



Mathematics
Mastery

A week's worth
of sample lesson
resources from
our primary
programme

Sample Resource Pack

Year 3 • Unit 2 • Week 1
Place value



Ark**Curriculum+**



The Mathematics Mastery Primary programme

Mathematics Mastery is already used in hundreds of primary schools across the UK to improve maths skills and teaching.

The programme includes everything that you'll need to deliver a mastery curriculum in the maths classroom.

Now available in three flexible tiers, priced from **just £1,350 per key stage***, Mathematics Mastery includes:

- **a well-sequenced and interlinked Reception, KS1 and KS2 mathematics curriculum** – ensuring pupils develop fluency and a deep understanding of mathematical concepts
- **integrated training and professional development** – helping to ensure all staff (including non-specialists) develop confidence in their maths mastery teaching
- **a full suite of classroom planning, delivery, assessment and intervention resources** – available on MyMastery in bite-sized units, for easy implementation.

* Additional savings available for small schools.



Proven impact

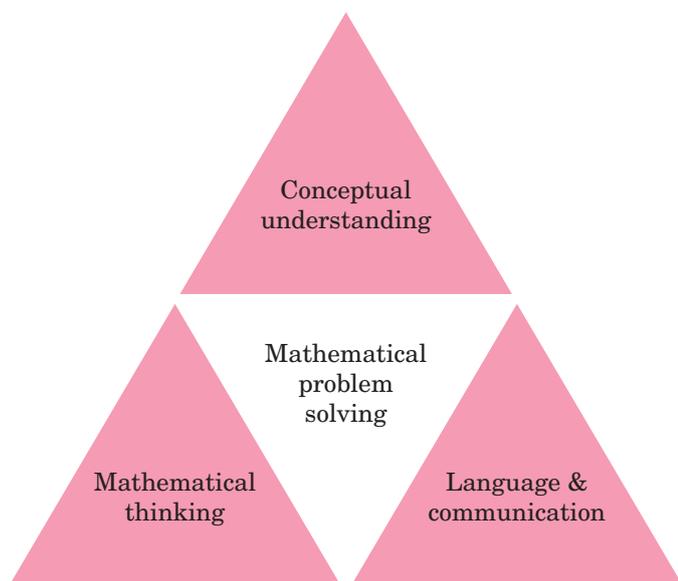
The Mathematics Mastery programme has been shown by EEF (the Education Endowment Foundation) to give pupils on average **one months' additional progress** after one year.

Teachers in our partner schools repeatedly tell us what a difference our programme is making.

Our approach

The Mathematics Mastery approach is driven by teacher consultation and the latest cognitive and educational research.

It is underpinned by the dimensions of depth – which together enable pupils to develop deep understanding of the subject.



Find out more about the dimensions of depth [here](#).

‘Since launching the programme, maths is now a key strength in our school. Visitors are blown away when they see the enthusiasm and engagement of pupils.’

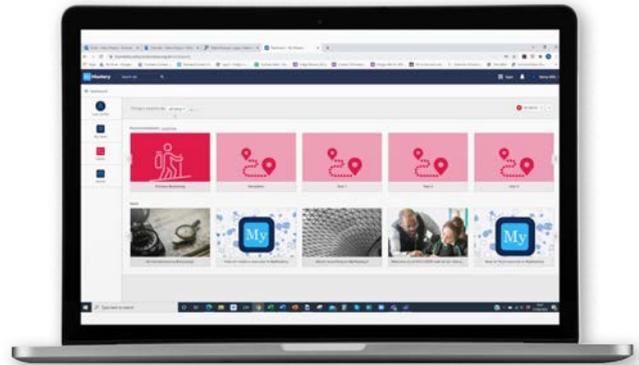
Michelle Thomas
Executive Headteacher
The New Wave Foundation





MyMastery

Our new MyMastery learning platform is at the heart of the programme – offering easy ‘anytime, anywhere’ access to the full suite of Mathematics Mastery content.



The resources on MyMastery are split into easily accessible chunks of learning – these are called **staging posts**.

Each staging post covers approximately 2 weeks of learning, with all the resources and comprehensive professional development needed to support the teaching of that stage and the units within it.

Your sampler includes a taster of the programme content for one week, including:

Curriculum map

An overview of the units of work and how they combine to build knowledge and understanding.

Year 3 Curriculum Map											
Autumn	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11
	Number sense and exploring calculation strategies			Place value		Graphs	Addition and subtraction			Length and perimeter	
Spring	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11
	Multiplication and division		Deriving multiplication and division facts			Time		Fractions			
Summer	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11
	Angles and shape			Measures			Securing multiplication and division		Exploring calculation strategies and place value		

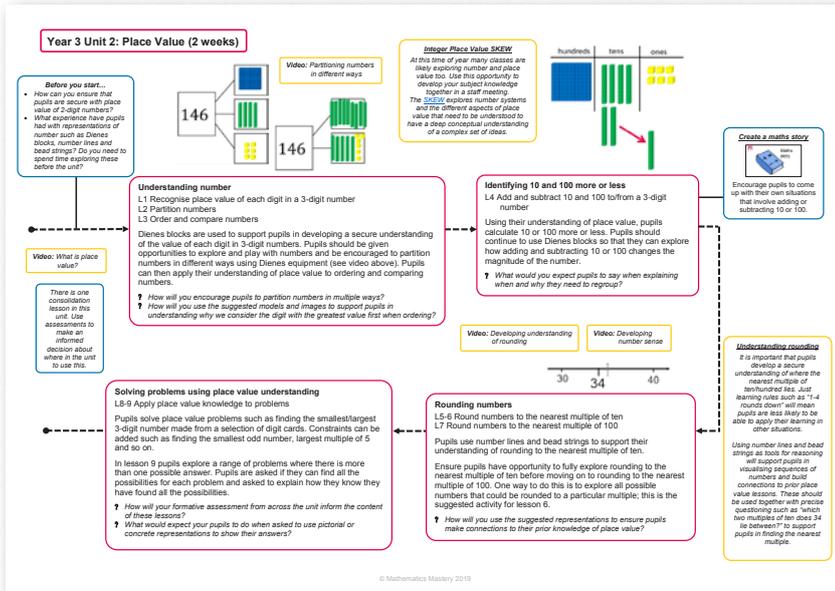
The Dimensions of Depth - Conceptual Understanding, Language and Communication and Mathematical Thinking - underpin all aspects of the curriculum: problem solving is at the heart and is embedded in all units.

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Unit narrative

An overview of the learning journey for each unit, with lessons grouped to give teachers flexibility on how much time to spend on each area.



Key representations

A helpful summary of the most important mathematical representations for each year group.

Year 3 Key Representations

Find out more... Watch the Unit tutorial before planning each unit and read the Unit Narrative. Read the planning guides for suggestions of representations. Make use of PD videos on unit pages and Progression in Calculations page. Explore the guidance for Year 3 representations.

Dienes equipment

An important resource for demonstrating the relative size of place value columns. Supports the process of regrouping – one ten is equal to ten ones, one hundred is equal to ten tens and so on. Can also be used to represent addition and subtraction 2- and 3-digit integers.

One ten is regrouped for ten ones. Ten ones is regrouped for one ten.

234 is two hundreds, three tens and four ones. I can represent subtracting 20 by removing two ten sticks.

Number lines

Number lines can be used to represent and compare numbers and can be used alongside a bead string. They demonstrate the continuous nature of the number system. When calculating, number lines may act as a joining of the steps of a mental calculation and may begin 'empty' i.e. not have numbers written. Pupils will have experienced this most through adding tens then ones as shown. The use of number lines is extended during Year 3.

Number bond knowledge

Pupils should be increasingly fluent in number bond recall for all numbers to 20. Make use of transitions and Maths Meetings to develop this.

Deriving facts

Pupils use known facts such as number bonds and understanding of place value and magnitude to derive further facts.

If I know $12 + 5 = 17$ then $22 + 5 = 27$.
If I know $12 + 5 = 17$ then $17 - 12 = 5$.
If I know $17 - 12 = 5$ then $27 - 12 = 22$.

Bead strings

Bead strings help support the ordinality of number. They are represented e.g. beads have the value 100-200 for representation when rounding.

Place value charts

Place value charts have been used to represent two-digit numbers and can be used alongside concrete, pictorial and abstract representations of number to secure understanding of the positional aspect of the number system. Pupils have made use of place value charts when adding two 2-digit numbers and that use is extended in Year 3.

Part-whole language and representations

A part-whole model is used to represent the relationship between numbers in all four operations. The model is made of a whole and two or more parts.

The whole is ten. One part is six and one part is four. Six plus four is equal to ten.

By moving the manipulatives the model represents subtraction.

The whole is ten. I subtract one part of six. The missing part is four. Ten subtract six is equal to four.

Multiplication, division and fractions of quantities can be represented using multiple equal parts.

There are three equal parts with a value of four. The whole is 12. Three multiplied by four is equal to 12. 12 divided into three equal parts is equal to four. One third of 12 is four.

Bar models

Pictorial bar models and concrete Cuisinart as bar models are used throughout the year and represent part-whole relationships and knowns and unknowns when problems. See PD videos for further exemplification.

I know the whole is 346, and one of the parts is 112. I do not know the value of the missing part. I can subtract 112 from 346.

The value of each part is 7 and there are 4 equal parts. The unknown is $7 \times 4 = 28$.

The 'make 10' strategy

Pupils apply number bonds to 10 to calculate how many more/less to the next multiple of ten. They partition the part into two parts to calculate mentally. Using concrete or pictorial representations can scaffold thinking.

$36 + 27 = 7$ I can partition 27 into 4 and 23. $36 + 4$ is equal to 40. $40 + 23$ is equal to 63.

Round and adjust

Pupils apply understanding of ordinality of number, recognising when a part or whole is close to a multiple of 10 or 20. They round before calculating, then adjust their answer accordingly. Concrete or pictorial models are used to represent this.

$35 - 19 = 16$

Representing fractions

A range of concrete and pictorial representations are used for fractions including fractions of a whole, as part of a set of objects and as part of a quantity such as a length or volume. Pupils should be familiar with a range of representations.

One of four equal parts. One quarter of a metre is 25 cm.

Arrays

Concrete and pictorial arrays demonstrate the commutativity of multiplication and inverse relationship of multiplication and division. Pupils should be familiar with considering rows and columns. Part-whole language may be used alongside.

There are four part/groups each with a value of three. The whole is 12. Four multiplied by three is equal to 12.

The whole is 12. There are three part/groups each with a value of 4. 12 divided by three is equal to four. One third of 12 is equal to four.





Planning guidance

Concise planning guides outline the core six-part structure of each lesson, ensuring our key learning principles are explored and practised.

Mathematics Mastery Year 3 Unit 2: Place value

Lesson 1: Reading and writing 3-digit numbers

Key Learning: To identify and represent 3-digit numbers

Lesson Overview: Pupils identify 3-digit numbers and understand what each digit represents.

Resources: Dienes blocks, digit cards, Place value charts, Task Sheet

Transitions: Counting on and back in 10s and 100s from 0 to 1000

Do Now: Exploring number information

Show the Big Picture (Blackpool) and explain to the pupils that the first week of this unit is about the place value of 3-digit numbers. Ask them to think of 3-digit numbers that could relate to the Big Picture, e.g. How many people visit the park? What is the score on the date game? How high are the rocks?

New Learning: Identifying what is represented by each digit in a 3-digit number

Display the number 245. Point to the 2 and ask pupils:

- What does this digit represent? (two lots of one hundred)

Repeat with the digits 4 and 5. Represent the number with Dienes blocks on the place value chart to show how the value of each column are different.

Remind pupils that our number system uses place value, which means that the position of a digit tells us its value, allowing us to make any number from just ten digits.

Why do we write 245 instead of 200405? Zeroes are only needed as place holders if there are no units in one or more of the columns to the right of the first digit.

Swap the digits round so that you make 425 and rearrange the same Dienes blocks. Ask pupils how to represent the number correctly. Show the cartoonoid from the Big Picture.

How many hundreds? How many tens? How many ones?

Make the number with Dienes blocks and ask pupils to say the value of each digit.

How do we say this number and how is it written in numerals?

Task Task: Saying what each digit in a number represents

Pupils choose and represent 3-digit numbers using Dienes blocks on a place value chart. They state what each digit represents and its value.

Pupil A chooses a number and reads it out. Pupil B then take it in turns to represent each part of the number on a place value chart using Dienes, explaining the value of each digit. They swap roles and repeat for other 3-digit numbers.

Develop Learning: Writing numbers in words

Display the number and discuss the value of each digit. Emphasise the value in the tens place and then explore writing the number in words.

How would you write 450? Why do you need the zero?

Write 450 on the board and say, "4 hundreds, 5 tens and 0 ones: four hundred and fifty."

Model writing it out in words, creating a word bank for pupils to refer to during the main task. Repeat with different numbers, some with and some without a 0 in the number.

Independent Task: Representing 3-digit numbers

Pupils complete the missing information for each of the four numbers. Each number should be represented as Dienes, written as digits in the place value chart, written as words and pupils should make use of the sentence structure provided. You may wish to complete a similar example to model.

Possible Adaptations:

- Pupils complete the activity practically, verbally saying each word and discussing the place value.
- Pupils generate their own 3-digit numbers and represent in different ways.

Plenary: Explaining and correcting errors in the representation of 3-digit numbers

Display a selection of numbers in digits and in words on the board – with errors. Pupils explain and justify the errors using their knowledge of the place value of hundreds, tens and ones.

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Lesson 1: Reading and writing 3-digit numbers

Mathematics Mastery

Lesson slides

PowerPoint slides are provided for each lesson – fully editable to meet your pupils' needs.

Task sheets

These support the independent task for each lesson and come in an editable word format, allowing you to make tweaks for your unique setting.

Key Learning: To identify and represent 3-digit numbers.

Fill in the missing information.

Hundreds	Tens	Ones

The digit represents three tens.

The digit **2** has a value of

The number is

Hundreds	Tens	Ones

The digit **7** represents

The digit represents four tens.

The number is

M Mathematics Mastery Y3 U2 L1 Task Copyright © Mathematics Mastery 2020





Adapting and differentiating

In order to successfully engage with the Mathematics Mastery planning resources and to provide appropriate support and challenge for all of your pupils, it is essential that you adapt the learning within a unit to suit their needs. We believe that differentiation should not be achieved by accelerating pupils through content, but that learning should be carefully planned with our three Dimensions of Depth in mind.

Scaffolds and constraints

By using scaffolds and constraints to provide support and challenge, all pupils can work with the same content and access deep mathematical thinking and reasoning. To support teachers with developing the skills of using scaffolds and constraints we have selected one task from each unit and provided some possible adaptations that could be used. These do not all need to be used and are instead useful to guide thinking about how the task has been altered, the impact of this on the task and who might benefit from this so that these can be applied when planning the use of other tasks. The process of adding and removing scaffolding to differentiate tasks, with practice, can become a time-efficient and powerful means of supporting the majority of pupils. Suggestions for adding scaffolding to a task:

- Partially completing examples or providing a scaffolded frame for pupils to record e.g. a partially completed table or a frame for completing calculations
- Completing all the examples to focus more on multiple representations or developing use of language to explain why they are correct
- Adding representations that support conceptual understanding

Constraints are conditions that can be applied to a task to change its nature. They can both increase and decrease the difficulty level of a task, as well as changing the way pupils engage with tasks, often increasing the creativity needed to solve a problem. General strategies for adding constraints:

- Specifying a number range
- Setting a condition for one or more number/element
- Specifying output criteria
- Specifying details of the strategy required

Ideas for Depth

Our 'Ideas for Depth' are a tools we have developed to help teachers challenge pupils to develop mathematical thinking and reasoning within a concept. Each of the ten ideas are represented by a picture or symbol so they can be easily identified by pupils without the need for written instruction. At the end of this document are suggestions of relevant tasks across the unit using these prompts.

Task Banks

Other resources for further ideas around differentiating and adapting are the Task Banks which are available in Years 3 to 5. These are a selection of activities based around the central themes of the unit which incorporate the ideas for Depth.



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Adaptations

These include examples and suggestions of how the learning across the unit can be adapted according to the different needs in your classroom

Big picture

Visuals relating to each unit support and stimulate mathematical discussions.

Exploring number information



Do Now



Maths Meetings in Year 3

amended for 2020-21 in response to school closures

Maths Meetings are a vital part of the Mathematics Mastery programme. Their purpose is to consolidate key areas of mathematics and develop fluency in recall of key knowledge. To be most effective, it is recommended that Maths Meetings occur daily for 10–15 minutes. A Maths Meeting should cover several curricular areas, broken down into short segments; each segment should take approximately 2–3 minutes.

Maths Meetings should:

- Provide opportunities to develop number sense by encouraging efficient mental calculations and ensuring that pupils discuss and compare their different strategies (e.g. using known number facts and place value, round and adjust, complementary addition to subtract, near doubles to add, doubling, halving, commutativity, inverse etc.);
- Give students enjoyable repeated practice of basic skills and concepts (fluency, consolidation, mastery of what has been taught);
- Be an exciting whole-class ritual around the Meeting Board or Interactive Whiteboard;
- Establish a routine for mathematical thinking in the day, building classroom culture, and making connections with mathematics in everyday life.

Maths Meetings expectations:

- Everyone in the class must be ready to respond
- Everyone in the class must look at and listen to the teacher (or pupil, if a pupil is leading)
- Teacher only accepts appropriate responses, including technical vocabulary and full sentences when appropriate.

Teachers should plan their own Maths Meetings depending on the needs of pupils, focusing on key knowledge to consolidate. Teachers should prioritise key learning areas for their class and also incorporate current learning in the Maths Meetings where necessary. Assessments will also inform the content of the Maths Meetings.

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Maths meetings

Daily maths meetings are a vital part of the Mathematics Mastery programme, consolidating key areas of mathematics and developing fluency in recall of key knowledge.





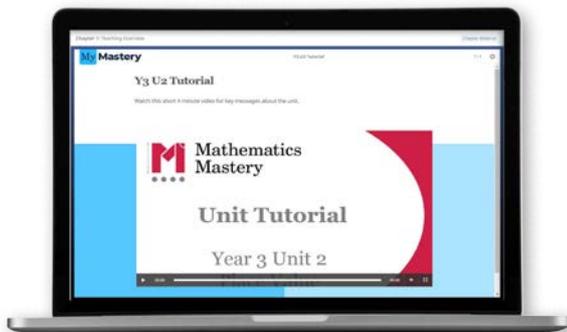
Professional development

Professional development and training is woven throughout our programme.

Each of our tiers includes access to a wide range of professional development modules to support your teachers as they work through the Mathematics Mastery curriculum.

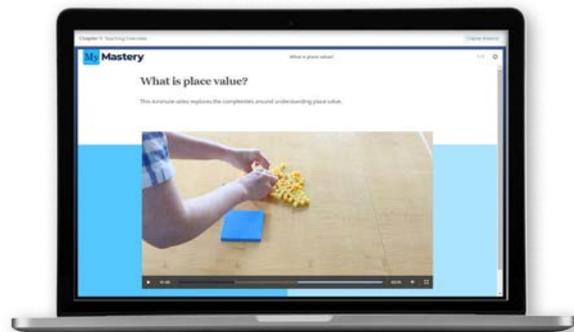
Available on demand, teachers can access the training they need when it suits them best – offering flexibility and support at the right points through the year.

So to accompany this unit, on MyMastery you will also find:



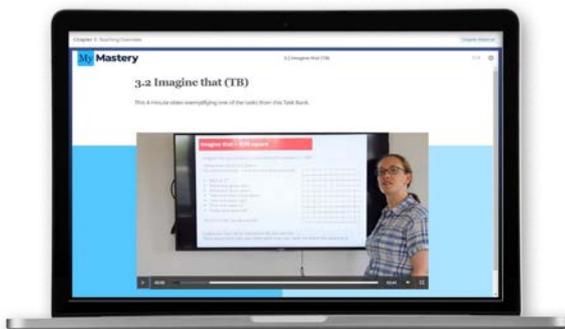
Unit tutorials

These outline the key content for the unit.



Knowledge recaps

Offering quick refreshers to support subject knowledge.



Modelling videos

Exemplifying the tasks from the Task Bank for this unit.

All video content can be accessed on demand, at a time that suits your teachers.

Great to help cover teachers get up to speed before they start teaching.



This is only a small selection of the MyMastery content

Other resources include:

- **Induction training** for teachers who are new to the programme
- **Intervention materials** that support catch-up for pupils who demonstrate gaps in learning
- **Formative assessment tools** including guidance on assessing understanding of key constructs and more formal half-termly assessments
- **Subject knowledge enhancement workshops (SKEWs)** that develop teacher subject knowledge and understanding of our dimensions of depth

plus much more.



Flexible Mathematics Mastery packages

We offer the Mathematics Mastery programme in three partnership 'tiers' - so there are options to suit each school's different requirements and budget.

Our **Mastery** tier includes access to all of the Mathematics Mastery curriculum, resources and professional development content on MyMastery.

Our subject **Leadership** and more bespoke **Tailored** tiers offer additional, more personalised, support with live induction training, a subject mastery leadership course, dedicated School Development Lead for your school and access to our annual conference.

Visit www.arkcurriculumplus.org.uk/join-us to find out more.



Contact us to find out more about the programme

Our friendly partnerships team will be happy to talk you through the Mathematics Mastery programme and help you decide on the right approach and package for your school.

 partnerships@arkcurriculumplus.org.uk

 **020 3116 6363**

You can also book a call online at
<https://calendly.com/ark-curriculum-plus>

Mathematics Mastery is a curriculum programme from



ArkCurriculum+

The Yellow Building, 1 Nicholas Road
London W11 4AN

