# Maths Policy

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| Review Date by Committee | October 24th 2019 |
| Next Review Date by Committee | September 2022 |

Waterhouses CE Primary Academy

*'Celebrate Learning, Achieving and Friendship in God's Love'*
*Core Values: Love, Trust, Hope, Respect*

## School Vision

Our vision is to provide a stimulating, creative and inclusive learning environment based on Christian principles in which all children will thrive and achieve the best that they possibly can.

**Through a core set of Christian values we aim to:**

- Create a rich and stimulating environment for teaching and learning which challenges and inspires every child.
- Build strong relationships between school, home, church, parish and the wider community.
- Develop independent learning skills which will encourage an enjoyment of lifelong learning
- Ensure everyone in our school is recognised and valued for their talents and strengths and everyone has an equal opportunity to develop to their full potential.
- For all children to be motivated and excited by a broad and balanced curriculum
- To value and celebrate the achievements and successes of all children.

## Introduction

"Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. "
**National Curriculum 2014**

## Aims

We aim to develop lively, enquiring minds encouraging pupils to become self-motivated, confident and capable in order to solve problems that will become an integral part of their future.
The National Curriculum for mathematics aims to ensure that all pupils:

- ✓ ***Become fluent*** in the fundamentals of mathematics so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- ✓ ***Can solve problems*** by applying their mathematics to a variety of problems with increasing sophistication, including in unfamiliar contexts and to model real-life scenarios.
- ✓ ***Can reason mathematically*** by following a line of enquiry and develop and present a justification, argument or proof using mathematical language.

At Waterhouses CE Primary Academy we have adopted a **'Mastery'** approach to teaching and learning in Mathematics.

Our definition of **Mastery**:

> "The essential idea behind 'mastery in mathematics' is that all pupils need a deep understanding of the mathematics they are learning so that future mathematical learning is built on solid foundations which do not need to be retaught. Key ideas and building blocks are important for everyone and the class work together on the same key point, whilst at the same time pupils are supported or accelerated to gain depth of understanding and proficiency. Acceleration to higher content is avoided. Instead, the reasoning behind mathematical processes is emphasised. Teacher/pupil interaction explores in detail how answers were obtained, why the method/strategy worked, and what might be the most efficient method/strategy." NCETM

At Waterhouses CE Primary Academy we have a core set of principles and beliefs for achieving mastery in mathematics. This includes a belief that all pupils are capable of understanding and doing mathematics. With good teaching, appropriate resources, effort and a 'can do' attitude, all children can achieve and enjoy mathematics. The key ideas and building blocks to becoming a 'master' at maths are important for everyone.

Mastery is not just being able to memorise key facts and procedures and to answer test questions accurately and quickly. Mastery involves **knowing that** (I need to do…) **knowing how** (I do it like this…) and **knowing why** (I got that answer because…). It also means being able to use one's knowledge appropriately, flexibly and creatively and to apply it in new and unfamiliar situations.

For all maths concepts, teachers need to ensure that children are "**challenged through being offered rich and sophisticated problems**." After developing fluency, children need to show that they can apply their knowledge in mathematics and then move on even further to prove they have mastered the concept.

Through quality first teaching, children learning together and immediate intervention, all children have the potential to 'go deeper' and broaden their understanding of mathematical concepts.

**The Curriculum**

The Programmes of study for mathematics are set out year by year for Key Stages 1 and 2 in the National Curriculum (2014). In Reception-Year 6 we have developed our curriculum following the White Rose Hub scheme of work (for curriculum coverage, please see appendix 1). It is designed to give us the opportunity to address key points individually, ensure that children have a secure and deep understanding of those points, before offering the opportunity to 'go deeper' within them.

Foundation Stage

The programme of study for the Foundation stage is set out in the EYFS Framework. In addition to the Reception class following White Rose Hub guidance, there is the opportunity to 'explore maths' and develop understanding of mathematical concepts through play. This involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shape, spaces and measures.

**Planning, Teaching and Learning**

At Waterhouses CE Primary Academy, there is a dedicated mathematics lesson in KS1 and KS2 daily, usually lasting approximately 60 minutes. In the Foundation Stage there is mathematical provision both indoors and outdoors at all times. This includes a combination of teacher led; child-initiated and free choice activities.

We follow the mastery approach of CONCRETE-PICTORIAL-ABSTRACT. Teachers ensure that fluency and conceptual understanding is achieved with the support of mathematical equipment or 'concrete apparatus' before moving towards more abstract approaches (either within the same lesson or subsequent lessons). All children, no matter their ability, should have access to mathematical equipment to aid their understanding at all times. For a list of equipment that every classroom should have, please see appendix 2. Other resources that are more subject-specific will be stored centrally in the ICT suite.

**Concrete**

- 'Hands on' stage, where children are introduced to an idea or skill with real objects. This stage is the foundation for conceptual understanding. In the case of division this may be sharing out 12 biscuits amongst 6 children

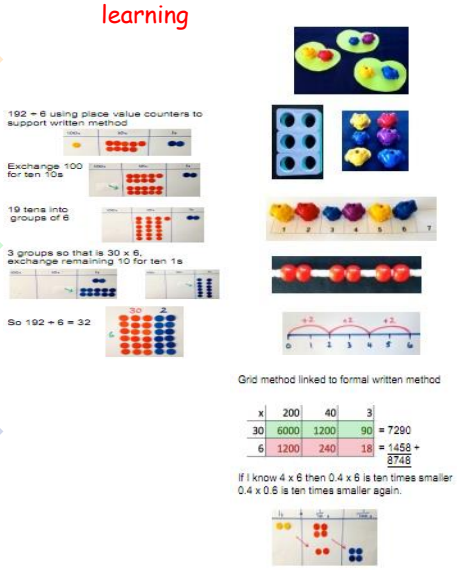
**Pictorial**

- Once the children have understood the concept they can now relate them to representations like a diagram or picture. In division, this would be circling objects

**Abstract**

- This stage introduces the children to representing the concept using symbols and in a written form

Examples of concrete learning




Although lessons do not have a set structure, quite often, teachers will follow the principles of 'My Turn, Our Turn, Your Turn', where children will be guided towards developing independence in thinking and the application of mathematical skills. Modelling of the key skill/lesson objective will take precedence, followed by partner work (forming the 'Our Turn' section of the lesson). We believe that partner work is crucial for providing opportunities for peer-to-peer support and assessment. For those who are potentially finding a concept tricky to master, they are able to spend longer practising and developing fluency, whilst for those who have developed fluency with the key skill, supporting a peer will provide stretch and challenge and an opportunity to reason and deepen a skill.

The children know that they need to explain why their answer is correct and how they worked it out. After we are certain that they have truly mastered a concept, the children then apply their knowledge to problem solving activities, developing their reasoning skills.

Guided Learning/ Misconceptions (My Turn) → Guided Practice (Our Turn) → Independent work (Your Turn) → Application

In mathematics lessons at Waterhouses CE Primary Academy, we aim to:

- ✓ Develop resilient learners with a 'We Can' attitude to Mathematics, whatever their previous level of attainment

You will see:

- ✓ Teachers delivering **'Quality first' teaching;** tailored to meet the needs of the learners in each class, and immediate intervention to address gaps in learning where necessary
- ✓ Teachers using high-quality questioning to explore children's understanding and develop it further
- ✓ Teachers making use of misconceptions to further understanding of key concepts
- ✓ Learners being given the opportunity, through careful planning, to 'go deeper' in mathematical concepts
- ✓ Pupils learning together
- ✓ The development of fluency, reasoning and problem solving over a series of lessons.

**Questioning**

Children will regularly be asked to "Convince me!" or "Prove It!" and other higher order questions in order to develop their mathematical thinking and language. Sentence stems are provided, used and displayed in every classroom to enable children to respond to such questioning with confidence and ability.

Examples of higher order questions in maths:

| EYFS | KS1 & KS2 |
|---|---|
| • Tell me about ……..?<br>• How many……..?<br>• How many more ……. would you need?<br>• Can you put ……. in groups?<br>• Can you put the ……. in order?<br>• Which is the best ……..? Why?<br>• Can you find another way to sort……?<br>• Can you tell me about this item?<br>• Can you sort the materials into groups?<br>• What could you put together?<br>• Why have you put these things together?<br>• Can you put the ……. in order?<br>• Is there another way to put the ……. in order?<br>• Can you put the ……. in groups? How will you do it?<br>• If you add the numbers on these two ……., how many will that be?<br>• Can you put one foot/hand on each of two ……. which add to 7?<br>• Which ……. has the highest number on?<br>• Which ……. has the smallest number on?<br>• Which is one more than this one?<br>• Which is one less than this one?<br>• Can you find a…… with a 2 on?<br>• Can you stand on a ……. with a 5 on? | ***Starter questions***<br>These take the form of open-ended questions that focus the pupils' thinking in a general direction and give them a starting point.<br>• How could you sort these …?<br>• How many ways can you find to …?<br>• What happens when we …?<br>***Questions to stimulate mathematical thinking***<br>These questions assist pupils to focus on particular strategies and help them to see patterns and relationships.<br>• What is the same?<br>• What is different?<br>• Can you see a pattern?<br>• How can this pattern help you find an answer?<br>• What do think comes next? Why?<br>***Assessment questions***<br>Questions such as these ask pupils to explain what they are doing or how they arrived at a solution<br>• What have you discovered/noticed?<br>• How did you find that out?<br>• Why do you think that?<br>• What made you decide to do it that way?<br>***Final discussion questions***<br>These questions draw together the efforts of the class and prompt sharing and comparison of strategies and solutions.<br>• Who has the same answer/pattern/grouping as this?<br>• Who has a different solution?<br>• Are everybody's results the same?<br>• Why/why not?<br>• Have we found all the possibilities?<br>• How do we know? |

**Mathematical Language and Vocabulary**

Teachers will refer to the National Curriculum glossary of terms, White Rose Hub guidance and our separate calculation policy when planning to ensure that they are using the correct mathematical terms and modelling accurate language. Relevant vocabulary will be clearly displayed in the classroom and children will be encouraged to use the correct mathematical language to discuss their mathematics and to explain their reasoning.

**Cross-Curricular Links**

The skills learned in maths should be applied and reinforced across the curriculum where appropriate. Some skills may be taught solely through creative lessons e.g. Roman Numerals or calculating scale on maps. Others may be practised such as measuring in a DT lesson or drawing graphs in science.

**Support and Stretch and Challenge**

At Waterhouses CE Primary Academy we follow a mastery curriculum and, in line with the National Curriculum document, ensure that most children move at broadly the same pace. However, there can still be a wide range of attainment in the class.

We aim to:

- ✓ Establish a classroom climate where all pupils feel that they can contribute, and which secures their motivation and concentration
- ✓ Develop an "I can do it!" attitude
- ✓ Rapid graspers are challenged through a mixture of more demanding problems and/or questioning which deepens their knowledge of the same content rather than being moved onto content from future year groups (differentiation by depth)
- ✓ Pupils' difficulties and misconceptions are identified through immediate formative assessment and addressed with rapid intervention

**Focus on depth: Deepen understanding before accelerating content coverage**

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

**Challenging pupils through deeper learning**

"The Mathematical Association has also argued the need for the most able students to be routinely expected to master essentially the same material as their peers – but more robustly, fluently and deeply, and with a greater emphasis on making connections. They should also focus on communicating mathematically and on developing better problem solving skills both within and beyond mathematics." Raising the bar: developing able young mathematicians, (ACME, 2013)

Examples of strategies include:

- Questioning – targeting individuals or groups, open questions, encouraging pupils to explain strategies and methods to each other
- Teaching focused (at times) on individuals/groups while others work independently
- Providing resources to support or extend pupils
- Open-ended tasks – investigations, problems
- Pre-teaching or same day interventions

**Same Day Interventions**
Same day intervention is designed to enable pupils to "keep up" rather than "catch up". It should address any points in the lesson that were not understood in order that all pupils are ready for the next lesson.

- Children who have not quite met the learning intention should be identified during the lesson
- The intervention work should be based on the lesson that day and completed, where possible, on that same day (preferably within the lesson)
- The intervention should be identified in the child's book, of completed in such (see Feedback Policy)

There will be some children who will need additional support in the form of other interventions.

**Inclusion**
In line with our Special Educational Needs and Disability Policy, each child will have equal entitlement to all aspects of the maths curriculum and to experience the full range of maths activities. Therefore, in delivering Maths, care will be taken to ensure that a variety of learning styles are accessed and teaching methods adopted. Intervention groups will take place both within the maths lesson and outside; these sessions may be delivered by the teacher or teaching assistant and may involve individual or small group work, accessing both ends of the learning spectrum.

**Special Educational Needs**
Children with SEND are normally taught within the daily mathematics lesson. Where additional staff are available to support groups or individual children, they may withdraw small groups to use intervention materials.

**Equal Opportunities**
Within the daily mathematics lesson teachers not only provide activities to support children who find mathematics difficult, but also activities that provide appropriate challenges for children who are high achievers in mathematics.

**Assessment and Feedback**
At the end of each lesson, the pupil and the teacher makes a judgment of the learning outcome in the child's book (see Feedback Policy). Teachers must build in regular opportunities to formatively assess children during each lesson (for example, through questioning or observation of peer discussion, mini-plenaries and hot marking of work).

In an addition to teacher assessment, each half-term, year groups 1-6 will use an assessment paper provided by the White Rose Hub. These can be completed in 'formal' conditions, one to one, in small groups or in multiple sittings, depending on the age and maturity of the children. The assessments are to be used **formatively** to inform future planning.

These assessments form a basis for making **summative** judgments on pupils' attainment on Insight Tracker. Four times a year, pupils will be teacher assessed against a set of 'Key Performance Indicators' and assigned a judgement of either 'Working Below', 'Just Below', 'On Track' or 'Working at Greater Depth' within the standard.

SATs tests are administered to Y2 and Y6 in the summer term in accordance with the Standards and Testing Agency.

**Calculations Policy**

At Waterhouses CE Academy, we have developed a consistent and progressive approach to teaching calculations through our separate Calculations Policy which can be accessed via our website (see maths curriculum page) or at the school office where a hard copy can be obtained. This document also sets out how concrete equipment and pictorial approaches may be used to support the development of more 'abstract' or 'traditional' calculation methods.

**Mental Maths**

By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work. The Standardised Multiplication Tables Check to be administered for the first time in 2020 will measure pupils progress in memorising and recalling these facts quickly and accurately. Waterhouses CE Primary Academy currently uses a mental maths award scheme to support the progression of mental maths skills and knowledge (mainly recognition of number; multiplication tables facts and associated divisions and number bonds and pairs). Pupils in Reception-Year 6 work through a series of levels which have been designed and allocated to year group standards according to the National Curriculum 2014 expectations (please see Appendix 3 for the Under The Sea Levels).

Children practise their target level in class and at home to achieve fluency and rapid recall before undertaking a short test. Once they have passed a level (based on 3 target skills), they are rewarded with a certificate and badge during our fortnightly celebration worships. Children work towards completing the scheme and becoming a 'Maths Ambassador' for the school. Photographs of our maths ambassadors are displayed in school.

In addition to our mental maths scheme, children in Years 2-6 (and pupils in year 1 in the Summer term) also have access to Times Tables Rock Stars. Here they are able to practise rapid recall of times tables facts and related divisions at home as well as in school. Each class is allocated time in the weekly timetable to access the school's ICT facilities in order to do this. Success within this scheme will also be celebrated in our fortnightly worships and displayed round school.

**Monitoring and Reviewing**

The policy and practise will be monitored and evaluated by the Mathematics Subject Leader, Laura Lafford; Executive Head, David Wood and the Deputy Head, Matthew Dodson.

Monitoring of the standards of children's work and the quality of teaching in mathematics is the responsibility of the maths subject lead and the senior leadership team. Over the course of each year, the senior leadership team and the maths lead will carry out moderation, lesson observations and learning walks and work sampling. The work of the subject leader also involves supporting colleagues in the teaching and planning of mathematics.

A named member of the school's local academy committee, Gordon Kneller, is briefed to oversee the teaching of mathematics.

## Appendix 1: Curriculum Coverage

### Reception

### Autumn Progression

| | | |
|---|---|---|
| Number and Place Value | Numbers to 5 | One, two, three |
| | | Four |
| | | Five |
| Addition and Subtraction | Sorting | Sorting into groups |
| Number and Place Value | Comparing groups | Comparing quantities of identical objects |
| | | Comparing quantities of non-identical objects |
| Addition and Subtraction | Change within 5 | One more |
| | | One less |
| Measurement | Time | My day |

### Spring Progression

| | | |
|---|---|---|
| Addition and Subtraction | Numbers to 5 | Number bonds to 5 |
| Number and Place Value | Numbers to 10 | Counting to 6, 7 and 8 |
| | | Counting to 9 and 10 |
| | | Comparing groups up to 10 |
| Addition and Subtraction | Addition to 10 | Combining two groups to find the whole |
| | | Number bonds to 10 – ten frame |
| | | Number bonds to 10 – part-whole model |
| Geometry | Shape and space | Spatial awareness |
| | | 3-D shapes |
| | | 2-D shapes |

## Summer Progression

| | | |
|---|---|---|
| Geometry | Exploring patterns | → Making simple patterns |
| | | → Exploring more complex patterns |
| Addition and Subtraction | Count on and back | → Adding by counting on |
| | | → Taking away by counting back |
| Number and Place Value | Numbers to 20 | → Counting to 20 |
| Multiplication and Division | Numerical patterns | → Doubling |
| | | → Halving and sharing |
| | | → Odds and evens |
| Measurement | Measure | → Length, height and distance |
| | | → Weight |
| | | → Capacity |

## Year 1/2

<table>
<tr><th></th><th>Week 1</th><th>Week 2</th><th>Week 3</th><th>Week 4</th><th>Week 5</th><th>Week 6</th><th>Week 7</th><th>Week 8</th><th>Week 9</th><th>Week 10</th><th>Week 11</th><th>Week 12</th></tr>
<tr><td>Autumn</td><td colspan="3">Number: Place Value<br>Y1 – Numbers to 20<br>Y2 – Numbers to 100</td><td colspan="5">Number: Addition and Subtraction<br>Year 1- Numbers within 20 (including recognising money)<br>Year 2- Numbers within 100 (including money)</td><td colspan="3">Number:<br>Year 1: Place Value to 50 and Multiplication<br>Year 2: Multiplication</td></tr>
<tr><td>Spring</td><td colspan="2">Number:<br>Year 1: Division & consolidation<br>Year 2: Division</td><td>Year 1: Place Value to 100<br>Year 2: Statistics</td><td>Measurement: Length and Height</td><td colspan="3">Geometry:<br>Year 1: Shape and Consolidation<br>Year 2: Properties of Shape</td><td colspan="2">Number:<br>Year 1: Fractions and Consolidation<br>Year 2: Fractions</td><td>Consolidation</td></tr>
<tr><td>Summer</td><td>Geometry: Position and Direction</td><td colspan="2">Measurement: Time</td><td colspan="2">Problem solving and efficient methods</td><td colspan="3">Measurement:<br>Year 1: Weight and Volume<br>Year 2: Mass, Capacity and Temperature</td><td colspan="3">Consolidation and Investigations</td></tr>
</table>

## Year 3/4

| | 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 | Number: Place Value | | | | Number: Addition and Subtraction | | | | Number: Multiplication and Division | | | |
| Spring | Number: Multiplication and Division | | Measurement: Length, Perimeter and Area | | Number: Fractions | | | | Y3: Measurement: Mass and Capacity | | | Consolidation |
| | | | | | | | | | Y4: Number: Decimals | | | |
| Summer | Number: Decimals (including Money) | | | Measurement: Time | | Statistics | | Geometry: Properties of Shape (including Y4 Position and Direction) | | | | Consolidation |

## Year 5/6

| | 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 | Number: Place Value | | Number: Four Operations | | | | | Number: Fractions | | | | |
| Spring | Number: Decimals and Percentages | | | Y5: Number: Decimals | | Measurement: Converting Units | Measurement: Perimeter, Area and Volume | | Y5: Consolidation | | Statistics | |
| | | | | Y6: Number: Algebra | | | | | Y6: Number: Ratio | | | |
| Summer | Geometry: Properties of Shape | | Geometry: Position and Direction | Y6: SATS | | Investigations and Consolidation | | | | | | |

**Appendix 2: Class Equipment list**

**KS1**
Teacher counting stick and set of pupil counting sticks
Teacher bead string and set of pupil bead strings
Unifix cubes
Large dice, blank dice and dice with numbers 1-6
Counters
Base 10 equipment
Numicon
Place Value counters (1s, 10s and 100s)
Place Value Arrow cards (1s, 10s and 100s)
Dominoes
Plain playing cards
Meter Sticks
Money (Assorted coins)
Mirrors

**Lower Key Stage 2**
Teacher counting stick and set of pupil counting sticks
Teacher bead string and set of pupil bead strings
Unifix cubes
Large dice, blank dice and assorted multi-sided dice
Counters
Base 10 equipment
Numicon
Place Value counters (1s, 10s, 100s, 1000s and 10,000s)
Place Value Arrow cards (1s, 10s, 100s, 1000s and 10,000s)
Dominoes
Plain playing cards
Meter Sticks
Money (Assorted coins)
Mirrors
Fraction walls

**Upper Key Stage 2**
Teacher counting stick and set of pupil counting sticks
Teacher bead string and set of pupil bead strings
Unifix cubes
Large dice, blank dice and assorted multi-sided dice including FDP dice
Counters
Base 10 equipment
Place Value counters (1s, 10s, 100s, 1000s, 10,000s, 100,000s and 1,000,000s)
Place Value Arrow cards (1s, 10s, 100s, 1000s, 10,000s, 100,000s and 1,000,000s)

Dominoes
Plain playing cards
Meter Sticks
Mirrors
Fraction walls
Protractors
Calculators

**Appendix 3: Under The Sea Levels**

Shrimp Targets

Level 1- Count on and back to 10.
Level 2- Recognise and form numbers to 5 correctly.

Seahorse Targets

Level 1- Count on and back to 20.
Level 2- Recognise and form numbers to 10 correctly.
Level 3- Begin to split 5 objects into 2 groups (practically).

Sea Urchin Targets

Level 1 - Count on and back to 30.
Level 2- Recognise and form numbers to 20 correctly.
Level 3- Know number bonds to 5.

Starfish Targets

Level 1- Know number bonds to 10.
Level 2- Know number bonds to 20.
Level 3- Count forwards and backwards in 2's to 20.

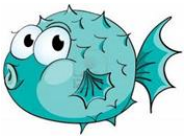
Angel Fish Targets

Level 1- Count to 100 in 5's and 10's.
Level 2- Add two numbers up to 10 (e.g. 5 + 3 =8, 4 + 3 =7).
Level 3- Add two numbers up to 20.

Clownfish Targets

Level 1- Know 2 times tables and division facts.
Level 2- Know 10 times tables and division facts.
Level 3- Know 5 times tables and division facts.

Puffer Fish Targets

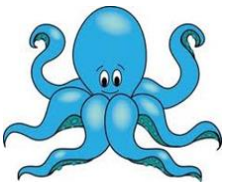


Level 1 – Know 3 times tables and division facts.
Level 2 – Know 4 times tables and division facts.
Level 3 – Know 8 times tables and division facts.

Sting Ray Targets

Level 1 – Know 6 times table and division facts.
Level 2 – Know 7 times table and division facts.
Level 3 – Know number bonds to 100.

Octopus Targets



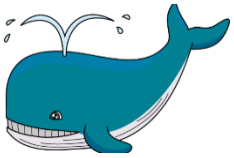
Level 1 – Know 9 times table and division facts.

Level 2 – Know 11 times table and division facts.
Level 3 – Know 12 times table and division facts.

Shark Targets

Level 1 – Know square numbers up to 12x12.
Level 2 – Know prime numbers up to 100.
Level 3 – Add and subtract 1d.p. decimals mentally.

Bumper Blue Whale Target



To know all times tables and division facts out of order.