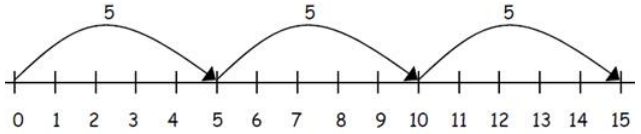
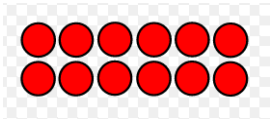
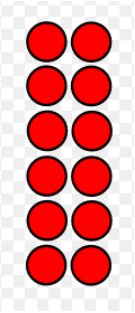
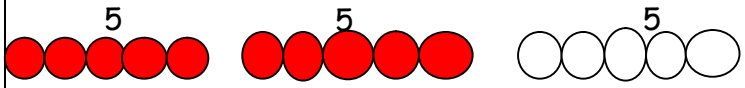
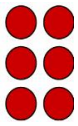
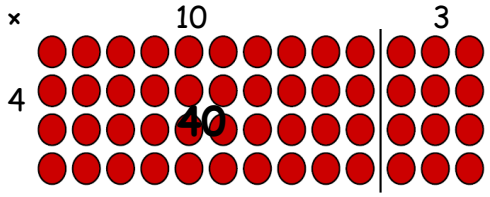
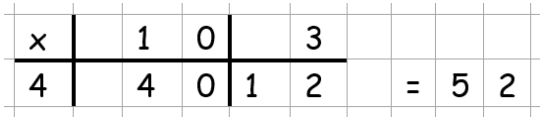
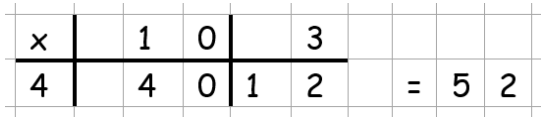
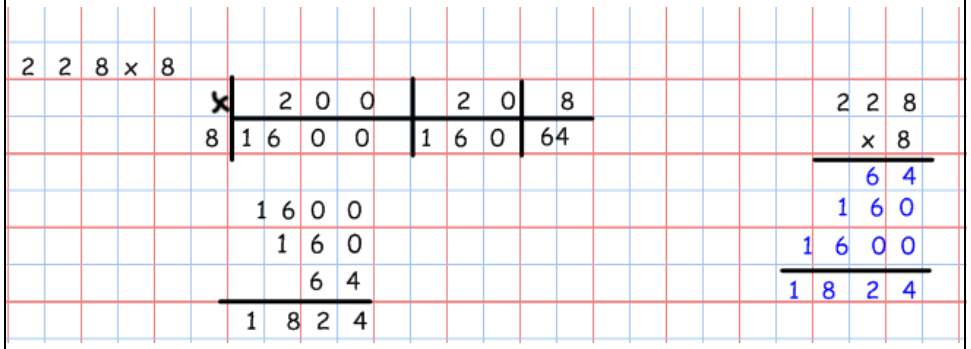
Mickleover Primary School
Calculation Policy
MULTIPLICATION

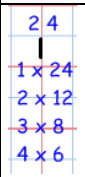
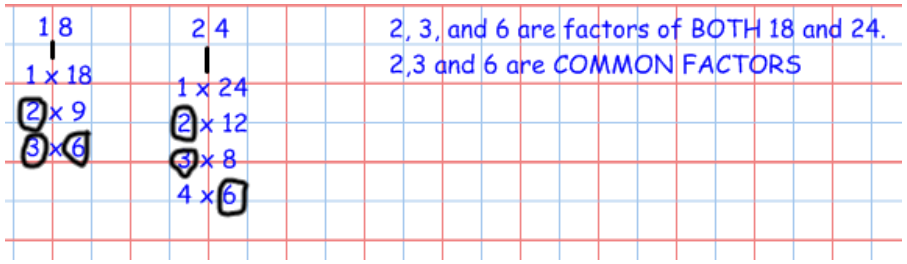
	Learning Objectives	*Success criteria*	*Method*
EYFS	Solve problems involving doubling.	Using concrete apparatus, children will be able to find a given number by placing objects in groups where each group is identical in number.	• In practical activities and through discussion they will begin to use the vocabulary involved in multiplication – groups, lots, double. • Through practical activities solve problems including doubling. 'You have 3 lollies and your friend gives you 3 more. How many do you have altogether? They will record pictorially then numerically 3+3=6 lollies Double 3 is 6

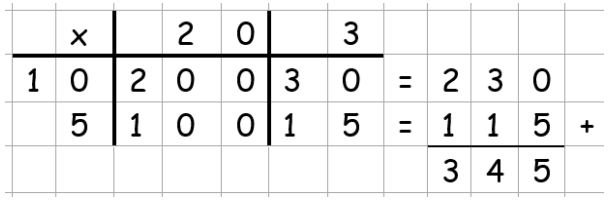
	Learning Objectives	Success Criteria	Method
Year 1	• Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations	Children will be able to count in 2's, 5's and 10's. Understands that doubling is adding the same number again.	Can put objects and pictures into groups and can count repeated groups of the same size.

	Learning Objectives	Success Criteria	Method
Year 2	• Recall & use multiplication facts for 2, 5 & 10 tables, including recognising odd and even numbers • Calculate mathematical statements for multiplication within the multiplication tables; write them using multiplication & equals (=) signs. • Show that multiplication of two numbers can be done in any order (commutative) • Solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	Count forward and backward in 2s, 5s and 10s. Know multiplication facts for the 2, 5 and 10 times table up to x12. Understand multiplications as 'lots' of the same thing. Understand multiplication as repeated addition. Make connections between the 10 times table and place value. Recognise and use arrays to represent multiplication. Understand that multiplication is commutative e.g. 4 × 3 = 3 × 4	1) Using a 100 square to discuss patterns when counting. 4 **5** 6 7 8 9 **10** 14 **15** 16 17 18 19 **20** 2) Solve multiplication through repeated addition. 5 + 5 + 5 = 3 × 5 = 3 groups of 5 = 15  And on a bead bar 5x3=5+5+5  6 x2 array 2x6 array  5 x 3 = 5 + 5 + 5  3) Use arrays to represent a multiplication calculation. 3 × 5 = 15 5 × 3 = 15  3 × 2 = 6 2 × 3 = 6

	Learning Objectives	Success Criteria	Method
Year 3	Recall & use x and ÷ facts for the 3, 4 and 8 tables. • Write and calculate statements for x and ÷ using tables they know, including for TU x U using mental and progressing to formal written methods. • Solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which ***n*** objects are connected to ***m*** objects.	Count forward and backward in multiples of 3 4 and 8 Understand that multiples of 4 can be derived from doubling multiples of 2 Understand that multiples of 8 can be derived from doubling multiples of 4 Understand that division is the inverse of multiplication. e.g. 4 × 3 = 12, 3 × 4 = 12, 12 ÷ 3 = 4, 12 ÷ 4 = 3.	Extend the use of arrays, rods and counters to solve two-digit multiplied by one-digit (introduction of grid method). 13 × 4 = (10 × 4) + (3 × 4)  In books:  13x4=(10x4)+(3x4) 40 + 12 = 52

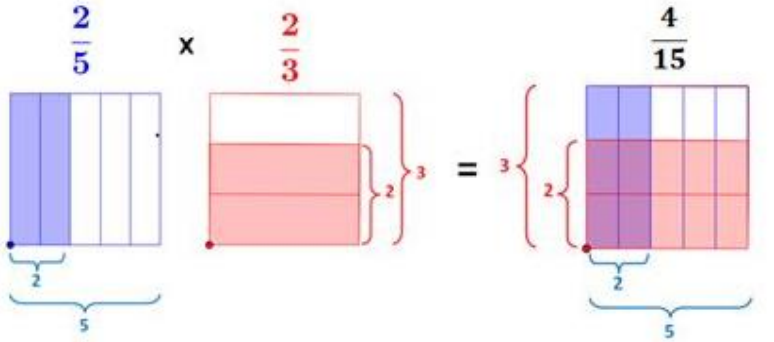
	Learning Objectives	Success criteria	Method
Year 4	• Recall multiplication and division facts up to 12 x 12. • Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. • Recognise and use factor pairs and commutativity in mental calculations. • Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. • Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to **m** objects.	Understand place value in three-digit numbers. Understand how the 2, 4 and 8 times tables and the 3 and 6 times tables are connected through doubling. Understand how to multiply larger numbers by using related facts, e.g. 400 × 3 = 1200 by using 4 × 3 = 12 Understand effect of multiplying by 10 and 100 (shifting digits to the left). Understand how the inverse can be used to check answers.	Multiply HTU x U or HT x U using grid method and vertical method alongside. Ie 13 x 4  13 X 4 12 4 x3 40 4 x 10 52  Leading to in Y5 HTU x U carrying above to avoid confusion with carrying below $^{1}2^{1}23$ X 6 1338

	Learning Objectives	Success criteria	Method
Year 5	• Identify multiples & factors; find all factor pairs of a number & common factors of 2 numbers.	• Children will understand that factors always come in pairs and be able to identify all factor pairs of a number	 factors of 24 are 1, 2,3,4,6,8,12,24
		• Children will understand that two different numbers can have common factors	
	• Know & use the vocabulary of prime numbers, prime factors & composite numbers.	• Children will know that numbers with only 2 factors, 1 and itself are prime numbers and that numbers that are not prime are call composite numbers.	Children will be able to identify whether a number has more than two factors.
		• Children will know that every number can be written as a product of prime factors	Prime factors Every number can be written as a product of prime numbers. Remember: 'product' means 'times' or 'multiply'. For example 40 = 2 x 2 x 2 x 5 126 = 2 x 3 x 3 x 7 28 = 2 x 2 x 7
	• Establish whether a number up to 100 is prime; recall primes up to 19.	• Children will know how to identify a prime number up to 100 and will have instant recall of prime numbers to 19	Children will recall 2, 3,5,7,11,13,17,and 19 as prime numbers. NB 1 is NOT a prime number.

	Learning Objective	*Success criteria*	*Method*
YEAR 5	Multiply numbers up to 4 digits by a one or two-digit number using a formal method, including long multiplication for two-digit numbers	• Building on written methods in year 4, children will see that written vertical methods for multiplication are underpinned by an understanding of the grid method	Use the grid method to solve two-digit multiplied by two-digit and three-digit multiplied by two-digit (this could also be done with arrays on the IWB if needed).  23 x 15 +15 (5x3) 100 (5x20) 30 (10x3) 200 (10x20) 345 For teaching of short and long multiplication teach as per mymaths http://app.mymaths.co.uk/1719-resource/short-and-long-multiplication

	Learning Objectives	*Success Criteria*	*Method*
YEAR 5	• multiply and divide numbers mentally drawing upon known facts	Children will be able to multiply numbers mentally by drawing on known facts	***Ie. Calculate*** 66 x5 by multiplying by 10 and halving 66 x 20 by doubling and multiplying by 10 66 x 15 by multiplying by 10 then adding half of this to the answer 285 x 4 by doubling and doubling 25 x 9 by multi0plying by 10 then subtracting 25 25 x 11 by multiplying by 10 and adding 25
	Multiply and divide whole numbers and those involving decimals by 10, 100 & 1000.	Children will be able to multiply whole numbers and decimals by 10, 100, 1000	Children will be taught that when x by 10, 100, 1000 the number moves one place to the left NEVER adding a zero, or two zeros etc.
	• Recognise and use square numbers & cube numbers and notation for squared ^{2}, cubed ^{3}	Children will understand the terms squared and cubed as repeated multiplication.	3^2 is equivalent to 3 x 3 3^3 is equivalent to 3 x 3 x3

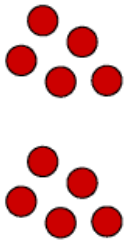
	Learning objective	Success Criteria	Method
YEAR 5	• Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes • Solve problems involving + - x ÷ and a combination of these, including understanding meaning of = sign • Solve problems involving x and ÷ including scaling by simple fractions & problems involving simple rates. • Multiply proper fractions & mixed numbers by whole numbers,	Children will be able to identify the correct operation to use when solving problems Including money, measures, scaling and simple rates Children will be able to multiply fractions by whole numbers	3/5 x5 using visual images and objects. Ie 5 lots of 1/5 1/5 1/5= 15/5= 3

	Learning Objective	Success Criteria	Method
Year 6	• . Multiply One-digit numbers with up to two decimal places by whole numbers (U.th hth x U) • Solve problems using multiplication, including decimals and measures, • Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example 1/4 x 1/2 = 1/8]	Children will be able to multiply U.th hth x U Children will be able to use multiplication to solve scale factor problems and multi step problems Children will be able to multiply simple fractions	Building on written methods in y5 children will become confident in using the formal written method for multiplication http://tube.geogebra.org/student/m27374 Using visual representations show that 2/5 x 2/3 

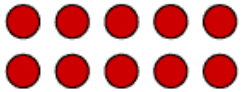
Using Arrays to Show Multiplication Concepts: Overview

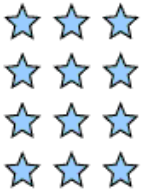
An arrangement of objects, pictures, or numbers in columns and rows is called an **array**. Arrays are useful representations of multiplication concepts.

Look at this example



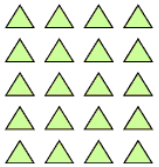
When equal groups are arranged in equal rows, an array is formed





This array has 4 rows and 3 columns.

It can be described as a 4 by 3 array.



This array has 5 rows and 4 columns.

It is a 5 by 4 array

$$\underset{\text{rows}}{2} \times \underset{\text{objects in each row}}{5} = \underset{\text{total number of objects}}{10}$$

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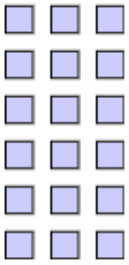
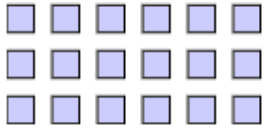


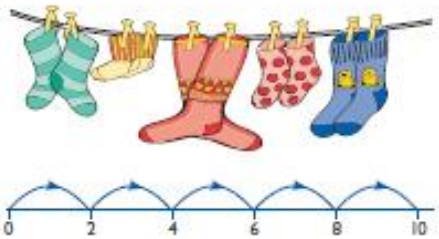


$$\underset{\text{rows}}{\underset{\text{factor}}{6}} \times \underset{\text{objects in each row}}{\underset{\text{factor}}{3}} = \underset{\text{total number of objects}}{\underset{\text{product}}{18}}$$

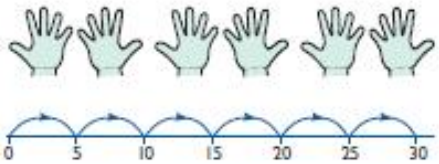
$$\underset{\text{rows}}{\underset{\text{factor}}{3}} \times \underset{\text{objects in each row}}{\underset{\text{factor}}{6}} = \underset{\text{total number of objects}}{\underset{\text{product}}{18}}$$

When you show students the connection between equal groups and arrays, students can easily understand how to use arrays to multiply. They will use arrays again later to divide. Look at the multiplication sentence that describes the array above. The numbers in multiplication sentences have special names. The numbers that are multiplied are called factors. The answer is called the product. Now look at what happens to the factors and product in the multiplication sentence when the array is turned on its side. The order of the factors changed, but the product stayed the same. When the order of the factors in any multiplication sentence changes, the product does not change. This is called the Commutative Property of Multiplication. Students should be familiar with the Commutative

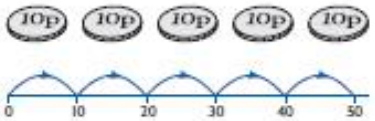
Models and images for understanding multiplication and division



$2+2+2+2+2=10$
$2\times5=10$
2 multiplied by 5
5 pairs
5 hops of 2

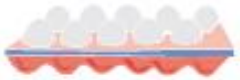


$5+5+5+5+5+5=30$
$5\times6=30$
5 multiplied by 6
6 groups of 5
6 hops of 5



$10p+10p+10p+10p+10p=50p$
$10p\times5=50p$
5 hops of 10

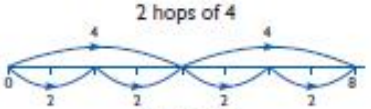
$4\times2=8$
$2\times4=8$

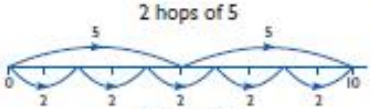


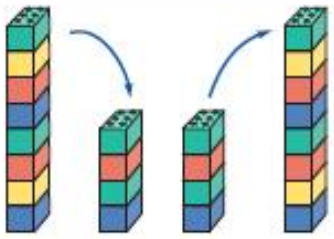
$5\times2=10$
$2\times5=10$

$2\times4=8$
$4\times2=8$

$2\times5=10$
$5\times2=10$

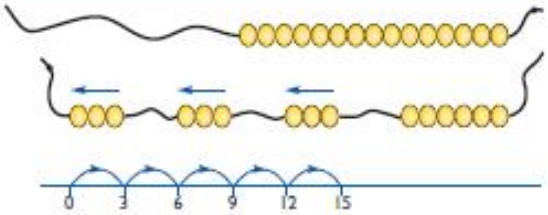






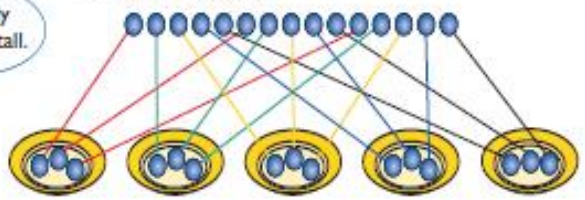
half of 8 is 4
$8\div2=4$

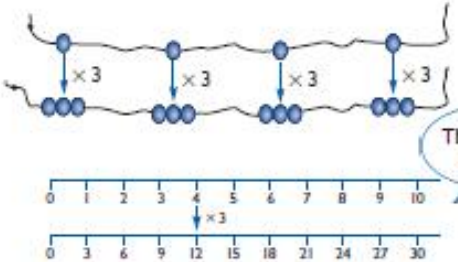
double 4 is 8
$4\times2=8$

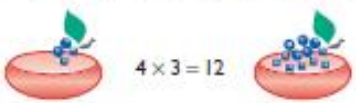


$15\div3=5$

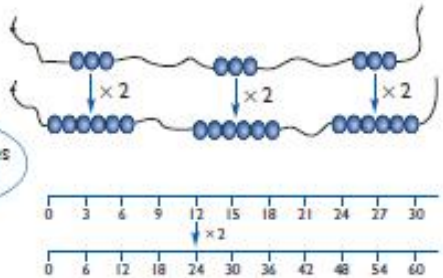
5 hops in 15. How big is each hop?
$15\div5=3$
15 shared between 5







$4\times3=12$



$12\times2=24$
Twice as many