Onslow Infant School

Maths Policy
incorporating 'Progession in Calculation' document

Policy Review

This policy was adopted September 2020

This policy will be reviewed September 2023

Maths Policy

Aims

- To promote enjoyment and enthusiasm for mathematics.
- To become fluent in the fundamentals of mathematics, including varied and frequent practice with increasingly complex problems over time, so that the children develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- To solve routine and non-routine problems building on resilience and developing verbal reasoning skills.
- To encouraging children to explain the strategies they have used using correct vocabulary.
- To understand the importance of mathematics in everyday life.

A Mastery Approach

At Onslow Infant School we teach maths for mastery; we want our children to be confident, independent mathematicians. The rationale behind this approach lies in the 2014 National Curriculum requirements which state:

"The expectation is that most pupils will move through the programmes of study at broadly the same pace. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration of new content. Those who are not sufficiently fluent with earlier material should consolidate either understanding, including through additional practice before moving on."

We have adopted a **growth mindset** approach – the belief that all children have the potential to succeed in maths – the key principles being:

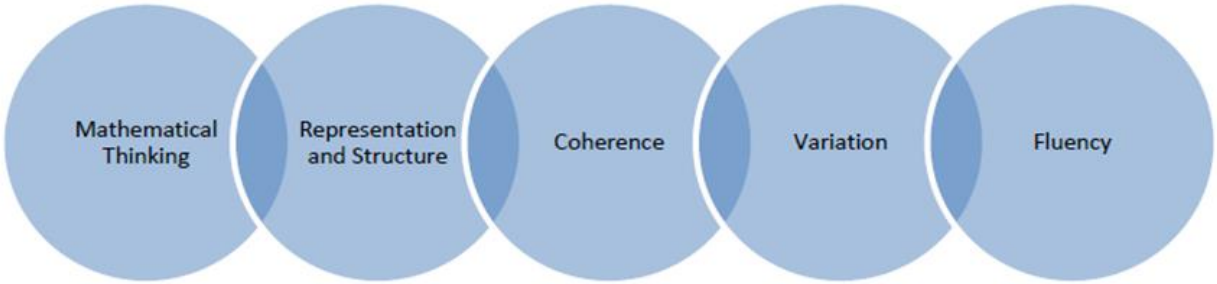
- talents can be developed
- effort is the path to mastery
- mistakes are part of learning
- learners should embrace challenge and welcome feedback
- others' successes should be inspirational.

The aim is that when children leave Onslow Infant School they:

- Have a secure knowledge of number facts which they can recall mentally
- Have a good understanding of the four calculation operations (addition, subtraction, multiplication and division)
- Have an efficient, reliable, method of calculation for each operation that they are able to apply with confidence
- Can show their reasoning in problem solving through verbal explanations, drawings or written methods

Teaching

Our teaching for mastery is underpinned by the NCETM's 5 Big Ideas, which allow children to make chains of reasoning connected with the other areas of mathematics. We ensure children are taught **fluency**, **reasoning** and **problem-solving** by focusing on representation and structure in our mastery curriculum. We use a **Concrete, Pictorial, Abstract** (CBA) approach within our maths lessons, so learning is reinforced in a variety of ways – please see the 'Progression in Calculations' guidance below to support this.



Staff at Onslow Infant School believe in the importance of mathematics and have high expectations for each child. The whole class is taught Maths together, with no differentiation by acceleration to new content – we believe that each child should have access to the same curriculum content and that children should deepen their conceptual understanding by solving challenging and varied problems. The learning needs of individuals are addressed through careful scaffolding, questioning and appropriate rapid intervention where necessary to provide the appropriate support and challenge.

The reasoning behind mathematical processes is emphasised. Teacher to pupil interaction explores ***how*** answers were obtained as well as ***why*** the method worked and what might be the most efficient strategy. Precise mathematical language, used in full sentences, is modelled by teachers so that mathematical ideas are conveyed with clarity and precision. We value 'mathematical talk' and children get lots of opportunity to talk about and evaluate their mathematics during lessons.

Classrooms each have an interactive, accessible maths area and a range of practical maths resources are readily available. Each year we have a Curriculum week during which children are exposed to exciting and inspiring activities. Every three years, this is a STEM week – so children have the opportunity to explore different maths tasks and hear from inspiring mathematicians at least once in their time at Onslow Infants.

<u>EYFS</u>

We follow the EYFS curriculum guidance for Mathematics. We are committed to ensuring the confident development of number sense and put emphasis on mastery of key early concepts. Pupils explore the 'story' of numbers and the development of models and images for numbers as a solid foundation for further progress. Teachers use a 'concrete – pictorial – abstract' approach to conceptual development. EYFS use the White Rose small steps to help support maths learning through continuous provision. We also use other resources such as NCETM and Numberblocks. Tapestry is used to make observations of children's learning for evidence and assessment.

<u>Year 1</u>

Long term planning follows a block approach to develop mastery - we use White Rose Maths as a tool to structure our planning; coherence is achieved through the planning of small and connected steps. We also use other resources such as NCETM and Numberblocks. Sufficient time is spent on key concepts to ensure learning is well developed and deeply embedded before moving on. Tapestry is used to make observations of children's learning for evidence and assessment alongside other informal assessment such as small group discussions or individual discussions with children. Written assessment material is used from the White Rose scheme at the end of every block of learning and at the end of each term to assess children's learning. Maths homework is set weekly for children to complete at home, to extend their learning.

<u>Year 2</u>

Long term planning follows a block approach to develop mastery - we use White Rose Maths as a tool to structure our planning; coherence is achieved through the planning of small and connected steps. Sufficient time is spent on key concepts to ensure learning is well developed and deeply embedded before moving on. Written assessment material is used from the White Rose scheme at the end of every block of learning and at the end of each term to assess children's learning. Standardised tests are carried out towards the end of KS1.

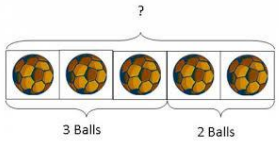
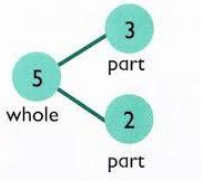
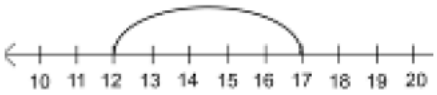
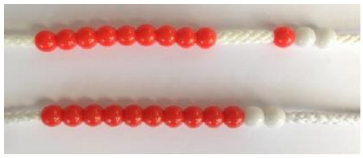
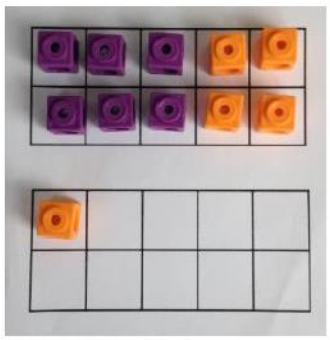
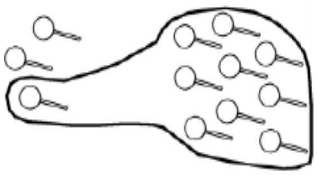
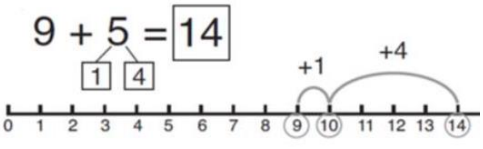
Maths homework is set online (on Purple Mash) weekly for children to complete at home; this reflects the maths learning at school that week.

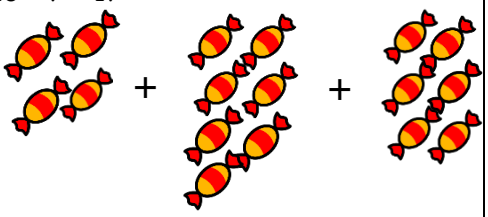
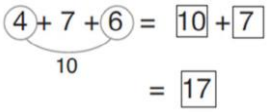
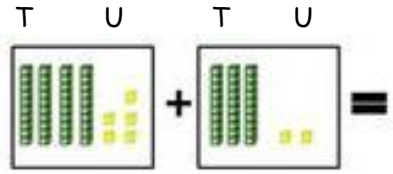
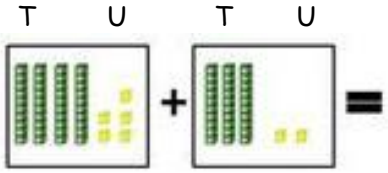
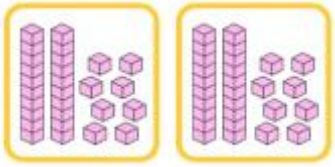
Progression in Calculations

This document details the progression in calculation for children. We refer to this document so that children:

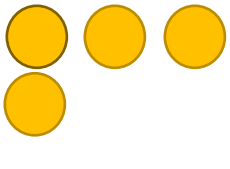
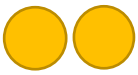
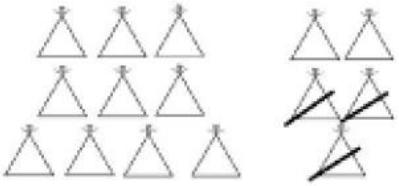
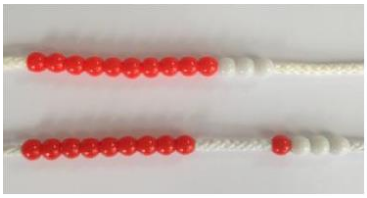
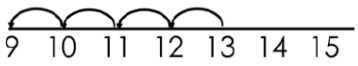
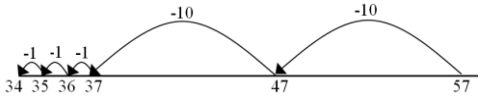
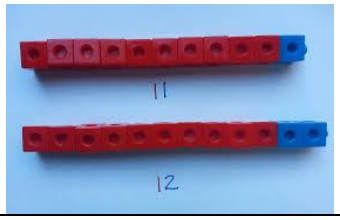
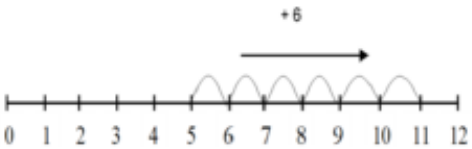
- Have a secure knowledge of number facts which they can recall mentally
- Have a good understanding of the four calculation operations (addition, subtraction, multiplication and division)
- Have an efficient, reliable, method of calculation for each operation that they are able to apply with confidence
- Can show their reasoning in problem solving through verbal explanations, drawings or written methods

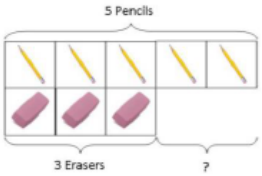
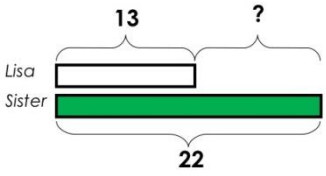
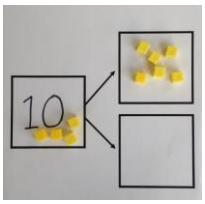
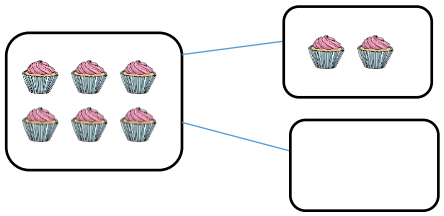
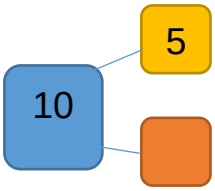
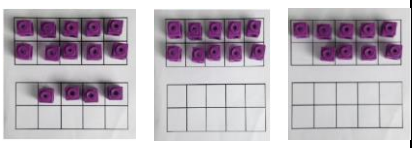
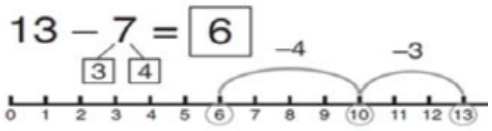
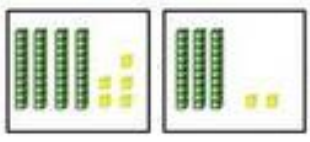
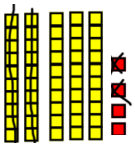
ADDITION

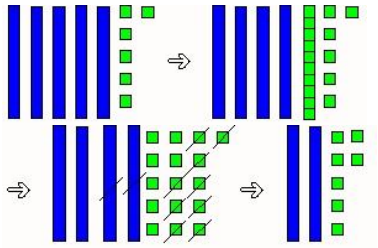
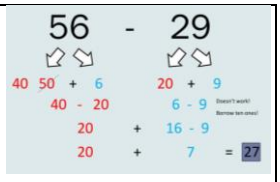
Key vocabulary	Sum, total, part, whole, plus, add, together, more, is equal to, is the same as		
Objective and Strategies	Concrete	Pictorial	Abstract
Addition Combining two parts to make a whole: part-whole model	Use cubes to add two numbers together as a group or in a tower.   	Use pictures to add two numbers together as a group or in a line.   	Use a part-whole model 4 + 3 = 7 10= 6 + 4  
Addition Starting at the bigger number and counting on	Start with the larger number on the bead string and then count on to the smaller number in 1s to find the answer. 	Start at the larger number on the number line and count on in 1s or in one jump to find the answer. 12 + 5 = 17  	Place the larger number in your head and count on the smaller number to find your answer. 5 + 12 = 17
Addition Regrouping to make 10.	Start with the bigger number and use the smaller number to make 10.  9 + 3 9 + 1 = 10 10 + 2 = 12  6 + 5 = 11 6 + 4 = 10 10 + 1 = 11	Use pictures or a number line. Regroup or partition the smaller number to make 10. 9 + 3 = 9 + 1 = 10 10 + 2 = 12   	7 + 4= 11 If I am at seven, how many more do I need to make 10? Now I am at 10. How many more do I add on now?

Addition Adding three single digits	Spot number bonds if you can. Use these to make the addition easier. 4 + 7 + 6= 4 + 6 = 10 10 + 7 = 17 	Spot number bonds if you can. 4 + 7 + 6= 4 + 6 = 10 10 + 7 = 17 	Combine the two numbers that make 10 and then add on the remainder. 
Addition Adding two 2-digit numbers (no regrouping)	Use dienes to build the number on a Tens and Units/Ones table. Add together the tens first then add the ones. 45 + 32= 	Draw dienes on a Tens and Units/Ones table. Add together the tens first and then add the ones. 45 + 32 = 	Add the tens and then the units/ones. 45 + 32 = 40 + 30 = 70 5 + 2 = 7 70 + 7 = 77
Addition Adding two 2-digit numbers with regrouping	Make both numbers on a tens and units/ones table. Count the total of tens and then add them to the total. Count the units/ones – notice you have more than 10 so you need to exchange 10 ones for one 10, or 'regroup'. Add them to the total.  28 + 28 = Add tens: 4 tens Add ones: 16 ones Regroup: 1 ten and 6 ones Total: 5 tens and 6 ones	Children can draw a pictoral representation of the dienes and follow the same method as the concrete – when exchanging or regrouping, cross out the ten and draw 10 units/ones in the ones column instead.	Start by partitioning the numbers on a tens and units/ones table before moving on to clearly show the exchange below the addition.

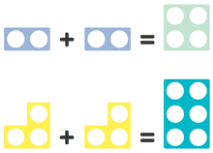
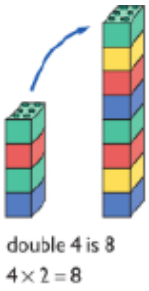
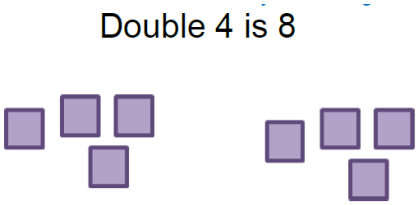
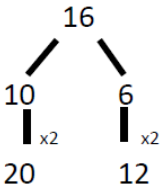
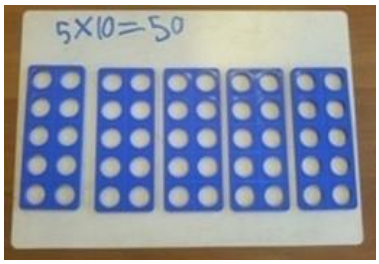
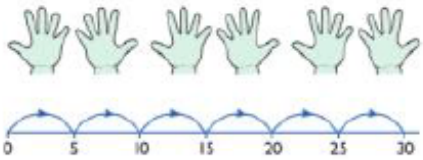
SUBTRACTION

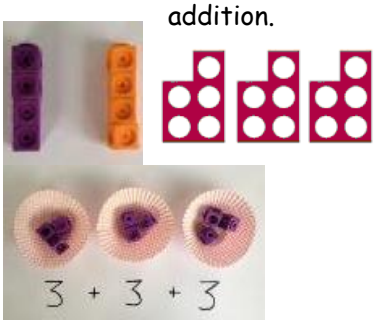
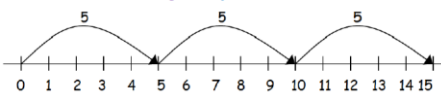
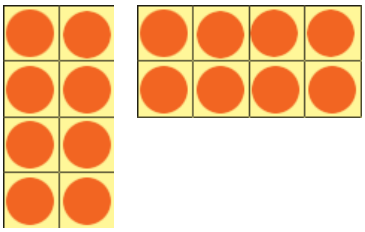
Key vocabulary	Take away, less than, difference, subtract, minus, fewer, decrease		
Subtraction Taking away ones	Use physical objects, counters or cubes to show how objects can be taken away. Practice placing objects in a line or in a 'Numicon' pattern to aid counting.  6 – 2 = 4 	Cross out drawn objects to show what has been taken away. If drawing the objects, practice drawing in a line, in a 'Numicon' pattern to aid counting.  15 – 3 = 12	18 -3 = 15 8 – 2 = 6
Subtraction Counting back	Make the larger number. Move the beads along your bead string as you count backwards in ones. 13 – 4  Use counters and move them away from the group as you take them away counting backwards as you go. 8 - 4 = 4 	Count back on a number line. Draw on the number line to show your jumps, or follow the jumps with your finger. 13 – 4 = 9  Start at the bigger number and count back the smaller number showing the jumps on the number line. This can progress all the way to counting back using two 2 digit numbers. Count back in 10s and then in 1s. 57 – 23 = 34 57 – 10 = 47 47 – 10 = 37 37 – 3 = 34 	Put 13 in your head, count back 4. What number have you got to? You could practice visualising the number line in your head or using your fingers to help.
Subtraction Finding the difference	Compare amounts and objects to find the difference. Use cubes to build towers and place together then count on from the shorter tower to find the difference. 	Using a number line, count on to find the difference. 	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches. Start at 15 and count up to 23.

	Use bar models with items to find the difference (you could use a tens frame for this with smaller numbers).  	Draw a bar model to find the difference between 2 numbers. Count up to find the difference. *Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.*  	
Subtraction Part-Part-Whole Model	Link to the addition method - use a part-part-whole model to help explain the inverse between addition and subtraction.  If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part part whole model. 6 - 2 = 	Move to using numbers within the part whole model. 
Subtraction Making 10	Make 14 on the ten frame.  14 - 9 = 14 - 4 = 10 10 - 1 = 9	 13 - 7 = 13 - 3 = 10 10 - 4 = 6	16 - 8= How many do we take off to reach the next 10? 6 How many do we have left to take off? 2
Subtracting Subtracting two 2-digit numbers (no regrouping)	Use dienes to make the bigger number then take the smaller number away. Subtract tens first and then units/ones. 45 - 13 = 32 	Draw the dienes on a tens and units/ones table. Subtract tens first and then units/ones - cross off the dienes when you have subtracted them. Clearer if you use a different coloured pen. 54 - 22 = 32 	Make sure the larger number is first. Partition each number into tens and units. Subtract tens and then 47 − 24 = 23 40 + 7 − 20 + 4 20 + 3 units/ones.
Subtracting Subtracting two 2-digit numbers with regrouping	Make the larger number using dienes on a tens and units/ones table. Look at the units/ones - notice you have more units/ones to subtract than you currently have. You	Children can draw a pictoral representation of the dienes and follow the same method as the concrete - when exchanging or regrouping, cross out the ten and	56 - 29 = (40 + 16) - (20 + 9) 40 - 20 = 20 16 - 9 = 7

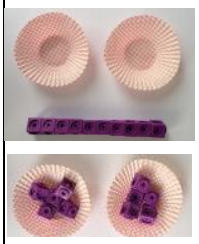
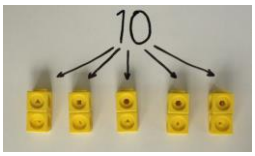
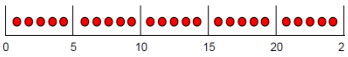
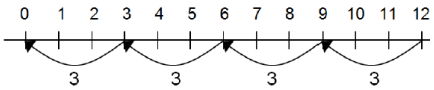
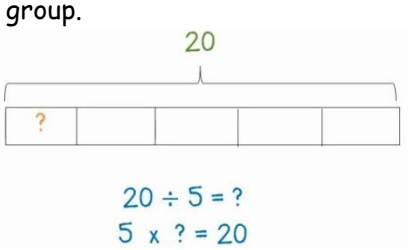
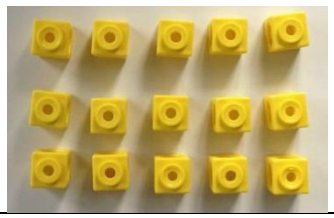
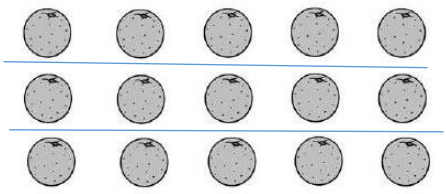
	need to exchange 10 ones for one 10, or 'regroup'. The overall number you started with stays the same, it is just represented in ones/units rather than a ten. 56 – 29 = 	draw 10 units/ones in the ones column instead.	

MULTIPLICATION

Key vocabulary	Double, times, multiplied by, groups of, lots of, equal groups		
Multiplication: Doubling	Use practical activities to show how to double a number e.g. on a tens frame or using bricks.   double 4 is 8 4 × 2 = 8	Draw pictures to show how to double a number.  Double 4 is 8	For 2-digit numbers, partition a number and then double each part before recombining it back together.  16 10 x2 6 x2 20 12
Multiplication: Counting in multiples	Count in multiples supported by concrete objects in equal groups.   Progress to counting in multiples using coins (2p, 5p, 10p). 	Use a number line, 100 square or pictures to support counting in multiples – body parts are great for counting in 2s, 5s and 10s.  	Count in multiples of a number by chanting, singing or clapping. Write sequences with multiples of numbers e.g. 2, 4, 6, 8, 10 and 5, 10, 15, 20, 25 , 30 and work out what the missing number in a sequence is.

Multiplication Repeated addition	Use different objects to make equal groups then add the groups together using simple addition.  Talk to children about repeated addition in every day life, e.g. paying with coins. 	Use the same method, but with pictures of objects e.g. there are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2 + 2 + 2 = 6  Use a number line or number square to count on. 5 + 5 + 5 = 15  	Write addition sentences to describe objects and pictures e.g. 2 + 2 + 2+ 2+ 2 = 10. 
Multiplication Arrays- showing commutative multiplication	Look for arrays in every day life e.g. egg boxes and on lego.  Create arrays using counters/ cubes to show multiplication sentences. 3 x 4 = 12 	Draw arrays in different rotations to find **commutative** multiplication sentences. 2 x 4 = 8 and 4 x 2 = 8 	Use an array to write multiplication sentences and reinforce repeated addition. 5 x 3 = 15 3 x 15 = 15 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 

DIVISION

Key vocabulary	Share, group, divide, divided by, half		
Division Sharing	I have 10 cubes, can you share them equally in 2 groups?  Share 1 by 1 methodically.	Children use pictures or shapes to share quantities.   8 ÷ 2 = 4	Share 9 buns between three people. 9 ÷ 3 = 3
Division Grouping	Use cubes, counters or objects and divide quantities into equal groups. Group 10 into 5 equal groups using cubes:  Group 25 into 5 equal groups using a bead string:  Group 12 stars into 3 equal groups: 	Use a number line to show jumps in groups. The number of jumps equals the number of groups. Group 12 into 4 equal groups:  Use a bar model. Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.  20 ÷ 5 = ? 5 x ? = 20	20 ÷ 4 = 5 Divide 20 into 4 groups. How many are in each group?
Division Arrays	Link division to multiplication by creating an array using small objects or cubes and thinking about the number sentences that can be created. E.g. 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15 	Draw an array and use lines to split the array into groups to make multiplication and division sentences.  E.g. 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	Find the inverse of multiplication and division sentences by creating four linking number sentences. 5 x 4 = 28 4 x 5 = 28 20 ÷ 5 = 4 20 ÷ 4 = 5