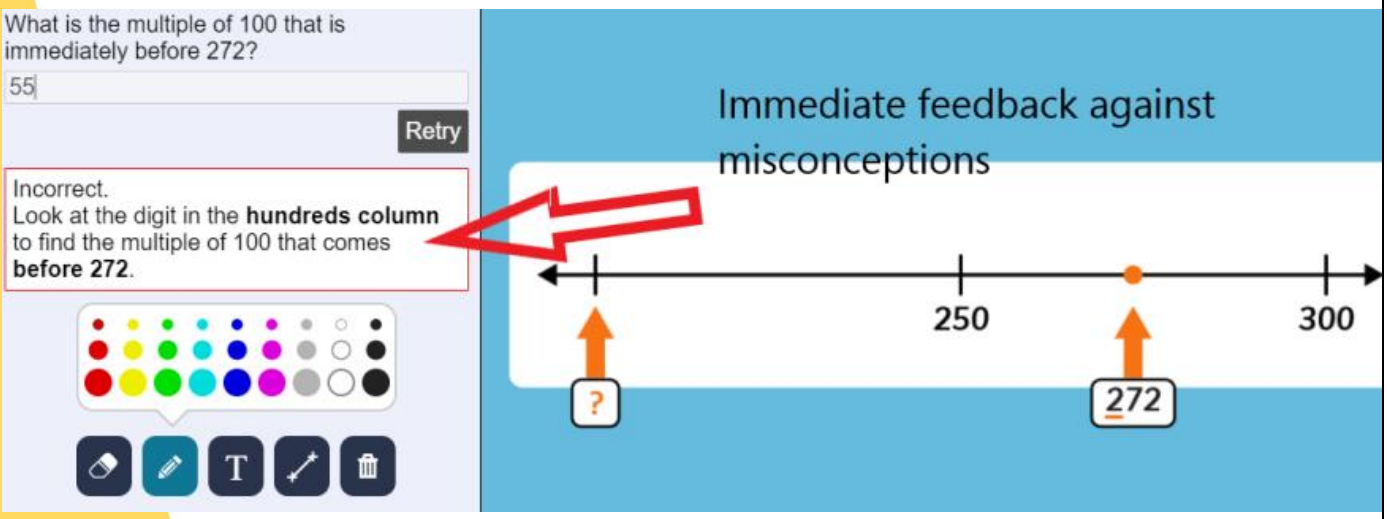
In line with our teaching and learning policy our most effective way to support children with SEND will be through an effective first wave of teaching. For lower attaining SEND learners we support them by ensuring tasks are pitched at an appropriate level and resources are readily available to provide the most appropriate entry point to work.</td>
</tr>
</table>

Most effective lessons look like…

Chilli Challenges: All maths lesson and to be presented in CC format. Children self-select starting points as lessons will have opportunities for fluency and reasoning in all levels of challenge. Provide an answer sheet and develop a positive culture of error, where if a child gets something incorrect they are to go back over their work and correct mistakes prior to moving.

Answers and Marking: In order to further develop our culture of error and celebrating mistakes within Mathematics leave an answer sheet to the chillies assigned for the day. This allows the children an opportunity to lookback over their work and address errors with a level of trust and integrity. Children will need to be taught how to do this effectively and will lead to higher levels of confidence. Ultimately, this will free your time to work with more children!

Learning by Questions: offers "hints" to provide a level of immediate feedback if done incorrectly.



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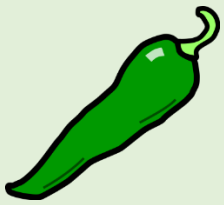
Template:

Mild	Spicy	Hot	Flaming Hot	Ay, Caramba!
				
Mild is the challenge with the highest scaffold for children. You may choose to scaffold your task in a number of different ways. This could be through giving some parts already filled in/completed, providing the visual representation of numbers through resources (dienes, Numicon etc.) and having the chilli challenge bigger so children can write straight onto the sheet.	Spicy and Mild should look very similar in appearance and require the same maths but most of the scaffold should be taken away. Here, children are still prompted to use column method and are reminded about putting the numbers into HTO, although are expected to complete these independently. Questions/equations should be different from mild.	Hot should be the most abstract version of the challenges and should require more reasoning and problem solving from the children. Within these challenges, you may decide to use the ideas for depth as a way to extend their learning further.	Flaming Hot should be a more accessible version of Ay Carumba allowing opportuinites to generalise understanding and apply gained knowledge in a deep meaningful manner.	Ay Carumba should be a far more open-ended type challenge where children are expected to develop their reasoning and problem solving skills. Tasks to use on this challenge are taken from White Rose, LBQ mastery resources when appropriate, using the Ideas For Depth or N-Rich.
• rules, EG. inverse and commutativity • Calculation layout • Spot mistakes. • Fluency		**Increased focus on:** • Explaining • Pattern spotting and using these to solve problems • Conjecturing and testing • Multi-step problems	Use of reasoning questions/ open ended questions which invovle investigation	
Fluency and Reasoning		**Fleuncy, Reasoning and Problem Solving**		

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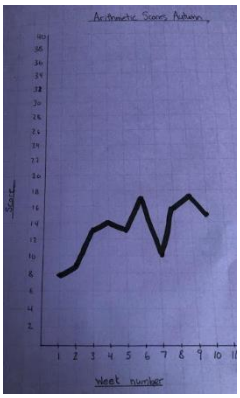
Planning to develop retention (Year 1-4)

Monday	Tuesday	Wednesday	Thursday	Next Friday
Lesson 1	Lesson 2	Lesson 3	Lesson 4	Recall Lesson

Planning to develop retention (Years 5 and 6)

Monday	Tuesday	Wednesday	Thursday	Friday
Lesson 1	Lesson 2	Lesson 3	Lesson 4	Arithmetic

Arithmetic



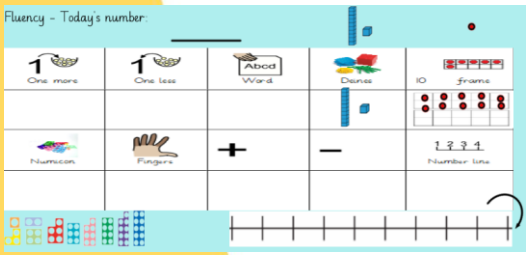
Each week Year 6 (from Autumn 1) and Year 5 (from Spring 1), will write an arithmetic paper to improve fluency and confidence in maths. The teacher will focus on gaps from previous papers and teach those skills and allow opportunity to practice within the lesson.

These lessons are fast paced and children mark their own papers while correcting “VSMs” along the way.

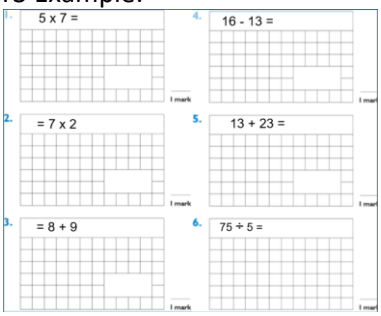
Children then are responsible for tracking their own scores and try to be their “personal best”!

In years 1-4 teachers will offer a “Daily Arithmetic” to further encourage and develop retention of fluency and fact recall. Children will have a set time to complete 6 questions

Y1 Example:



Y3 Example:



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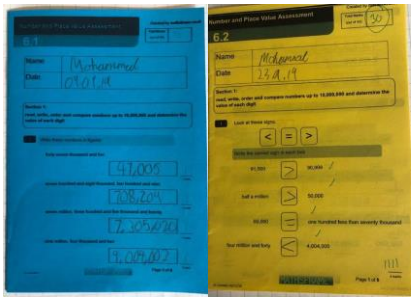
Cold Tasks and Hot Tasks:

- **Cold (blue books)** and **Hot tasks (yellow books)** should be completed at the beginning and the end of a unit. Questions to form these tasks can be taken from MATHSFRAME or from WhiteRose (end of unit assessments found at https://whiterosemaths.com/resources/assessment/primary-assessment/end-of-block-assessments/) and be adapted based on Year group coverage.

Pre **Post**

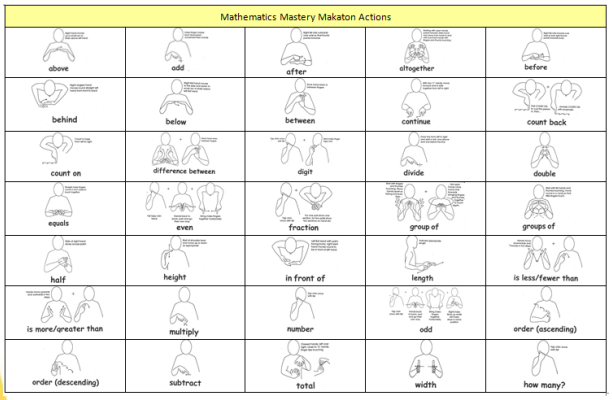


- Teachers should consider what areas the children have done well in and what areas children have been unsuccessful. Areas where children have been unsuccessful should be revisited in Maths Meetings
- If children are successful within the Cold Task, teachers should explore different ways to extend and challenge the children throughout the unit.
- Cold Tasks should be printed on blue paper and Hot Tasks should be printed on yellow paper, both should be stuck into exercise books so a clear sequence is evident (cold task, sequence of learning, hot task).
- In KS1 these tasks do not need to be booklets, but rather a 'one page' of upcoming content to be stuck in their books.

Key Words:

For each lesson, you will teach a list of 'key words' that will be promoted for children to use and praised when they hear these mathematical terms. We adopt a '**My Turn Your Turn'** call and response strategy for this. Each teacher should be supplied with 'star word stickers' at the beginning of the year. During each lesson, adults in the classroom should give out the star word stickers to children using the correct terminology. As well as this, during all lessons teachers should be promoting children to talk in full sentences when explaining the maths, to continue to develop their reasoning and mathematical understanding.

In KS1, teachers should use Makaton actions (see below) alongside the star words to support speech and language. Teachers should liaise with previous teachers and use the Makaton actions below to ensure consistency across the school.



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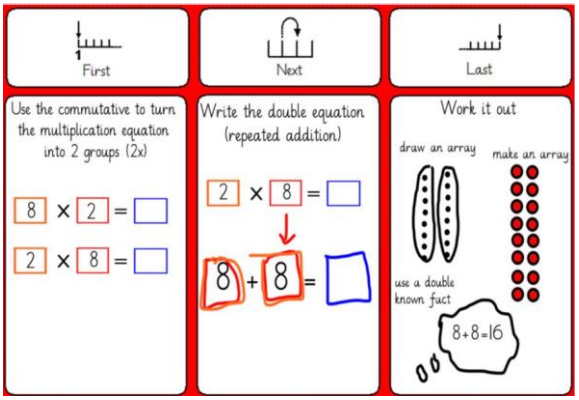
These key words can be located in the Vocabulary progression document that is adapted from the "NCETM – Mathematics Glossary – Key Stages 1 -3" (2014).
https://www.ncetm.org.uk/media/hpihrj3s/national-curriculum-glossary.pdf

or vocabulary with definitions can be found here:
https://thirdspacelearning.com/blog/maths-vocabulary-list-for-ks1-and-ks2/

Split Inputs:

As well as the differentiation of chilli challenges and use of less scaffolds, there are other ways in which you can successfully challenge greater depth learners. In our most successful lessons, teachers have identified a group of children who are already being successful in the 'new learning' and would benefit from getting set off on the independent task early. Teachers should consider whether these children would learn anything new from the talk task or need the extra practice and if not, during the talk task whilst the majority of children are completing the task, teachers should complete a split input and model the chilli challenges to the greater depth pupils. This allows these children to have enough time to complete all chilli challenges and ensures they develop their reasoning and problem solving.

First, Next, Last

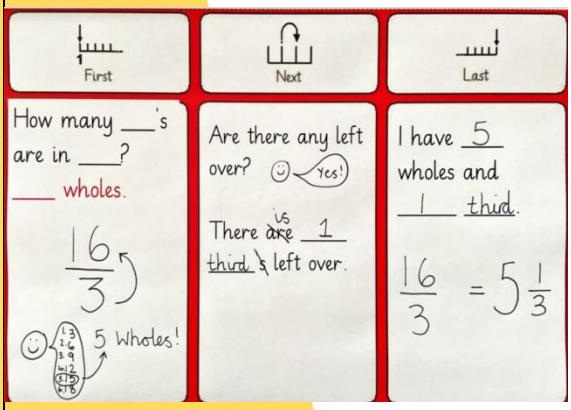


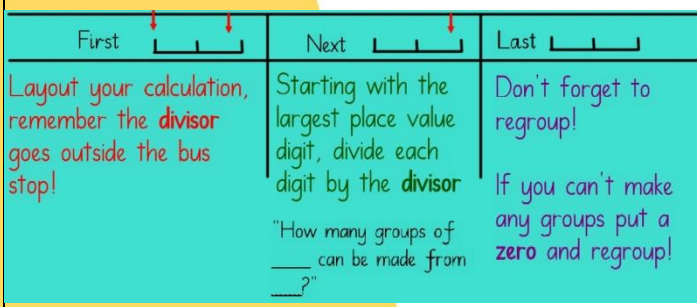
We use FNL in all lessons at CAW and should be on display within lessons.

Chunking to sequence insturctions, enables children to know exactly what is required and when.

Within a lesson FNL can be used as a "how to" based on the learning or a simple checklist of task (example – **F**: do your margin, **N**: write the date, **L**: write the learning objective).

FNL is also an opportunity to provide clear and concise modeling. In doing this successfully this will provide many children a much needed scaffold to enable access to challenges.





Lesson Structures

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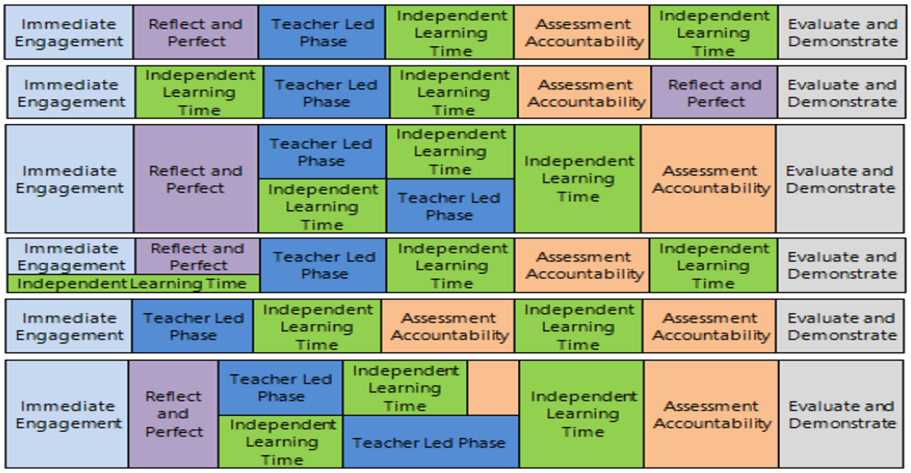
Below are a range of different lesson structures to explore and develop as you get to know what works best for the range of learners in your lessons.



Pupil Outcomes

Intended Learning

Learning Objectives for individual lessons should be taken directly from the National Curriculum.

All LO's should begin with 'To be able to…'

White Rose provides us with "small steps" in the lesson by lesson overview (see below).

Each of these small steps would fall under the curriculum objective: Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit.

As the small steps are a guide – where appropriate merge steps into a lesson while maintaining the sequence of the steps.

Example:
Day 1 – Numbers to 10,000 and to 1,000,000
Day 2 – Numbers to a million and to 10,000,000

On Both days compare and order with the range of numbers
Day 3 – Move on (if appropriate)

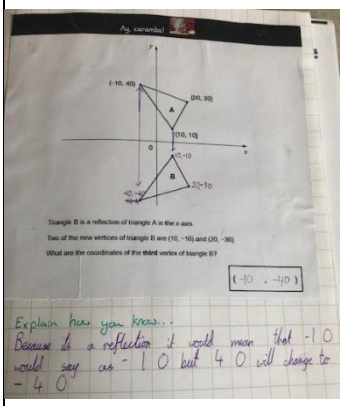
Day	Topic	
Monday	Numbers to 10,000	NPV-2 R
Tuesday	Numbers to 100,000	NPV-2 R
Wednesday	Numbers to a million	NPV-2 R
Thursday	Numbers to 10 million	NPV-2
Friday	Compare and order any number	NPV-3

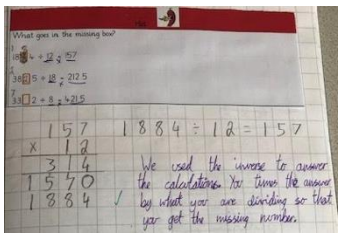
Exercise Books/Demonstrable Outcomes

Evidencing in books is crucial "tell the story". All work should be in chilli challenges (Y1-6) on a daily basis.

If there is a practical element to the learning please can this also be documented in the books.

Exercise books should demonstrate the learning achieved in the lesson and are opportunities to assess the children's progress against the objective.





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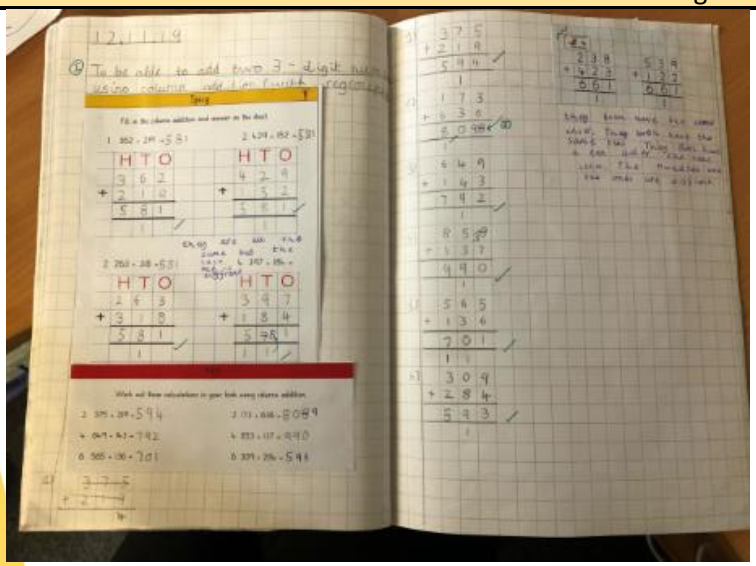
Feedback
Please refer to our Feedback and Marking Policy in line with this guidance



Written Feedback: Written feedback should be used to praise children's progress against the learning objective and provide a specific next step. This may be in the style of the next chilli challenge available, a new challenge using the ideas for depth, or to check their mistakes.

Ensure adequate time is set aside for children to complete their feedback in purple pen.

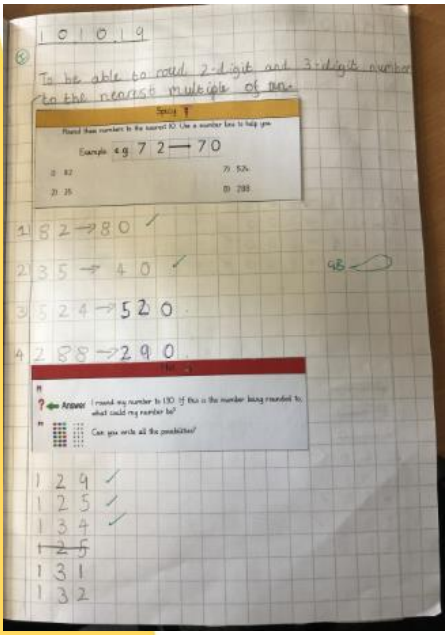
Provide written feedback where it is relevant and helpful for the child's progress: in **some** lessons, verbal feedback or a split input will be more effective. In most cases if children are working in their book it will be in the child's best interest to respond through written feedback.

Work should also be annotated with an

H (high level of support)

M (medium level of support)

I (independent)



Verbal Feedback: In some instances, it may be more effective to convey praise and next steps verbally – either within the same lesson or at the beginning of the next.

This may be used to show that conferencing has taken place within the lesson and teachers can use bullet points to show what was discussed if this would be helpful for the child.

Verbal feedback can also be used when formative assessment displays that a group of children all require a further input on a specific skill.

Summative Assessment:
PIXL and STAR will inform teacher assessment and next steps.

See assessment timetable.

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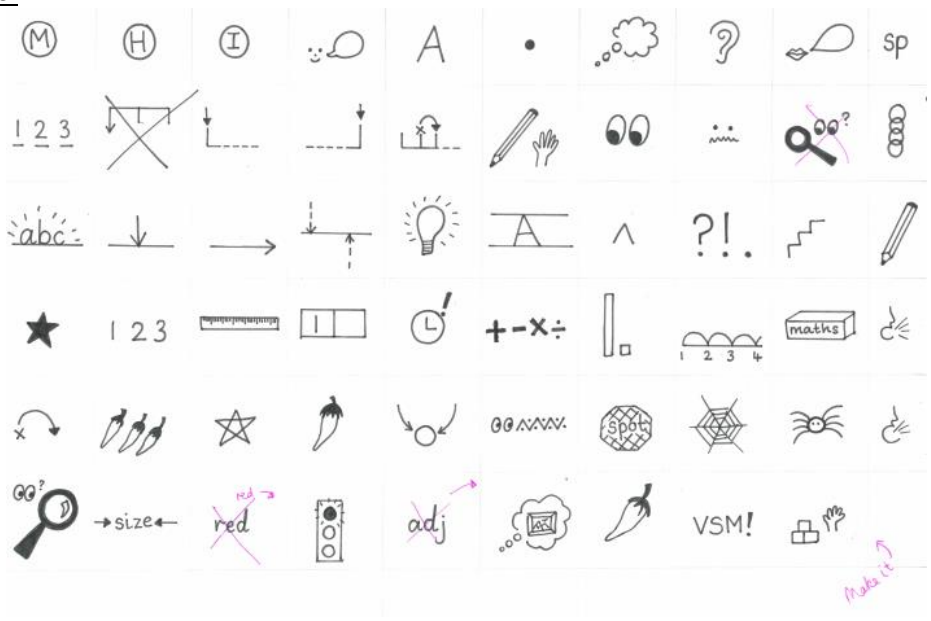
Marking Symbols:



Times Tables Progression

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Reception						
Year 1	Unitizing	Equal and unequal groups	1x	2x	5x	10x
Year 2	(1x) 2x	5x	(5x) 10x	3x	0x and revision	Revision of 1s, 2s, 3s, 5s, 10s and 0s
Year 3	(2x) 4x	(4x) 8x	3x	(3x) 6x	(6x) 12x	Revision of 0s, 1s, 2s, 3s, 4s, 5s, 6s, 8s, 10s and 12s
Year 4	(3x) 9x	7x	(1x) 11x	(4x) 8x	Revision of all times tables	**Multiplication Check (June)**
Year 5	Assessment of times tables knowledge for gap analysis	Revision of times tables from term 1 assessment	Revision of times tables from term 1 assessment	Squared Numbers	In school assessment for gap analysis	Revision of times tables from term 5 assessment
Year 6	Assessment of times tables knowledge for gap analysis	Revision of times tables from term 1 assessment	Revision of times tables from term 1 assessment	Revision of all times tables including squares	**SATs**	

Fluency Focus	
	Each lesson should start with fluency recall and activities to develop retention of number facts (5 Minutes). By "fluency" we mean that a student is able to retrieve the correct answers to facts from memory almost instantly. A student who needs to stop and think about the answer to a math fact isn't fluent with that fact, even if they eventually arrive at the correct answer. It important that students are able to answer facts quickly. Students who can automatically recall maths facts are more capable problem solvers, learn new maths skills more quickly, and are more likely to succeed in their next stages of mathematical learning . **Ideas** Counting Stick (see appendix 1) Whiteboard Quizzing Explicit Teaching (smile maths) If I know then I know… Part, Part, Whole Bar Modelling PiXL Timestable App **Intrinsic vs Extrinsic Motivation** Motivation will be key in improving fluency this year and we will play a massive role in this. This will involve specific praise, accessible activities and improved confidence. Our goal will be to be able to develop a sustainable level of intrinsic motivation in maths throughout the school. **Fluency Badges** Y3-Y6 (when ready) can come and see Mr McAdam/Mr Mcmorrin to receive a "Fluency Badge" if they can successfully answer a specific set of age appropriate questions mentally and quickly! The purpose of this is to celebrate the children to work towards a goal and to further develop the way children can lead within the school community.
Homework **ATOM Prime**	We have noticed that children at CAW are desperate to "do more". In 2021-2022, our Year 6 cohort sampled an integrated learning platform called ATOM Prime. It was very successful and children enjoyed access questions, related to their learning, while at home. ATOM not only helps children with their learning but allows adults to engage and it enables them to support the learning (regardless of level of confidence). This year we plan to launch ATOM from Year 3 – Year 6 and hope to have even more success than we had in 2021-2022!

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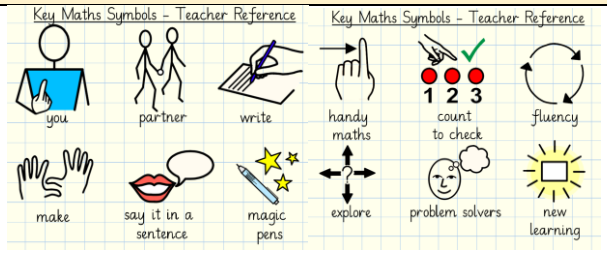
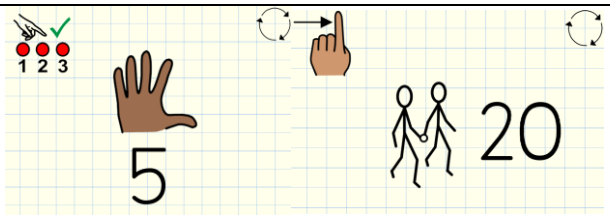
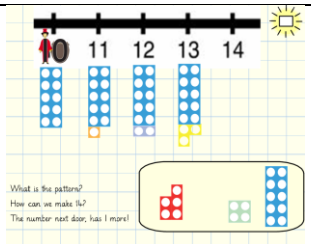
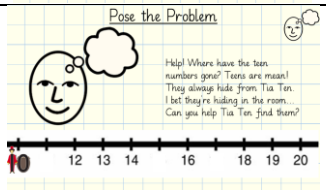
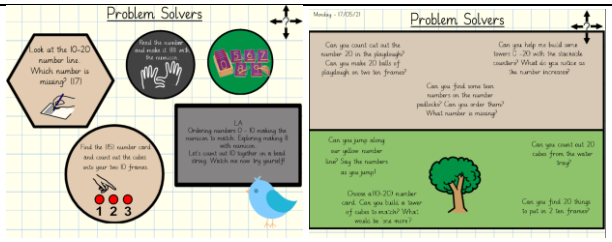
Maths in Reception
In line with the Early Years framework our intention to provide a secure understanding of number through lesson. Based around White Rose (https://whiterosemaths.com/resources/early-years-resources/reception-sol/), children will be offered all that is needed to be successful in their next phase of school.

Lesson Structure

	Children are introduced to key symbols during lessons. This supports them to make connections between concepts by prompting them to use certain methods.
	Handy Maths is a fluency based starter activity. Children work by themselves or with a partner to represent numerals using their fingers. This supports quick recall from learners as well as equipping with another method when completing addition or subtraction activities in the future. Children 'grow, show and blow' the numbers they have made.
	New Learning is where a new concept or method is introduced to the children. Where possible, characters and songs/phrases are used to make learning exciting and memorable.
	Pose the Problem is where the teachers ask the children for help. The children are given a problem which links to the 'new learning'. This is to help excite the pupils to engage in the next phase of the session with purpose. It also helps encourage reasoning as a resolution is required.
	Explore/Problem Solvers is where children engage in tabletop maths activities which follow the thread introduced in 'pose the problem'. Symbols are used to indicate to the children what they need to do e.g. make, count to check, draw, explain etc. Children sit in mixed-attainment tables, which change lesson to lesson. This provides teachers with a good opportunity to assess which children require further support following on from this session. Learners performing well below ARE are supported to explore this session in an adult-led group. This group remains fluid and changes lesson to lesson. The activities are left out for the COOL Time sessions and used to observe adult-led or child-initiated observations. Key questions are provided to support staff who are outside or in the studio as a way of prompting them to engage in reasoning based activities related to the topic.

Feedback:
VFG – Is used when working with children in Reception.
Purple Pen – Is used during paper-based maths activities.
Please refer to EY Rationale, Tapestry assessments for more information regarding the assessment structures followed when recording math-based observations.

In Development:

It is so important for us to continue to try new approaches and be ambitious in developing maths across the school. Here are some changes that we are working on at the moment.

- **Mathshubs** –For the first time we have joined the Brighton and Hove Mathshub to further develop quality first Mathematics teaching across the school. We are in the first year of 3 year process to embed the mastery approach in our teaching. This involves 6 sessions with a Mastery Special and a work group tailored to our school.
- **Moving away from Maths Meetings** – We will still continue to utilise the concepts and quick recall but in lesson time rather than cutting into other curriculum areas.
- **Fast Fluency** – Continue to focus on developing fluency across the school by teaching specific skills and providing practice.
- **Nursery provision** – This curriculum will be in line with our EYFS provision and will be sequenced to help support our Hatchlings develop in to Robins!
- **Intervention structure** – As a school involved in PiXL we are starting to launch an intervention structure to help develop a secure understanding in Mathematics. We are also using "Basic Number Screening Tests" to help support our lower attaining children in their maths, this will help us place children in a "Catch up Numeracy" intervention group run by a non-class-based teacher (15-minute sessions).
- **Financial Literacy** – How to learn about money and finances has been something we have been thinking about for a few years with our Year 6 children. We are happy to be involved with Metro Bank, who come in and support our children in learning 3 key elements of finance: saving, debt and budgeting. These banking sessions are complemented by class teaching (Year 6) with sessions on meal planning and budgeting and the risks associated with stocks and cryptocurrencies. We feel children need to leave primary school with a sound understanding of basic finance.

We are always working on new approaches with out teaching and if you have any further questions please get in touch our Maths lead.

Appendix 1

Counting Stick To Teach Multiplication Facts

Teaching Structure	
Start with zero and tenth multiple on the counting stick	*Place value reminder*
"Which 'times table' are we learning?" / "The first multiple."	
"**Double** the first multiple."	
"**Double** the second multiple." (to find the fourth multiple)	
"**Double** the fourth multiple." (to find the eighth multiple)	
What is the tenth multiple? **Half** it to find the fifth multiple.	*3 ways to find the fifth?*
"This is the key!" "Add **one lot** on to the second multiple."	
"**Double** the third multiple." "**Add one lot** on to the fifth multiple."	
"**One (lot) more** than the sixth multiple."	*3 ways to find the seventh?*
"**One (lot) less** than the tenth multiple."	*3 ways to find the ninth?*
Then…	
Count forward in multiples reminding them of the strategies, identifying numerals	
Count forward in multiples removing known facts	
Count forwards and backwards (horizontally and vertically)	

Multiple and strategy	
0	"**No** lots of a number." / "Zero."
1	"Which 'times table' are we learning?" / "The first multiple."
2	"**Double** the first multiple."
3	"This is the key!" "Add **one lot** on to the second multiple."
4	"**Double** the second multiple."
5	"**Half** of the tenth multiple."
6	"**Double** the key!" "**Double** the third multiple." "**Add one lot** on to the fifth multiple."
7	"Add **one lot** on to the sixth multiple."/ "**One (lot) more** than the sixth multiple."
8	"**Double** the fourth multiple."
9	"**One (lot) less** than the tenth multiple."
10	"**Ten times bigger** than the first multiple." (Use place value teaching to reinforce.)