Teaching for Mastery

Questions, tasks and activities to support assessment

Year 1

Mike Askew, Sarah Bishop, Clare Christie,
Sarah Eaton, Pete Griffin and Debbie Morgan

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Contents

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About the authors

Mike Askew is Professor of Mathematics Education, the University of the Witwatersrand, Johannesburg. Mike has directed many research projects, including the influential 'Effective Teachers of Numeracy in Primary Schools', and was deputy director of the five-year Leverhulme Numeracy Research Programme. Mike's research has been widely published both in the academic arena and as books and resources for teachers.

Debbie Morgan holds a national role as Director of Primary Mathematics at the National Centre for Excellence in the Teaching of Mathematics. Debbie has experience as a primary teacher, Headteacher, Mathematics Advisor, Senior Lecturer in Mathematics Education and Director of a Mathematics Specialist Teacher Programme. Debbie currently provides advice and expertise to the DfE to support the implementation of the Primary Mathematics Curriculum.

Pete Griffin works at a national level as Assistant Director for the National Centre for Excellence in the Teaching of Mathematics. Pete has experience as a secondary teacher, Advisory Teacher, and lecturer in Mathematics Education at the Open University. Pete has worked with QCA and the National Strategies and has written and developed a wide range of teacher professional development materials.

Sarah Bishop is an Assistant Headteacher and Year 2 teacher with experience as a Primary Strategy Maths Consultant. She is currently a Mathematics SLE with Affinity Teaching School Alliance and has delivered CPD and school-to-school support as part of this role. Sarah has been involved in making the NCETM videos to support the National Curriculum and is part of the DfE Expert Group for Mathematics. More recently, Sarah has taken on the role of Primary Lead for the East Midlands South Maths Hub.

Sarah Eaton is an Assistant Headteacher and Year 6 teacher. Sarah has been a Mathematics SLE with the Affinity Teaching School Alliance for four years, enabling her to lead CPD across the alliance. Sarah has been part of a Mathematics research project in Shanghai and Finland, and has been part of the KS2 teacher panel for the 2016 Maths tests.

Clare Christie is a primary teacher and Maths Leader. Clare is also a Mathematics SLE, supporting schools with Maths teaching and learning. Clare is primary lead of the Boolean Maths Hub and a member of the ACME Outer Circle.

Introduction

In line with the curricula of many high performing jurisdictions, the National curriculum emphasises the importance of all pupils mastering the content taught each year and discourages the acceleration of pupils into content from subsequent years.

The current National curriculum document[1] says:

'The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.' (National curriculum page 3)

Progress in mathematics learning each year should be assessed according to the extent to which pupils are gaining a deep understanding of the content taught for that year, resulting in sustainable knowledge and skills. Key measures of this are the abilities to reason mathematically and to solve increasingly complex problems, doing so with fluency, as described in the aims of the National curriculum:

'The national curriculum for mathematics aims to ensure that all pupils:

- *become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately*
- ***reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language*
- *can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.'* (National curriculum page 3)

Assessment arrangements must complement the curriculum and so need to mirror these principles and offer a structure for assessing pupils' progress in developing mastery of the content laid out for each year. Schools, however, are only '*required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study*' (National curriculum page 4). Schools should identify when they will teach the programmes of study and set out their school curriculum for mathematics on a year-by-year basis. The materials in this document reflect the arrangement of content as laid out in the National curriculum document (September 2013).

These *Teaching for Mastery: Questions, tasks and activities to support assessment* outline the key mathematical skills and concepts within each yearly programme and give examples of questions, tasks and practical classroom activities which support teaching, learning and assessment. The activities offered are not intended to address each and every programme of study statement in the National curriculum. Rather, they aim to highlight the key themes and big ideas for each year.

1. Mathematics programmes of study: key stages 1 and 2, National curriculum in England, September 2013, p3

Ongoing assessment as an integral part of teaching

The questions, tasks, and activities that are offered in the materials are intended to be a useful vehicle for assessing whether pupils have mastered the mathematics taught.

However, the best forms of ongoing, formative assessment arise from well-structured classroom activities involving interaction and dialogue (between teacher and pupils, and between pupils themselves). The materials are not intended to be used as a set of written test questions which the pupils answer in silence. They are offered to indicate valuable learning activities to be used as an integral part of teaching, providing rich and meaningful assessment information concerning what pupils know, understand and can do.

The tasks and activities need not necessarily be offered to pupils in written form. They may be presented orally, using equipment and/or as part of a group activity. The encouragement of discussion, debate and the sharing of ideas and strategies will often add to both the quality of the assessment information gained and the richness of the teaching and learning situation.

What do we mean by mastery?

The essential idea behind mastery is that ***all children***[2] 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 re-taught;
- there is no need for separate catch-up programmes due to some children falling behind;
- children who, under other teaching approaches, can often fall a long way behind, are better able to keep up with their peers, so that gaps in attainment are narrowed whilst the attainment of all is raised.

There are generally four ways in which the term mastery is being used in the current debate about raising standards in mathematics:

1. **A mastery approach**: a set of principles and beliefs. This includes a belief that all pupils are capable of understanding and doing mathematics, given sufficient time. Pupils are neither 'born with the maths gene' nor 'just no good at maths'. With good teaching, appropriate resources, effort and a 'can do' attitude all children can achieve in and enjoy mathematics.
2. **A mastery curriculum**: one set of mathematical concepts and big ideas for all. All pupils need access to these concepts and ideas and to the rich connections between them. There is no such thing as 'special needs mathematics' or 'gifted and talented mathematics'. Mathematics is mathematics and the key ideas and building blocks are important for everyone.
3. **Teaching for mastery**: a set of pedagogic practices that keep the class working together on the same topic, whilst at the same time addressing the need for all pupils to master the curriculum and for some to gain greater depth of proficiency and understanding. Challenge is provided by going deeper rather than accelerating into new

2. Schools in England are required to adhere to the 0-25 years SEND Code of Practice 2015 when considering the provision for children with special educational needs and/or disability. Some of these pupils may have particular medical conditions that prevent them from reaching national expectations and will typically have a statement of Special Educational Needs/ Education Health Care Plan. Wherever possible children with special educational needs and/or a disability should work on the same curriculum content as their peers; however, it is recognised that a few children may need to work on earlier curriculum content than that designated for their age. The principle, however, of developing deep and sustainable learning of the content they are working on should be applied.

mathematical content. Teaching is focused, rigorous and thorough, to ensure that learning is sufficiently embedded and sustainable over time. Long term gaps in learning are prevented through speedy teacher intervention. More time is spent on teaching topics to allow for the development of depth and sufficient practice to embed learning. Carefully crafted lesson design provides a scaffolded, conceptual journey through the mathematics, engaging pupils in reasoning and the development of mathematical thinking.

4. **Achieving mastery of particular topics and areas of mathematics**. Mastery is not just being able to memorise key facts and procedures and answer test questions accurately and quickly. It involves knowing 'why' as well as knowing 'that' and knowing 'how'. It means being able to use one's knowledge appropriately, flexibly and creatively and to apply it in new and unfamiliar situations.[3] The materials provided seek to exemplify the types of skills, knowledge and understanding necessary for pupils to make good and sustainable progress in mastering the primary mathematics curriculum.

Mastery and the learning journey

Mastery of mathematics is not a fixed state but a continuum. At each stage of learning, pupils should acquire and demonstrate sufficient grasp of the mathematics relevant to their year group, so that their learning is sustainable over time and can be built upon in subsequent years. This requires development of depth through looking at concepts in detail using a variety of representations and contexts and committing key facts, such as number bonds and times tables, to memory.

Mastery of facts, procedures and concepts needs time: time to explore the concept in detail and time to allow for sufficient practice to develop fluency.

Practice is most effective when it is intelligent practice,[4] i.e. where *the teacher is advised to avoid mechanical repetition and to create an appropriate path for practising the thinking process with increasing creativity.* (Gu 2004[5]) The examples provided in the materials seek to exemplify this type of practice.

Mastery and mastery with greater depth

Integral to mastery of the curriculum is the development of deep rather than superficial conceptual understanding. '*The research for the review of the National Curriculum showed that it should focus on "fewer things in greater depth", in secure learning which persists, rather than relentless, over-rapid progression.*'[6] It is inevitable that some pupils will grasp concepts more rapidly than others and will need to be stimulated and challenged to ensure continued progression. However, research indicates that these pupils benefit more from enrichment and deepening of content, rather than acceleration into new content. Acceleration is likely to promote superficial understanding, rather than the true depth and rigour of knowledge that is a foundation for higher mathematics.[7]

Within the materials the terms *mastery* and *mastery with greater depth* are used to acknowledge that all pupils require depth in their learning, but some pupils will go deeper still in their learning and understanding.

Mastery of the curriculum requires that all pupils:

- use mathematical concepts, facts and procedures appropriately, flexibly and fluently;
- recall key number facts with speed and accuracy and use them to calculate and work out unknown facts;
- have sufficient depth of knowledge and understanding to reason and explain mathematical concepts and procedures and use them to solve a variety of problems.

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3. Helen Drury asserts in 'Mastering Mathematics' (Oxford University Press, 2014, page 9) that: 'A mathematical concept or skill has been mastered when, through exploration, clarification, practice and application over time, a person can represent it in multiple ways, has the mathematical language to be able to communicate related ideas, and can think mathematically with the concept so that they can independently apply it to a totally new problem in an unfamiliar situation.'
4. Intelligent practice is a term used to describe practice exercises that integrate the development of fluency with the deepening of conceptual understanding. Attention is drawn to the mathematical structures and relationships to assist in the deepening of conceptual understanding, whilst at the same time developing fluency through practice.
5. Gu, L., Huang, R., & Marton, F. (2004). Teaching with variation: A Chinese way of promoting effective mathematics learning. In Lianghuo, F., Ngai-Ying, W., Jinfa, C., & Shiqi, L. (Eds.) How Chinese learn mathematics: Perspectives from insiders. Singapore: World Scientific Publishing Co. Pte. Ltd. page 315.
6. Living in a Levels-Free World, Tim Oates, published by the Department for Education https://www.tes.co.uk/teaching-resource/living-in-a-levels-free-world-by-tim-oates-6445426
7. This argument was advanced by the Advisory Committee for Mathematics Education on page 1 of its report: Raising the bar: developing able young mathematicians, December 2012.

A useful checklist for what to look out for when assessing a pupil's understanding might be:

A pupil really understands a mathematical concept, idea or technique if he or she can:

- describe it in his or her own words;
- represent it in a variety of ways (e.g. using concrete materials, pictures and symbols – the CPA approach)[8]
- explain it to someone else;
- make up his or her own examples (and non-examples) of it;
- see connections between it and other facts or ideas;
- recognise it in new situations and contexts;
- make use of it in various ways, including in new situations.[9]

Developing mastery with greater depth is characterised by pupils' ability to:

- solve problems of greater complexity (i.e. where the approach is not immediately obvious), demonstrating creativity and imagination;
- independently explore and investigate mathematical contexts and structures, communicate results clearly and systematically explain and generalise the mathematics.

The materials seek to exemplify what these two categories of *mastery* and *mastery with greater depth* might look like in terms of the type of tasks and activities pupils are able to tackle successfully. It should, however, be noted that the two categories are not intended to exemplify differentiation of activities/tasks. Teaching for mastery requires that all pupils are taught together and all access the same content as exemplified in the first column of questions, tasks and activities. The questions, tasks and activities exemplified in the second column might be used as deepening tasks for pupils who grasp concepts rapidly, but can also be used with the whole class where appropriate, giving all children the opportunity to think and reason more deeply.

National curriculum assessments

National assessment at the end of Key Stages 1 and 2 aims to assess pupils' mastery of both the content of the curriculum and the depth of their understanding and application of mathematics. This is exemplified through the content and cognitive domains of the test frameworks.[10] The content domain exemplifies the minimum content pupils are required to evidence in order to show mastery of the curriculum. The cognitive domain aims to measure the complexity of application and depth of pupils' understanding. The questions, tasks and activities provided in these materials seek to reflect this requirement to master content in terms of both skills and depth of understanding.

Final remarks

These resources are intended to assist teachers in teaching and assessing for mastery of the curriculum. In particular they seek to exemplify what depth looks like in terms of the types of mathematical tasks pupils are able to successfully complete and how some pupils can achieve even greater depth. A key aim is to encourage teachers to keep the class working together, spend more time on teaching topics and provide opportunities for all pupils to develop the depth and rigour they need to make secure and sustained progress over time.

8. The Concrete-Pictorial-Abstract (CPA) approach, based on Bruner's conception of the enactive, iconic and symbolic modes of representation, is a well-known instructional heuristic advocated by the Singapore Ministry of Education since the early 1980s. See https://www.ncetm.org.uk/resources/44565 (free registration required) for an introduction to this approach.

9. Adapted from a list in 'How Children Fail', John Holt, 1964.

10. 2016 Key stage 1 and 2 Mathematics test frameworks, Standards and Assessments Agency www.gov.uk/government/collections/national-curriculum-assessments-test-frameworks

The structure of the materials

The materials consist of PDF documents for each year group from Y1 to Y6. Each document adopts the same framework as outlined below.

The examples provided in the materials are only indicative and are designed to provide an insight into:

- How mastery of the curriculum might be developed and assessed;
- How to teach the same curriculum content to the whole class, challenging the rapid graspers by supporting them to go deeper rather than accelerating some pupils into new content.

The assessment activities presented in both columns are suitable for use with the whole class. Pupils who successfully answer the questions in the left-hand column (Mastery) show evidence of sufficient depth of knowledge and understanding. This indicates that learning is likely to be sustainable over time. Pupils who are also successful with answering questions in the right-hand column (Mastery with Greater Depth) show evidence of greater depth of understanding and progress in learning.

This section lists a selection of key National Curriculum programme of study statements. The development and assessment of these is supported through the questions, tasks and activities set out in the two columns below.

This section lists a selection of key ideas relevant to the selected programme of study statements.

Number and Place Value

Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

- count to and across 100, forwards and backwards, beginning with 0 or one, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less

The Big Ideas

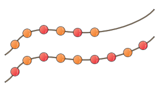
The position a digit is placed in a number determines its value.

The language used to name numbers does not always expose the place value, for example the word 'twelve' does not make it transparent that the value of this number is ten and two. It is important that children develop secure understanding of the value of each digit.

Place value is based on unitising: treating a group of things as one 'unit'. In mathematics, units can be any size, for example units of 1, 2, 5 and 10 are used in money. In place value units of 1, 10 and 100 are used.

Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

Mastery	Mastery with Greater Depth
Compare amounts. What's the same? What's different? *Children compare the bead strings and notice:* *One has 9 beads and the other has 6 beads.* *9 is 3 more than 6.* *6 is 3 less than 9.*  *Pupils should be able to successfully respond to questions such as:* - *Count forwards from 36, etc.* - *Point to the third object in the line.* - *Show me 8 cubes.* *Pupils should demonstrate one to one correspondence, cardinality and conservation of number.*	I am going to count on from 20. Will I say the number 19? Convince me. I am going to count on in twos from 3. Will I say an even number? Convince me. I am going to count backwards from 20. How many steps will it take to reach 0? Convince me. I am going to count backwards in twos from 20. How many steps will it take to reach 0? Convince me.

This section reminds teachers to check pupils' understanding by asking questions such as 'Why', 'What happens if …', and checking that pupils can use the procedures or skills to solve a variety of problems.

This section contains examples of assessment questions, tasks and teaching activities that might support a teacher in assessing and evidencing progress of those pupils who have developed a sufficient grasp and depth of understanding so that learning is likely to be sustained over time.

This section contains examples of assessment questions, tasks and teaching activities that might support a teacher in assessing and evidencing progress of those pupils who have developed a stronger grasp and greater depth of understanding than that outlined in the first column.

Number and Place Value

Selected National Curriculum Programme of Study Statements

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- count to and across 100, forwards and backwards, beginning with 0 or one, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
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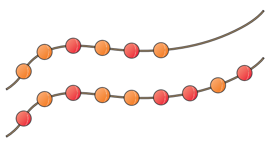
Mastery	Mastery with Greater Depth
Compare amounts. What's the same? What's different? *Children compare the bead strings and notice:*  *One has 9 beads and the other has 6 beads.* *9 is 3 more than 6.* *6 is 3 less than 9.* *Pupils should be able to successfully respond to questions such as:* - *Count forwards from 36, etc.* - *Point to the third object in the line.* - *Show me 8 cubes.* *Pupils should demonstrate one to one correspondence, cardinality and conservation of number.*	I am going to count on from 20. Will I say the number 19? Convince me. I am going to count on in twos from 3. Will I say an even number? Convince me. I am going to count backwards from 20. How many steps will it take to reach 0? Convince me. I am going to count backwards in twos from 20. How many steps will it take to reach 0? Convince me.

Mastery

Write the numbers in order of size.

15	16	5	71	50

What is one more than…?

What is one less than…?

Complete:

19		21	22		

Mastery with Greater Depth

2	3	4	5	6

Use two of the digit cards to make a number greater than 50.
Use two of the digit cards to make a number less than 30.
Use two of the digit cards to make an odd/even number.
Use two of the digit cards to make a number between 47 and 59.

What is the smallest 2-digit number you can make?
What is the largest 2-digit number you can make?

Explain your reasoning.

Mastery

Write 25 in the correct place on the number grid.

8	9	10	11	12	13
14	15	16	17		

Write the numbers missing from these sequences.

11		13	14	15

13
33
43

Mastery with Greater Depth

Which number could be the odd one out? Why?

40	71	65

Pupils suggest their own reasoned ideas, for example 71 might be the odd one out because it's not a multiple of 5.

Sam says 40 is the odd one out. What reasons did she give?

Pupils suggest their own reasoned ideas, for example 40 might be the odd one out because it's not an odd number.

What's the same? What's different?

45	54

If Sam places these 5 numbers in order, starting with the smallest number, which number will be in fourth position?

46 64 24 42 50

smallest				largest

www.mathshubs.org.uk
www.ncetm.org.uk
www.oxfordowl.co.uk

Mastery	Mastery with Greater Depth
Write the missing number in each box. 19 is **1** less than → ☐ 33 is **1** less than → ☐ 54 is **1** less than → ☐ 59 is **1** less than → ☐	Complete: ☐ is **1** less than → ☐ ☐ is **1** more than → ☐
Look at the grid. Choose a number and complete the second grid.	Gemma thought of a number. One more than her number was 18. What was her number? Gemma thought of a number. Ten more than her number was 67. What was her number? Gemma thought of a number. Ten less than her number was 71. What was her number?

		50	
Count in 1s	49	50	51
Count in 10s	40	50	60

		?	
Count in 1s			
Count in 10s			

<table>
<tr><th>Mastery</th><th>Mastery with Greater Depth</th></tr>
<tr><td>Complete:
<table>
<tr><td>5</td><td>10</td><td></td><td></td><td></td><td>30</td></tr>
</table>
<table>
<tr><td></td><td>4</td><td>6</td><td></td><td></td><td>12</td></tr>
</table>
<table>
<tr><td></td><td></td><td></td><td>40</td><td>50</td><td>60</td></tr>
</table>
</td><td>Alin says, ‘If I start at 5 and count in fives I will say the number 100.’
Is he correct?

Explain your reasoning.

Sita says, ‘If I start at 17 and count in twos I will say the number 28.’
Is she correct?

Explain your reasoning.</td></tr>
</table>

Addition and Subtraction

Selected National Curriculum Programme of Study Statements

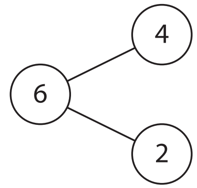
Pupils should be taught to:

- represent and use number bonds and related subtraction facts within 20
- add and subtract 1-digit and 2-digit numbers to 20, including 0

The Big Ideas

Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given 8 + 7, thinking of 7 as 2 + 5 and adding the 2 to 8 to make 10 and then the 5 to total 15.

Thinking of part whole relationships is helpful in linking addition and subtraction. For example, where the whole is 6, and 4 and 2 are parts. This means that 4 and 2 together form the whole, which is 6 and 6 subtract 4 leaves the 2 and 6 subtract 2 leaves the 4.

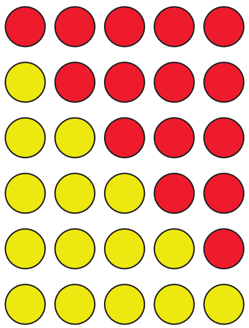


Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

Mastery

Use the pattern to complete the number sentences.



0 + 5 = 5
1 + □ = 5
2 + □ = 5
3 + □ = 5
4 + □ = 5
5 + □ = 5

Now do the same for rows of 6 counters, 7 counters, 8 counters, 9 counters and 10 counters.

Children should be able to recall all number bonds to and within 10. Exposing the structure of the mathematics supports this process. They should then apply this to number bonds to 20, so if 5+3 = 8, 15 +3 = 18

Mastery with Greater Depth

I'm thinking of a number. I've subtracted 5 and the answer is 7. What number was I thinking of? Explain how you know.

I'm thinking of a number. I've added 8 and the answer is 19. What number was I thinking of? Explain how you know.

I know that 7 and 3 is 10. How can I find 8 + 3? How could you work it out?

Show children a price list with items costing up to 20p.

I have 20p to spend. If I spend 20p exactly, which two items could I buy? And another two, and another two.

If I bought one of the items how much change would I have? And another one, and another one.

Mastery

Complete:

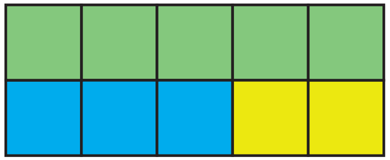
3 + □ = 10	10 – □ = 3	13 + □ = 20	20 – □ = 13
□ + 5 = 10	10 – 5 = □	15 + □ = 20	20 – □ = 15
□ + □ = 10	10 – □ = □	16 + □ = 20	20 – □ = 16

What do you notice?

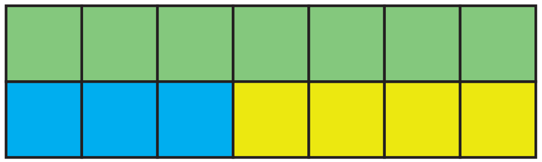
Children may 'know' number pairs totalling ten but are they able to use them to support other calculations? For example, when probed to say, 'If you know 3 + 7 = 10, what else do you know?' They should reply with answers, such as 13 + 7 = 20 or 4 + 7 = 11

Can you see these number sentences in the picture below?

3 + 2 = 5
2 + 3 = 5
5 – 3 = 2
5 – 2 = 3



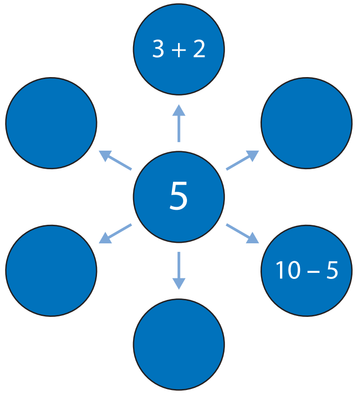
Now write the four number sentences for the picture below:



Mastery with Greater Depth

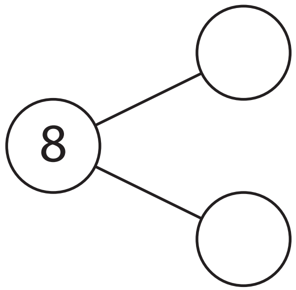
If you know one fact, what other facts do you know?

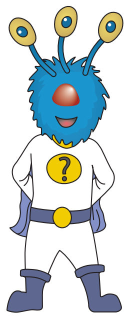
Complete:

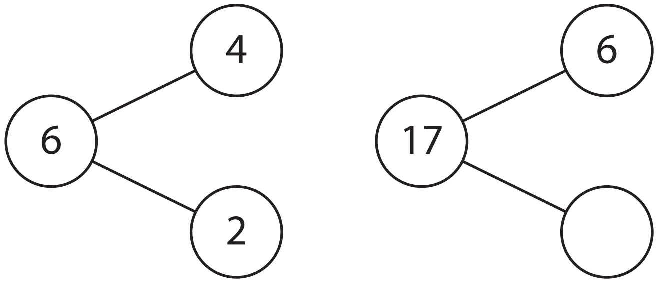
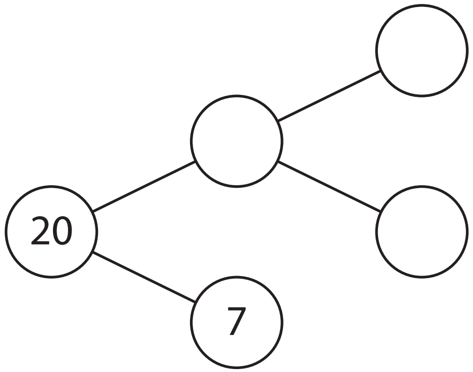
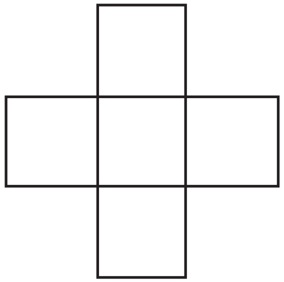


Draw a bar model for 7 + 2 = 9 and write four number sentences.

Complete and write the number sentences using this model.



Mastery	Mastery with Greater Depth
Use the first number sentence to complete the second number sentence. 4 + 3 = □ 7 + □ = 9 7 − □ = 4 9 − □ = 7 5 + 2 = □ □ + 3 = 9 □ − □ = 2 □ − □ = □	Write a pair of numbers in the boxes to add to 12. □ + □ = 12 And another pair, and another, and another. Can you find all possibilities? Convince me!
Captain Conjecture says, 'If you add 0 to a number, the number stays the same.' Do you agree? Explain your reasoning. 	Captain Conjecture says, 'If you add together six 0s the answer is 6.' Do you agree? Explain your reasoning. 
Complete: 10 + □ = 10 6 + □ = 6 20 – □ = 20 16 – □ = 16 What do you notice?	Complete: 3 + □ + 3 = 9 7 + □ + 1 = 10 6 + 3 + □ = 9 7 + 1 + □ = 11

Mastery	Mastery with Greater Depth
Complete: 	Complete:  Now create a similar diagram. Can you extend your diagram?
Fill in the missing numbers: $3 + 5 + \square = 10$ $1 + 5 + \square = 10$	Write the numbers 1 to 5 in the squares so that each row and column adds up to the same number, called the 'magic number'. What is the 'magic number'? 
Robert has 5 more cherries than John. John has 11 cherries. How many does Robert have? Write a number sentence you would use to solve the problem. $\square \quad \square \quad \square = \square$	Together Sam and Tom have 19 football stickers. Tom has 8 stickers. How many stickers does Sam have? Write a number sentence you could use to solve the problem.

Multiplication and Division

Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

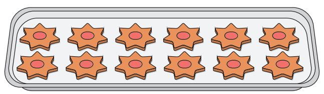
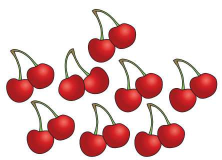
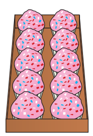
The Big Ideas

Counting in steps of equal sizes is based on the big idea of 'unitising'; treating a group of, say, five objects as one unit of five.

Working with arrays helps pupils to become aware of the commutative property of multiplication, that 2 × 5 is equivalent to 5 × 2.

Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

Mastery	Mastery with Greater Depth
Ask pupils to use concrete objects to answer questions such as: ■ What is double 4? ■ What is half of 6?	Captain Conjecture says, 'I can double any number, but I can only halve some numbers'. Do you agree? Explain your reasoning. 
Show pupils pictures or groups of objects like the examples below. Ask questions such as 'How many biscuits are there altogether?' *'How many cherries are there altogether?'* *Observe how pupils count the objects. Do they count in twos, fives etc. or do they count in ones?*   	If I start on 0 and count on in fives will I say the number 55? If I start on 4 and count on in twos will I say the number 17? If I start at 10 and count on in tens will I say 100?

Mastery	Mastery with Greater Depth
Sarah is filling party bags with sweets. She has 20 sweets altogether and decides to put 5 in every bag. How many bags can she fill?	How else could 20 sweets be put into bags so that every bag had the same number of sweets? How many bags would be packed each time?
Anna is counting in fives: 5, 10, ☐, 20, ☐, ☐, … Fill in the missing numbers. Anna says if she keeps on counting in fives she will say the number 54. Is she right or wrong? Can you explain?	If you counted back from 50 in tens, would you say 0? Can you explain?
I can see 10 wheels. How many bicycles?	Toy aeroplanes have 5 wheels. How many wheels would you need to make different numbers of aeroplanes?
Show 19p using only 2p, 5p and 10p coins. Find three different ways to do it. 	Using only 2p, 5p and 10p coins, can you show 20p? In how many different ways can you do this? Are you sure you have got them all? Explain how you know.
Ali buys 3 bags of apples. Each bag has 4 apples in it. How many apples does he buy?	Lollies cost 5p each. A pack of 3 lollies costs 13p. How much money do you save when you buy a pack of 3 lollies instead of 3 single lollies?

Fractions

Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

- recognise, find and name a half as one of two equal parts of an object, shape or quantity
- recognise, find and name a quarter as one of four equal parts of an object, shape or quantity

The Big Ideas

Fractions express a relationship between a whole and equal parts of the whole. Ensure children express this relationship when talking about fractions. For example, *'If the circle* (where the circle is divided into four equal parts with one part shaded) *is the whole, one part is one quarter of the whole circle.'*

Halving involves partitioning an object, shape or quantity into two equal parts.

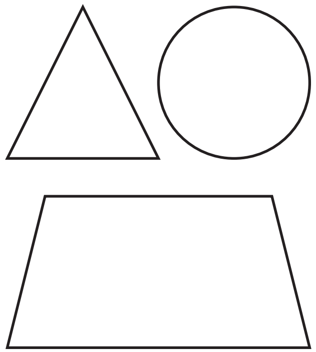
The two parts need to be equivalent in, for example, area, mass or quantity.

Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

Mastery

Colour half of each whole shape:

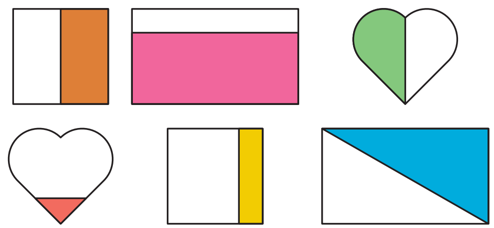


Check that pupils do not think that just dividing a shape into any two pieces is halving but understand that they need to be equal pieces.

Which of these show half of each whole shape?

Explain your reasoning.

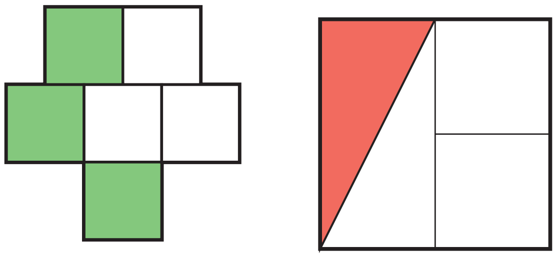
Children should talk about the two parts needing to be equal parts of the whole.

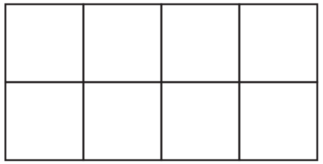
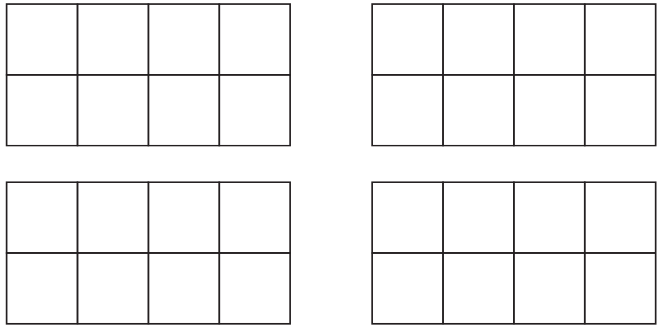
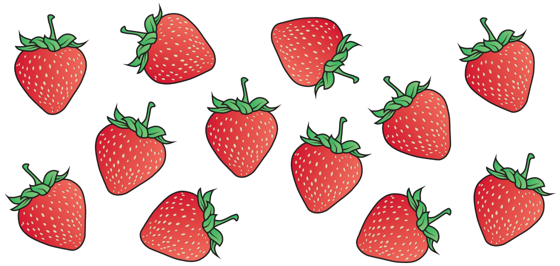
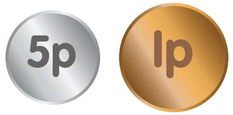


Mastery with Greater Depth

What fraction of the whole shape is shaded?

Explain your reasoning.



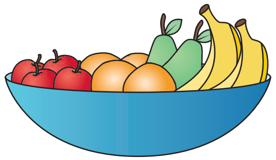
Mastery	Mastery with Greater Depth
Shade to show half of the whole shape. 	Shade each whole shape to show half in four different ways. 
Circle half of this group of strawberries. 	What is half of this amount? 
There are 12 children in a class. Sammy says half of the class is 7. Do you agree? Explain your reasoning.	Half the children at a party are girls. How many children could be at the party? Give four different answers. Explain your reasoning.

Mastery

Sam and Tom share the fruit equally. There are 4 apples, 4 oranges, 2 pears and 2 bananas.

How many of each fruit do they receive?

Complete the table below.



	Apples	Oranges	Bananas	Pears
Sam				
Tom				

Four children share a pizza equally. Draw a diagram to show how much pizza each child gets.

What fraction of the pizza does each child eat?

Four children share a bag of 12 marbles equally. Draw a diagram to show how many marbles each child gets.

What fraction of the bag of marbles does each child get?

Complete this halving wall.

20	
10	

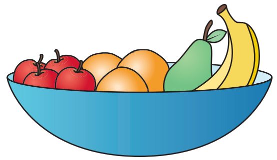
Choose any number and create your own halving wall.

Mastery with Greater Depth

Sam and Tom share the fruit equally. There are 4 apples, 3 oranges, 1 pear and 1 banana.

How many of each fruit do they receive?

Complete the table below.



	Apples	Oranges	Bananas	Pears
Sam				
Tom				

Four children share 2 pizzas equally. Draw a diagram to show how much pizza each child gets.

What fraction of the pizzas does each child eat?

Four children share two bags of 8 marbles equally. Draw a diagram to show how many marbles each child gets.

What fraction of one bag of marbles does each child get?

Complete this halving wall.

What is the relationship between the top row and one part of your final row?

Explain your reasoning.

20			
10			

Choose any number and create your own halving wall.

Measurement

Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

- compare, describe and solve practical problems for measurement and begin to record the following:
  - lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
  - mass/weight [for example, heavy/light, heavier than, lighter than]
  - capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
  - time [for example, quicker, slower, earlier, later]
- tell the time to the hour and half past the hour and draw the hands on a clock face to show these times

The Big Ideas

Measurement is about comparison, for example measuring to find out which rope is the longest.

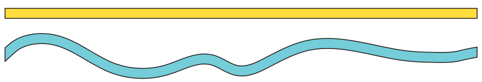
Measurement is about equivalence, for example how many cubes are equivalent to the length of the table or the mass of the teddy?

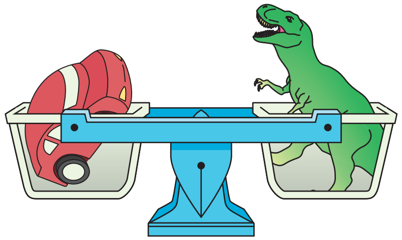
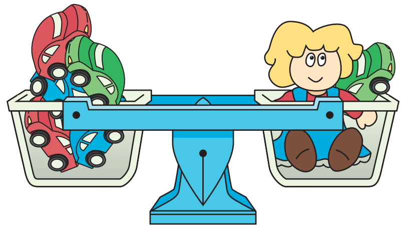
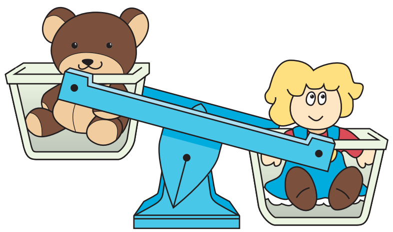
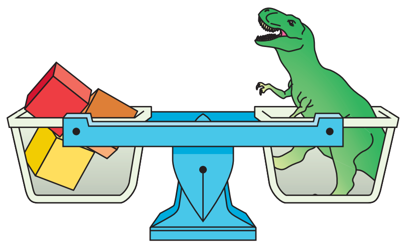
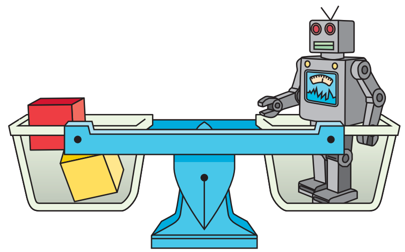
Standard units can initially be introduced through using a unit that is greater than the things being compared, for example comparing the capacity of a cup and a carton by filling each and pouring into matching bottles to compare the two.

Measuring is a practical activity and the activities below should be conducted in practical contexts, using real materials.

Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

Mastery	Mastery with Greater Depth
LENGTH Which line is longer? Explain your reasoning. 	A long brick is twice the length of a short brick. Which is longer: 2 long bricks or 3 short bricks? 3 long bricks or 5 short bricks? 

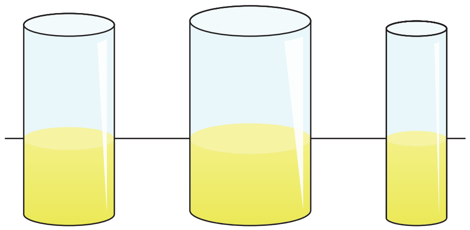
Mastery	Mastery with Greater Depth
MASS Here are three items. Can you sort them from lightest to heaviest by feeling them with your hands? *Give pupils three items that are quite different in mass.*	Here are four items. Can you sort them from lightest to heaviest using these balance scales? *Give pupils four items that are quite similar in mass.*
Which is heavier, a toy car or a toy dinosaur? 	Look at these balance scales. There are five cars on one side. The doll weighs the same as how many cars? 
Which toy is heavier?  If you added a toy car to the teddy, what would happen to the scales? Explain your reasoning.	Which of these statements is true? ■ The dinosaur is lighter than the robot. ■ The robot is lighter than the dinosaur. ■ The dinosaur and robot weigh the same.   Explain your reasoning.

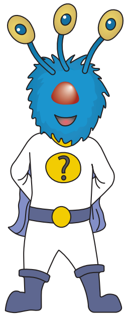
Mastery

CAPACITY

Captain Conjecture says, 'All of the glasses contain the same quantity of lemonade.'

Do you agree?



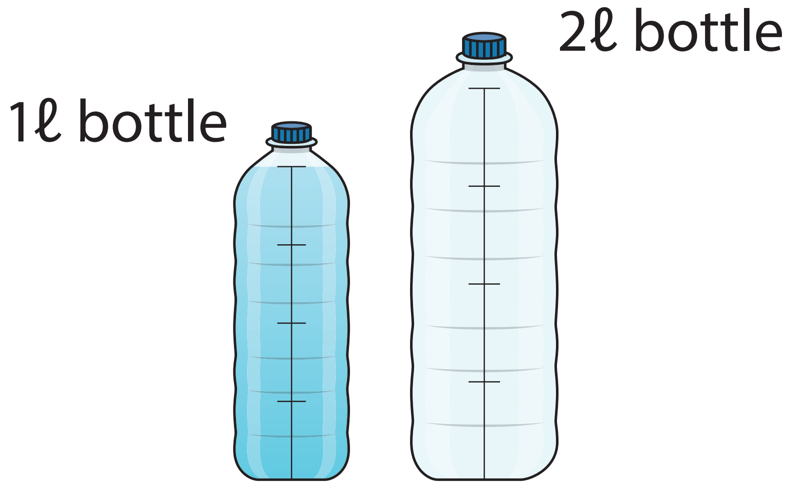


Explain your reasoning.

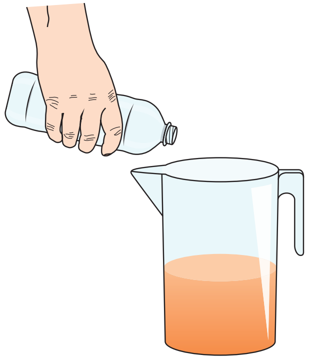
Mastery with Greater Depth

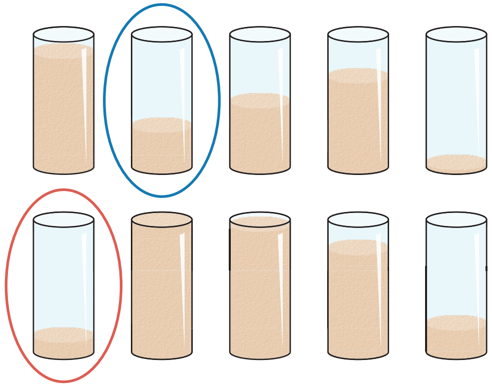
Dave has a 1 litre and a 2 litre bottle. He pours the water from the small bottle into the large bottle.

Mark where the water comes to on the large bottle.



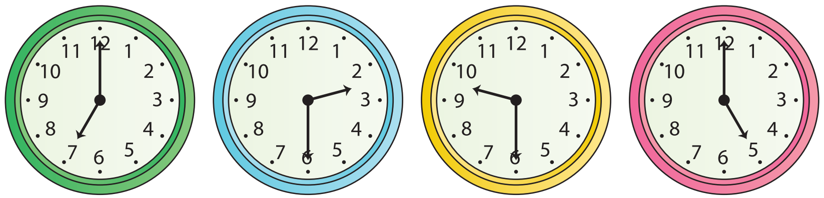
Mastery	Mastery with Greater Depth
Sid has a full bottle of drink. He pours it into a jug. Which has the greater capacity, the bottle or the jug?	Point to a glass which is about half as full as the glass in the red oval? Can you point to a glass which is about twice as full as the glass in the blue oval?





TIME

Match the clocks to the following times:



half past nine | five o'clock | half past two | seven o'clock

Jackie is looking forward to the events marked on the calendar.

January						
Sun	Mon	Tue	Weds	Thurs	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Use the clues to identify the date that she carried out each activity.

Jackie is going to a party at the weekend. This is ☐ January.

She is visiting her aunty on a Tuesday. This is ☐ January.

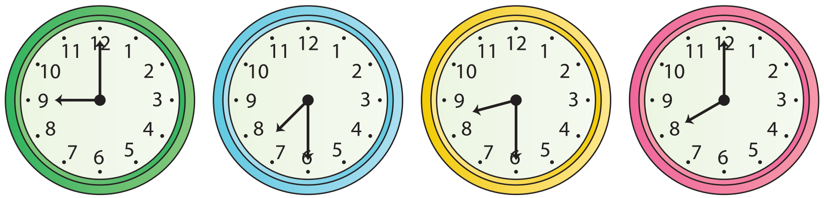
Three days after the party she is going swimming. This is ☐ January.

Near the end of the month she is going to the cinema. This is ☐ January.

Mastery

Sam leaves for school at 8 o'clock. Jay leaves half an hour later than Sam.
Circle the clock which shows when Jay leaves for school.

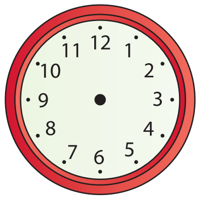
Explain your reasoning.



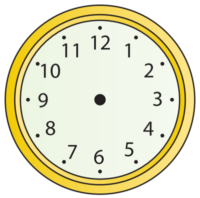
Circle the times which are shorter than 1 week.

1 year 1 day 1 minute 1 hour 1 month

Draw nine o'clock on this clock face:



Draw half past one on this clock face:



Mastery with Greater Depth

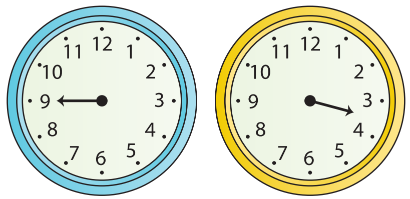
I walk to school every day. On Monday my journey takes 10 minutes.
On Tuesday I walk more slowly. Does my journey take more or less time than on Monday?

Explain your answer.

On Wednesday it takes me 8 minutes to walk to school.
On which of the 3 days do I walk quickest?
On which of the 3 days do I walk slowest?

Explain your reasoning.

Here are some clocks where the minute hand has broken off.
Use the hour hand to work out what time it is.



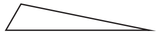
Geometry

Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

- recognise and name common 2-D and 3-D shapes, including:
  - 2-D shapes [for example, rectangles (including squares), circles and triangles]
  - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]
- Describe position, direction and movement, including whole, half, quarter and three-quarter turns

The Big Ideas

It is important for children to be familiar with a range of 2-D and 3-D shapes and not just recognise them in specific orientations, e.g. thinking that this  is a triangle but this  or this  are not.

It is preferable to introduce 3-D shapes before 2-D shapes, since 2-D shapes only exist in the real world as faces of 3-D shapes.

An emphasis should be placed upon identifying and describing the properties of shapes. It is important that pupils develop the correct mathematical language to do so.

The development of precise language to describe position and movement is important.

Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

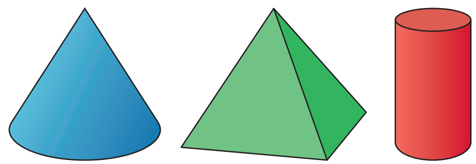
Mastery

Sort a range of 3-D objects into groups:

Explain how you have sorted them using mathematical names for the shapes.

Mastery with Greater Depth

What's the same and what's different about these shapes?



Which could be the odd one out and why?

Could each one be the odd one out?

Explain your reasoning.

Mastery	Mastery with Greater Depth
Just knowing the correct mathematical names of shapes doesn't constitute mastery. Pupils should be able to recognise shapes and describe their properties. *Check that pupils:* *a) can recognise shapes in different orientations;* *b) are able to describe what is special about certain shapes (e.g. a triangle has 3 sides and 3 corners or vertices).*	
Have a range of shapes in a 'feely bag'. Can you feel for the triangle, the square, the rectangle? Explain how you know. *Children should describe the shapes, using their properties.*	Provide children with a variety of 3-D shapes and ask: What's the same and what's different between these shapes? *Children make comparisons, drawing out the properties of shape and using language such as straight, curved, number of vertices.* Tom says, 'My shape has 4 rectangular faces and 2 square faces. What is my shape?' Sam says, 'My shape has 2 triangular faces and 3 rectangular faces. How many vertices does my shape have?'

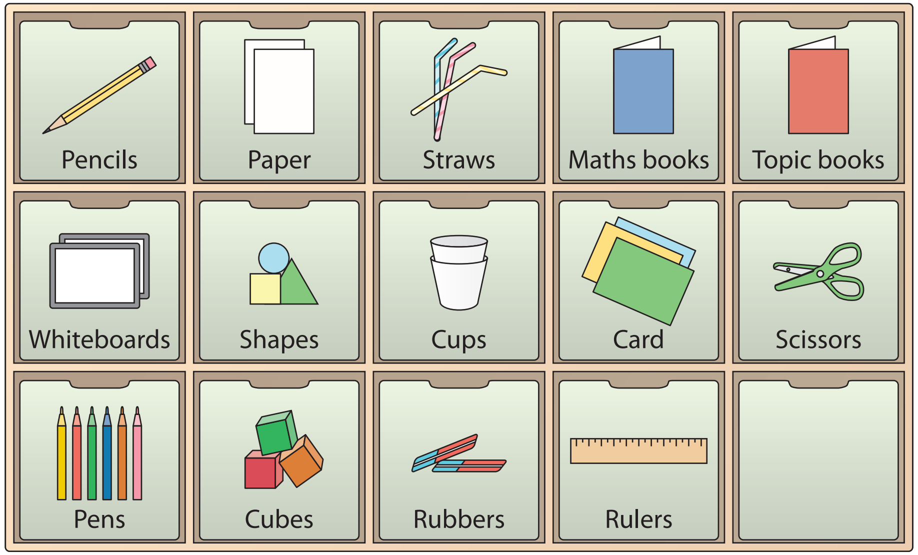
Mastery

Identify the position of each item.

Top, middle or bottom?

First, second or third?

Left or right?



The cups are in the middle row and third from the left.

The shapes are in the ______ row and ______ from the left.

The rulers are in the ______ row and ______ from the right.

The maths books are in the ______ row and ______ from the right.

Describe the position of other items.

Mastery with Greater Depth

Which drawer will Ziggy open?

You may ask him four questions to identify the drawer.

He can only answer 'Yes' or 'No'.

Which four questions would you ask?

Explain your reasoning.