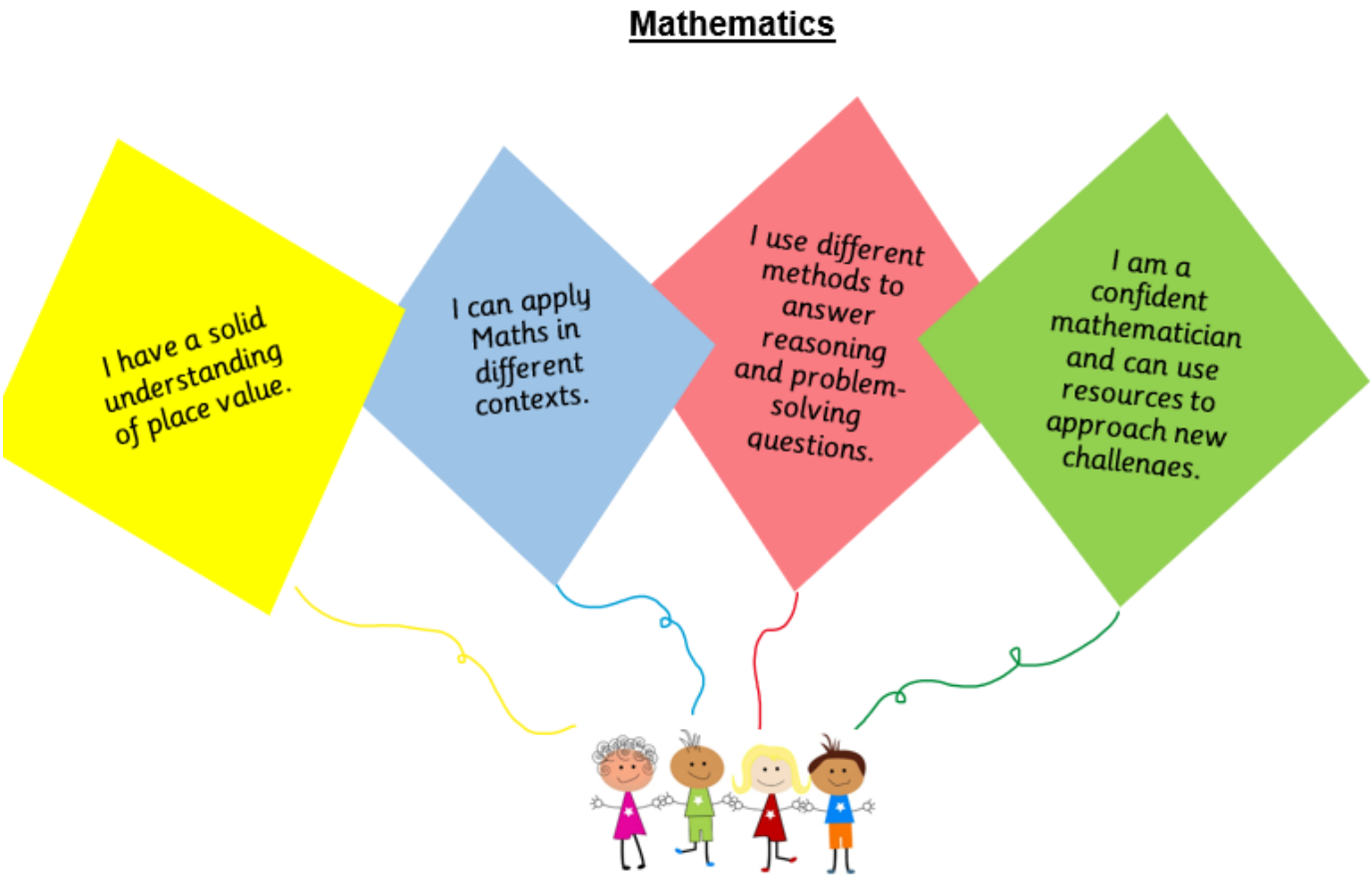
# How To Teach Maths

Bowling Green Academy

Achieving Together

# Curriculum



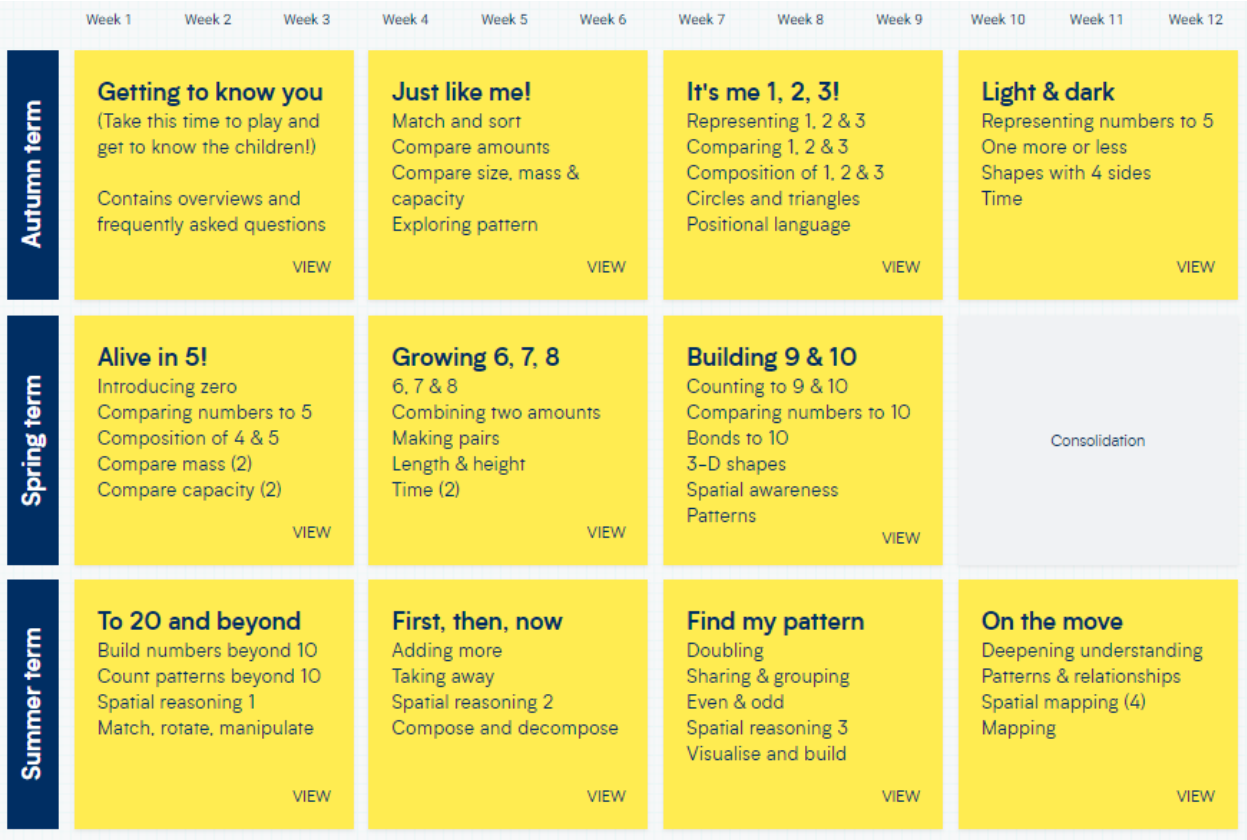

At Bowling Green Academy, we follow the White Rose Maths scheme of work which has been designed in accordance with The Early Years Foundation Stage Curriculum and The National Curriculum.

We strive for all our children to become successful problem solvers and resilient mathematicians. We want the children to have a strong and secure mathematical knowledge that will give them the correct foundations for later life. To do this we use the Concrete Pictorial Abstract (CPA) approach to teach mathematical concepts. This enables children to solve problems in a variety of ways. By following the stages of CPA the children develop a deep understanding that they can reason with and explain.

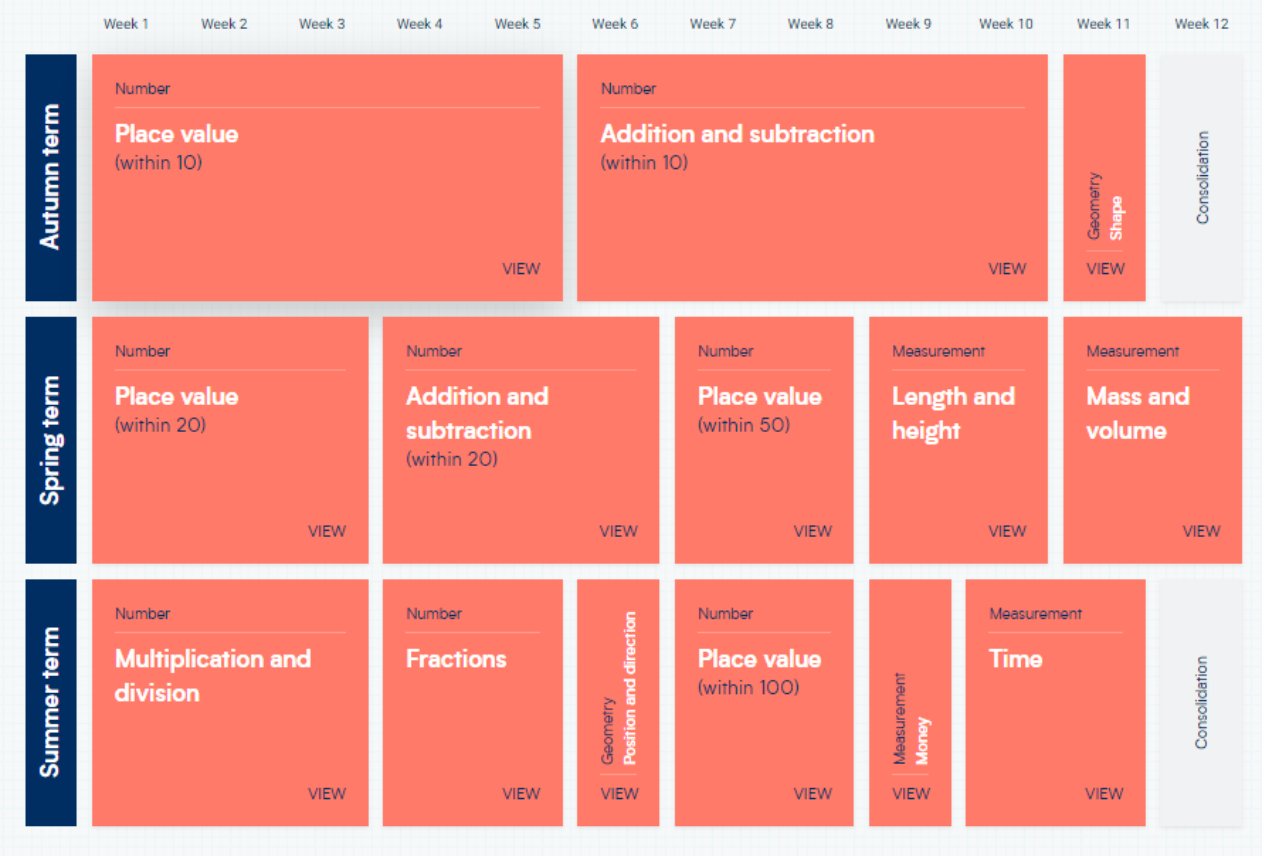
At Bowling Green Academy, we follow the White Rose Maths 'small steps' scheme of learning. Please note that if classes need more or less input during a unit of work or a 'small step', teachers are free to adapt this sequence to meet the needs of a class, e.g. extending a fractions unit. Furthermore, teachers are instructed not to solely use resources from the White Rose scheme but to meet individual and whole class needs. Further information is below.

# Maths Unit Overview

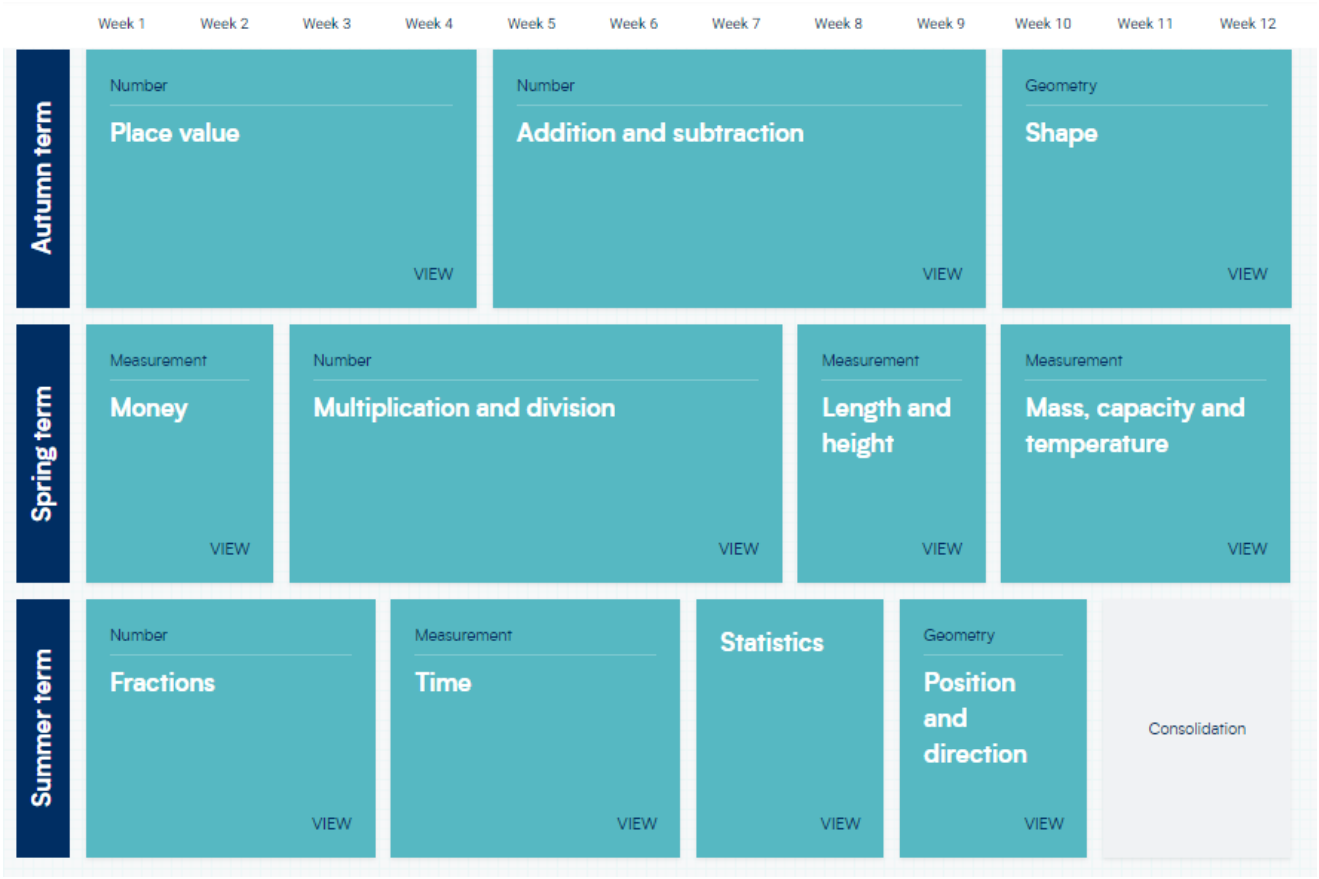
## Reception



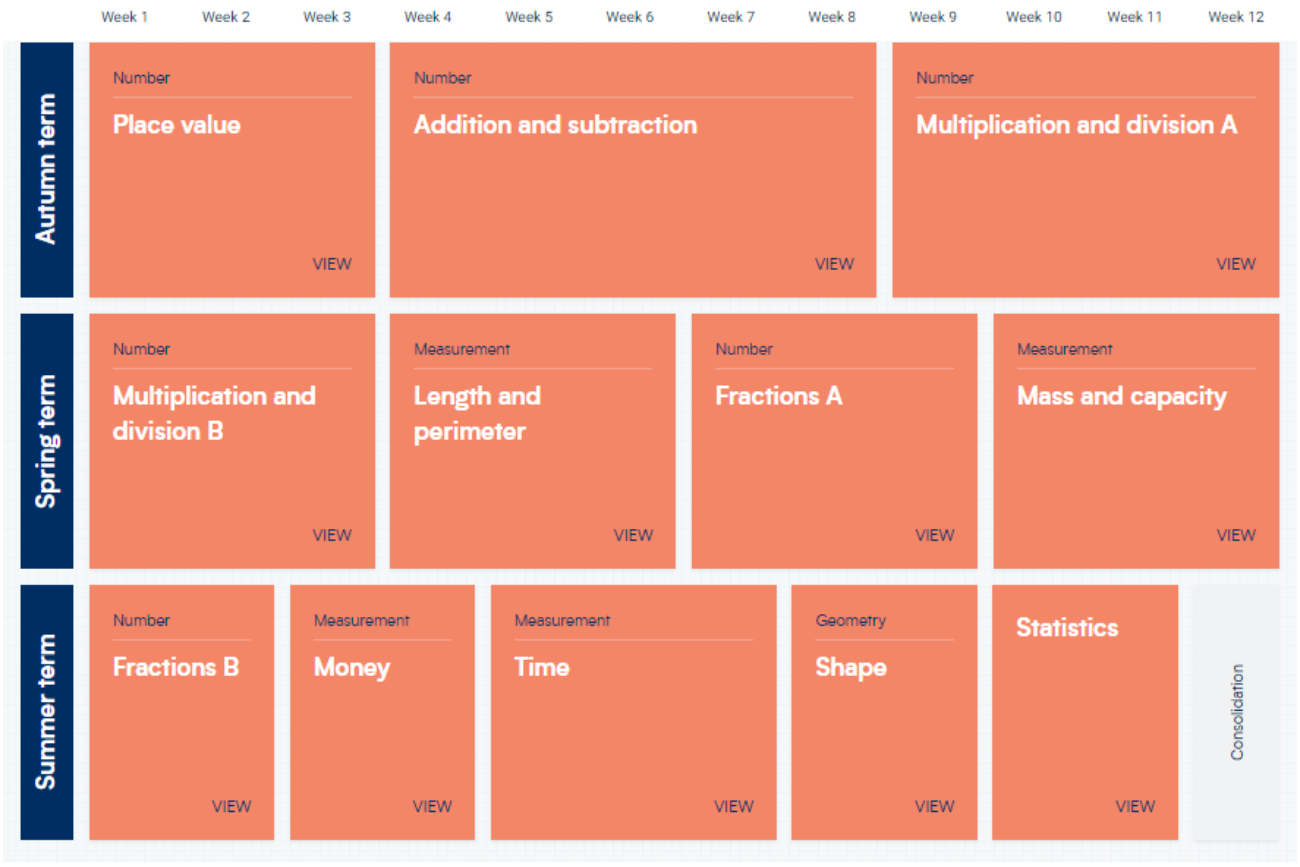

## Year 1:



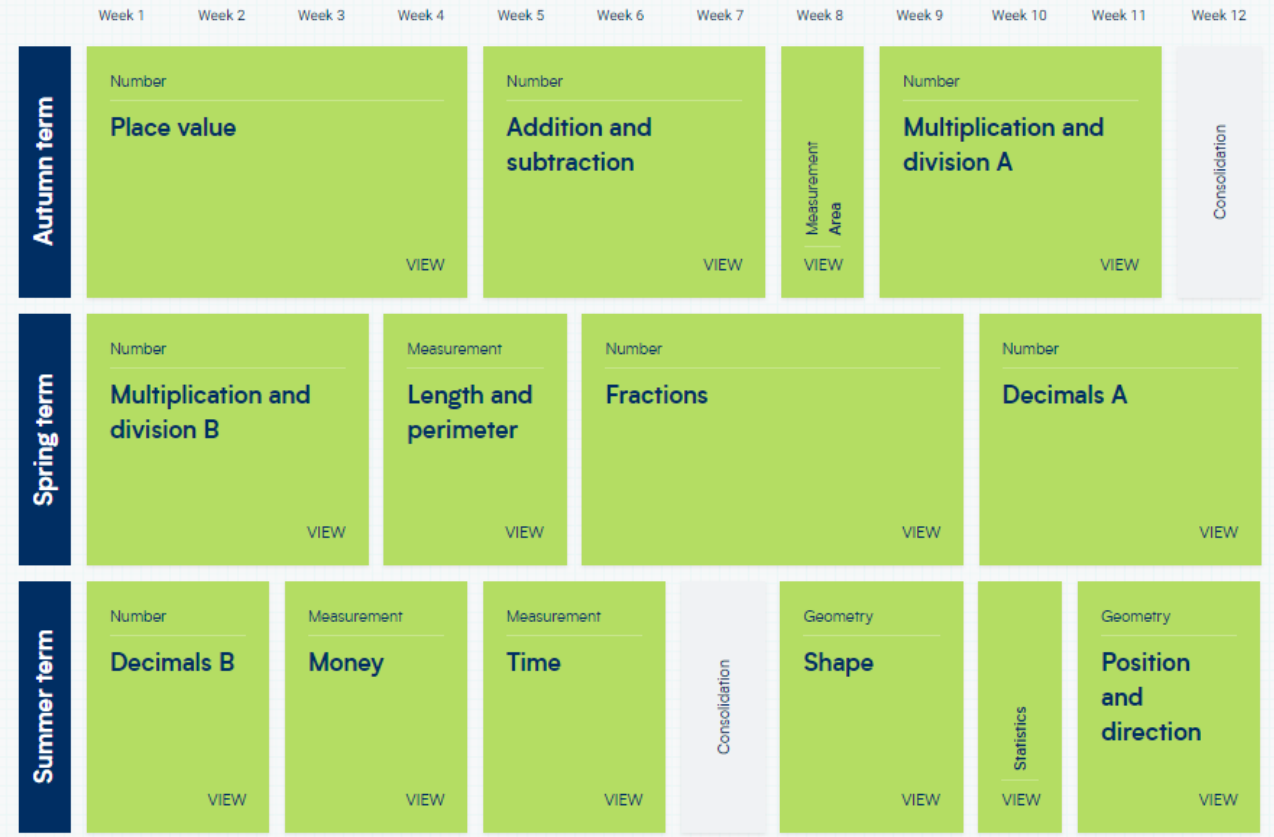
## Year 2:


Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Number
Place value
VIEW
Number
Addition and subtraction
VIEW
Geometry
Shape
VIEW
Spring term
Measurement
Money
VIEW
Number
Multiplication and division
VIEW
Measurement
Length and height
VIEW
Measurement
Mass, capacity and temperature
VIEW
Summer term
Number
Fractions
VIEW
Measurement
Time
VIEW
Statistics
VIEW
Geometry
Position and direction
VIEW
Consolidation

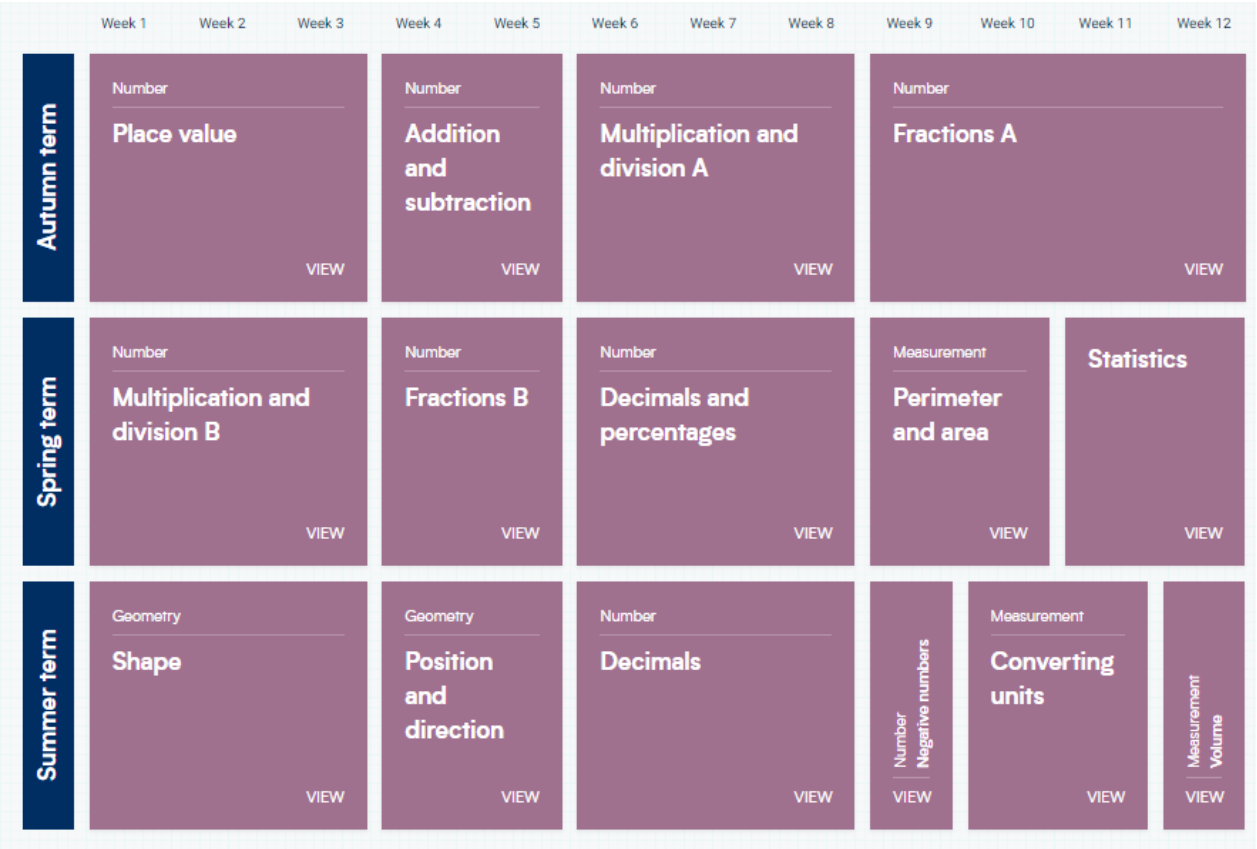
## Year 3:


Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Number
Place value
VIEW
Number
Addition and subtraction
VIEW
Number
Multiplication and division A
VIEW
Spring term
Number
Multiplication and division B
VIEW
Measurement
Length and perimeter
VIEW
Number
Fractions A
VIEW
Measurement
Mass and capacity
VIEW
Summer term
Number
Fractions B
VIEW
Measurement
Money
VIEW
Measurement
Time
VIEW
Geometry
Shape
VIEW
Statistics
VIEW
Consolidation

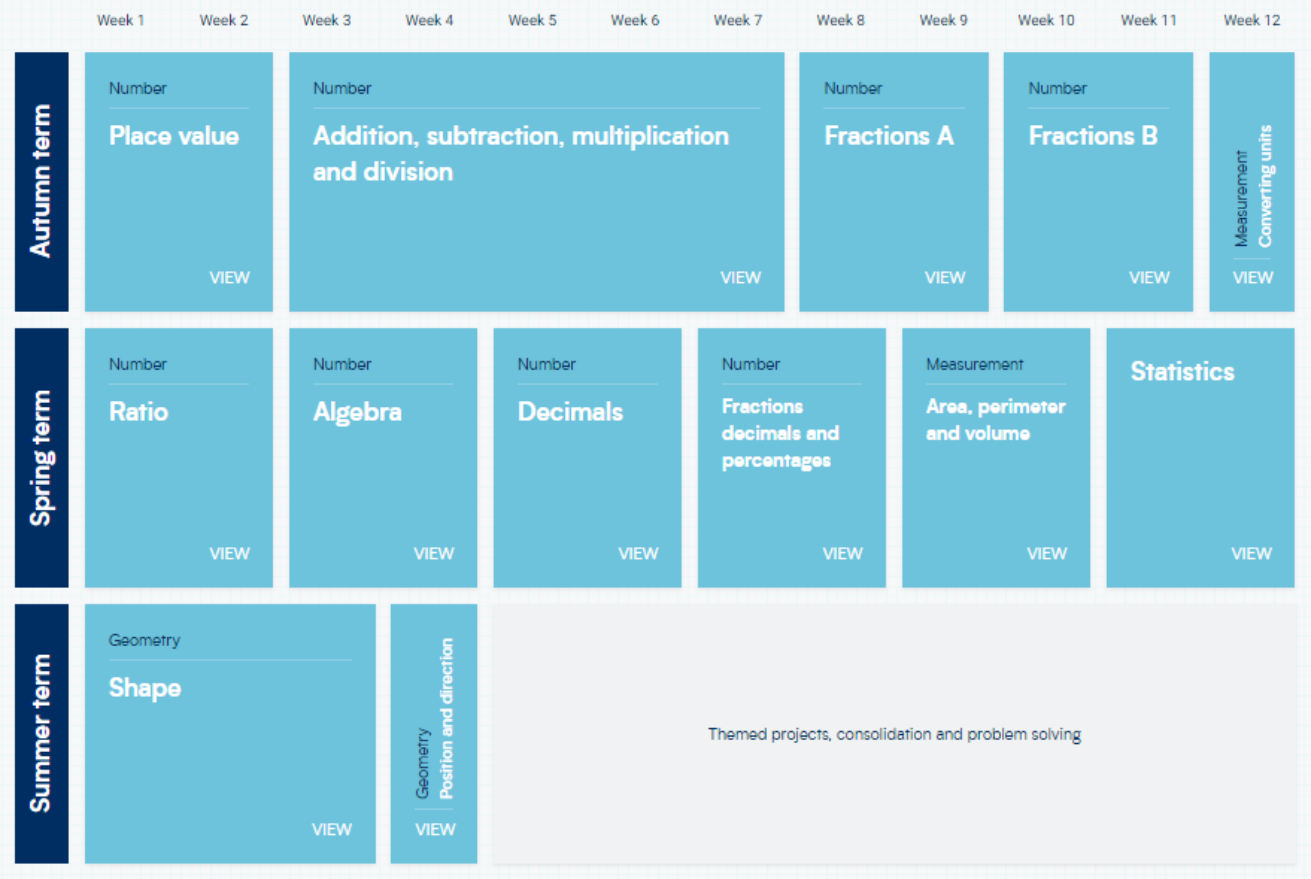
## Year 4:


Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Number
Place value
VIEW
Number
Addition and subtraction
VIEW
Measurement
Area
VIEW
Number
Multiplication and division A
VIEW
Consolidation
Spring term
Number
Multiplication and division B
VIEW
Measurement
Length and perimeter
VIEW
Number
Fractions
VIEW
Number
Decimals A
VIEW
Summer term
Number
Decimals B
VIEW
Measurement
Money
VIEW
Measurement
Time
VIEW
Consolidation
Geometry
Shape
VIEW
Statistics
VIEW
Geometry
Position and direction
VIEW

## Year 5:

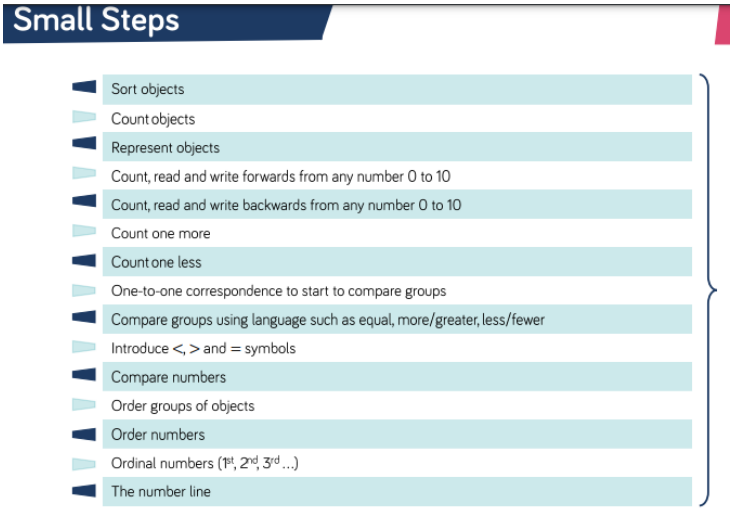

Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Number
Place value
VIEW
Number
Addition and subtraction
VIEW
Number
Multiplication and division A
VIEW
Number
Fractions A
VIEW
Spring term
Number
Multiplication and division B
VIEW
Number
Fractions B
VIEW
Number
Decimals and percentages
VIEW
Measurement
Perimeter and area
VIEW
Statistics
VIEW
Summer term
Geometry
Shape
VIEW
Geometry
Position and direction
VIEW
Number
Decimals
VIEW
Number
Negative numbers
VIEW
Measurement
Converting units
VIEW
Measurement
Volume
VIEW

# Year 6:




## Small steps overview

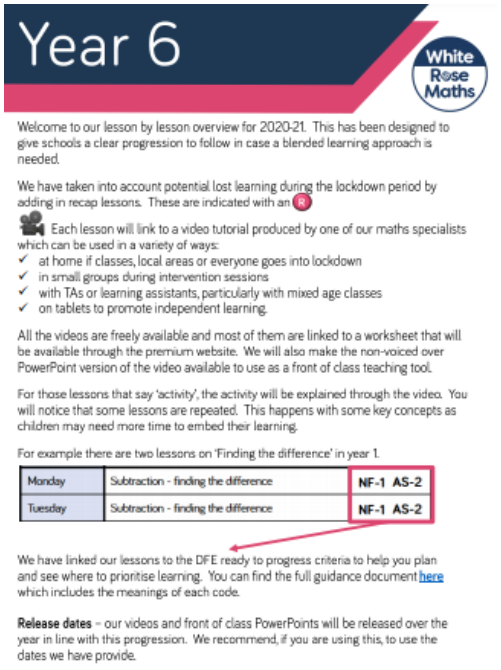
The objectives are broken down into a series of carefully planned small steps. It is recommended to teach the small steps in the suggested order as the step sequences are designed to gradually develop children's understanding.



# Lesson by lesson overview

White Rose have provided an overview of all lessons which has been designed to give a clear progression to follow in case a blended learning approach is needed. It also includes how the objectives relate to the new DFE/NCETM ready to progress criteria, released in July 2020. With the related codes in **Bold** (please refer to guidance).

The Primary Progression map highlights the previous learning objectives which will help when planning differentiation for lost learning and intervention. Resources for each lesson are available through the premium resources section on the White Rose Hub website. Each teacher will have their own log on for this. It is important to note that these resources may need adapting to adapt to all children's learning needs and teachers will need to seek out other high-quality resources to support maths teaching and learning.



Year 6

White Rose Maths

Welcome to our lesson by lesson overview for 2020-21. This has been designed to give schools a clear progression to follow in case a blended learning approach is needed.

We have taken into account potential lost learning during the lockdown period by adding in recap lessons. These are indicated with an (R)

Each lesson will link to a video tutorial produced by one of our maths specialists which can be used in a variety of ways:

- ✓ at home if classes, local areas or everyone goes into lockdown
- ✓ in small groups during intervention sessions
- ✓ with TAs or learning assistants, particularly with mixed age classes
- ✓ on tablets to promote independent learning.

All the videos are freely available and most of them are linked to a worksheet that will be available through the premium website. We will also make the non-voiced over PowerPoint version of the video available to use as a front of class teaching tool.

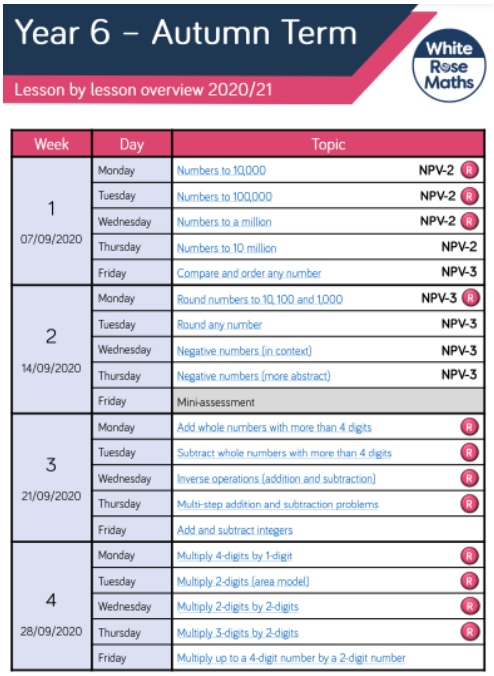
For those lessons that say 'activity', the activity will be explained through the video. You will notice that some lessons are repeated. This happens with some key concepts as children may need more time to embed their learning.

For example there are two lessons on 'Finding the difference' in year 1.

| | | |
|---|---|---|
| Monday | Subtraction - finding the difference | NF-1 AS-2 |
| Tuesday | Subtraction - finding the difference | NF-1 AS-2 |

We have linked our lessons to the DFE ready to progress criteria to help you plan and see where to prioritise learning. You can find the full guidance document here which includes the meanings of each code.

**Release dates** – our videos and front of class PowerPoints will be released over the year in line with this progression. We recommend, if you are using this, to use the dates we have provide.



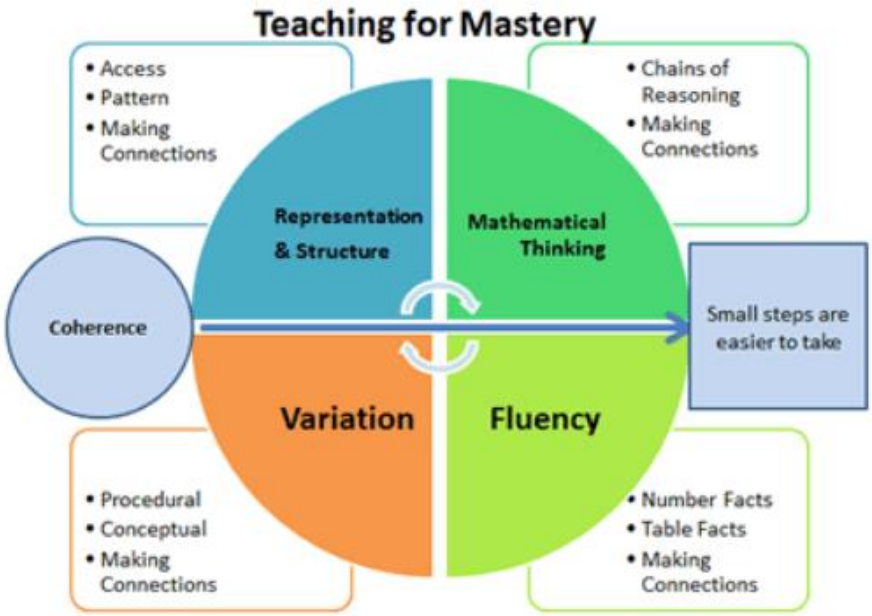
Year 6 – Autumn Term

Lesson by lesson overview 2020/21

White Rose Maths

| Week | Day | Topic | |
|---|---|---|---|
| 1 07/09/2020 | 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 |
| 2 14/09/2020 | Monday | Round numbers to 10, 100 and 1,000 | NPV-3 (R) |
| | Tuesday | Round any number | NPV-3 |
| | Wednesday | Negative numbers (in context) | NPV-3 |
| | Thursday | Negative numbers (more abstract) | NPV-3 |
| | Friday | Mini-assessment | |
| 3 21/09/2020 | Monday | Add whole numbers with more than 4 digits | (R) |
| | Tuesday | Subtract whole numbers with more than 4 digits | (R) |
| | Wednesday | Inverse operations (addition and subtraction) | (R) |
| | Thursday | Multi-step addition and subtraction problems | (R) |
| | Friday | Add and subtract integers | |
| 4 28/09/2020 | Monday | Multiply 4-digits by 1-digit | (R) |
| | Tuesday | Multiply 2-digits (area model) | (R) |
| | Wednesday | Multiply 2-digits by 2-digits | (R) |
| | Thursday | Multiply 3-digits by 2-digits | (R) |
| | Friday | Multiply up to a 4-digit number by a 2-digit number | |

## Teaching for mastery



A central component in the NCETM/Maths Hubs programmes to develop Mastery Specialists has been discussion of Five Big Ideas, drawn from research evidence, underpinning teaching for mastery. The diagram above is used to help bind these ideas together. When teaching maths at Bowling Green Academy it is important that teachers understand the Five Big Ideas and are able to reference this in their teaching.

## Concrete, pictorial, abstract

At Bowling Green Academy we use a concrete, pictorial and abstract approach when teaching maths. The CPA method involves using actual objects for children to add, subtract, multiply or divide. They then progress to using pictorial representations of the object, and ultimately, abstract symbols.

Children often find maths difficult because it is abstract. The CPA approach helps children learn new ideas and build on their existing knowledge by introducing abstract concepts in a more familiar and tangible way.

**Concrete** is the 'doing' stage, using concrete objects to solve problems. It brings concepts to life by allowing children to handle physical objects themselves. Every new abstract concept is learned first with a 'concrete' or physical experience.

**Pictorial** is the 'seeing' stage, using representations of the objects involved in maths 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.

## Fluency, problem solving and reasoning

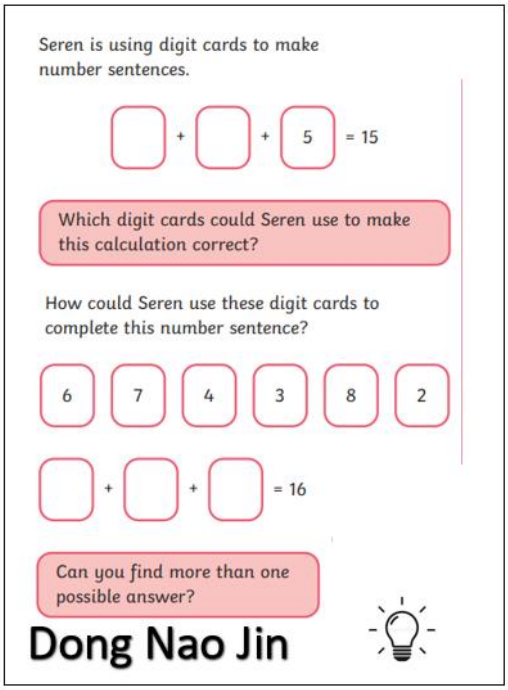
At Bowling Green Academy, we recognise the importance in all children given the opportunity to access fluency, reasoning and problem-solving tasks in maths. A solid foundation is laid for all children using varied fluency which ensures that children can access arithmetic questions confidently and accurately. Children are then able to extend their learning and understanding through the use challenging problem solving and reasoning questions. On every maths working wall, key vocabulary is displayed for pupils alongside STEM sentences.

## Vocabulary

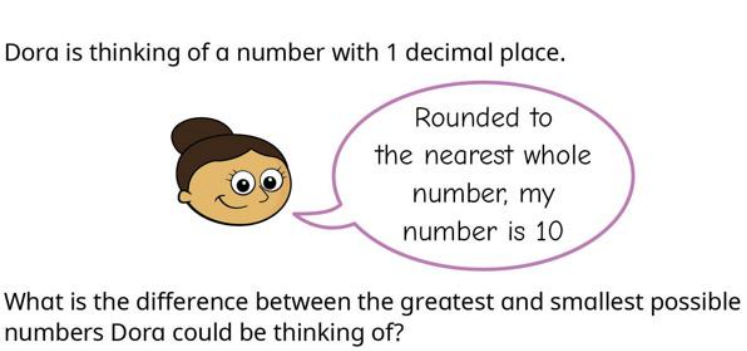
At Bowling Green Academy, we recognise the importance of oracy in maths and have used the White Rose scheme of learning to ensure that the vocabulary used in maths is consistent, progressive and accessible for all. Maths lessons are designed to ensure that discussion happens frequently. We recognise that this discussion is a valuable assessment for learning tool, enabling teachers to understand what students know and don't know about a topic, before starting formal book work.

‘Mastery for the Majority’

At Bowling Green Academy, we follow a mastery approach. The expectation is that the majority of pupils will move through the programme of study at broadly the same pace. However, we recognise that some pupils may grasp concepts quickly, whilst others require extra consolidation – as such, we offer a bespoke ‘mastery for the majority’ curriculum. Teachers plan mastery for the majority, work that is aimed at providing challenge for the vast majority, if not all of the classroom. They also plan for the lowest 20% & SEND and vulnerable work that can further support consolidation, mainly through varied fluency. Pupils who grasp concepts quickly are further challenged through ‘Dong Nao Jin’s’ (roughly translated as ‘make your brain think’. These questions provide deeper challenge for pupils, without the need to accelerate into new content.




Dong Nao Jin




‘Keep up, not catch up’

After evaluating our curriculum offer in maths, we are keen to ensure that children at risk of falling behind in maths are identified early and strategies put in early to ensure that no child is left behind. Here are some of the strategies that we use to enforce this;

- Teachers use the Ready To Progress criteria to ensure that core elements in maths are embedded and ‘overtaught’ when needed.
- Pre teaching is used when needed for any children identified.
- Teachers plan scaffolding in maths lessons and identify when and how to remove this in order for every child to achieve independently.
- EYFS children take part in daily Mastering Number Sense sessions, which is aimed at strengthening the understanding of number, and fluency with number facts, among children in the first three years of school.

- TT Rockstars is used from Year 2- Year 6 three to five times a week and set as homework outside of school. This is aimed at children developing rapid recall of multiplication and division facts to 12.
-

Application across the curriculum

At Bowling Green Academy, we understand the importance of maths in everyday life therefore we make links to maths in other areas of the curriculum. Examples of this include;

- Graphs in Geography
- Pictograms in Computing
- To analyse data in Science

We also complete an entrepreneur week across the school. This encourages children to look at the rea life application of money and gives them the opportunity to have a hands-on experience of handing money.

Seesaw is our online learning and communication platform. At times, Maths work is well-suited to being recorded verbally or children may just use concrete resources to achieve an objective. Teachers or children may upload work onto SeeSaw.

**Marking and feedback**

Where possible teachers 'live mark' in lessons to ensure that feedback given is prompt and avoids misconceptions being embedded. This approach ensures that children are identified quickly who may not have fully grasped the concept and need further support. This also helps challenge those who have shown a solid understanding and are ready to move onto a Dong Nao Jin.

**Pre/post assessments**

End of unit assessments are provided by White Rose Hub. These are to be completed at the start of a unit, as a formative assessment and repeated at the end of a unit as a summative assessment. It is recommended that teachers complete the pre-assessment in advance of a new unit, allowing chance to plan based on the outcomes. Pre-assessment results should be used to inform planning and interventions. Pre and post assessment scores should be recorded in the child's maths book.

Measurement: Length and height

| Pre assessment score | Post assessment score |
|---|---|
| | |

**Termly assessments**

At the end of Autumn and Spring term, Y1, 3, 4 & 5 children need to complete a White Rose Maths progress check. There are two papers: an arithmetic paper and a reasoning and problem-solving paper. White Rose have provided a RAG analysis excel spreadsheet, which results from termly assessments should be added to. Teachers should then analyse these results and use this to inform planning and highlight any children who may need further intervention. Year 2 and Year 6 pupils complete past SAT papers, to assess their progress towards end of year assessments. At the end of the academic year Y1, 3, 4 & 5 assess using NFER tests.
Every term teachers add their teacher judgement to Arbor, the school assessment system. This gives an overview of where every child is in maths and what they are on track to achieve.

<u>What does Maths look like in EYFS?</u>

In Early Years at Bowling Green children are taught a deep knowledge of numbers 0 -10 and are given opportunities to apply this in in different ways. The White Rose Maths scheme of learning is used in Reception and ensures that all children follow a sequence of learning that enables them to become active learners and apply their knowledge in independent play. Provision provides further opportunities for children to apply their learning, with high quality resources available at all times. Children are encouraged to become critical thinkers in maths and explore numbers through a variety of concrete methods. Early Years at Bowling Green Academy lays a solid foundation for children moving into Year 1 to begin working on the National Curriculum with number facts being embedded in the EYFS curriculum, mainly bonds to 5 with exposure of bonds to 10. Pupils leave EYFS confident, independent and resilience mathematicians, ready for the next challenge in their mathematical learning journey.

| | | |
|---|---|---|
| Maths | **Number** | • Have a deep understanding of number to 10, including the composition of each number.<br>• Subitise (recognise quantities without counting) up to 5.<br>• Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. |
| | **Numerical Patterns** | • Verbally count beyond 20, recognising the pattern of the counting system.<br>• Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.<br>• Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally. |

## Inclusion

Use the below boxes to amend and add to with clear expectations for your subject to ensure learners with SEND and the bottom twenty percent are catered for at the planning stage.

What does progression look like?

As children start their mathematical journey they will rely on concrete resources and one to one correspondence to achieve in maths. As they move through their year group curriculum their knowledge of number facts will develop and they will become fluent and be able to recall facts, such as timetables, rapidly. This will underpin all other areas of maths and enable pupils to access other areas of the curriculum confidently.

Strategies to support learners

- Pre teaching
- Use of Ready to Progress Criteria, particularly when supporting low attaining pupils
- Repetition of key learning points.
- Stem sentences and modelling of good vocabulary
- Concrete resources available for all learners
- Pictorial approaches modelled

What knowledge must learners acquire?

All children must have a solid foundation in place value to be able to progress into other areas of the curriculum. For children identified as SEND and in the lowest 20%, teachers use the Ready To Progress criteria to ensure that they are teaching the essential foundations so that children can access the whole maths curriculum.

Further varied fluency is provided for the lowest 20% to help secure foundations before accelerating through the curriculum.

Strategies to support learners include

- The use of the online learning platform Seesaw to record practical learning and oral understanding of questioning.
- Working walls containing unit specific vocabulary and STEM sentences.
- All adults in school modelling good vocabulary and STEM sentences to children.

Where is vocabulary and language explicitly taught?

Unit specific vocabulary is taught daily from Reception up to Year 6. This is displayed in classrooms and modelled throughout daily maths lessons.

STEM sentences will be used to demonstrate and extend learning and should be modelled on working walls. By being immersed in mathematical vocabulary children will be able to orally explain their understanding in maths. This is especially important for children who may have barriers which prevent them from recording their understanding formally.

Strategies to support learners include

- Memory activities to learn number facts.
- Precision teaching of number facts and number formation.
- The use of concrete resources and different pictorial approaches used.
- 3 before me- children encouraged to become independent learners and use the classroom environment to solve problems before approaching the teacher.

Useful Resources

- White Rose Maths- For planning, resources and challenges
  https://whiterosemaths.com/
- Classroom secrets- Has resources linked to White Rose Maths
  https://classroomsecrets.co.uk/
- Primary stars- Has resources linked to White Rose Maths
  https://primarystarseducation.co.uk/
- NCETM
  https://www.ncetm.org.uk/
- NRICH
  https://nrich.maths.org/
- TWINKL- Has resources linked to White Rose Maths
  https://www.twinkl.co.uk/
- Ten Town- For EYFS
  https://tentown.co.uk/
- TT Rockstars- for times table knowledge
  https://ttrockstars.com
- Numbots- For Year 1
  https://numbots.com/