Number: Multiplication and Division with Reasoning

MULTIPLICATION & DIVISION FACTS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
count in multiples of twos, fives and tens (copied from Number and Place Value)	*count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward* (copied from Number and Place Value)	*count from 0 in multiples of 4, 8, 50 and 100* (copied from Number and Place Value)	*count in multiples of 6, 7, 9, 25 and 1 000* (copied from Number and Place Value)	*count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000* (copied from Number and Place Value)	
	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	recall multiplication and division facts for multiplication tables up to 12 × 12		
	Missing numbers 10 = 5 x $\square$ What number could be written in the box? **Making links** I have 30p in my pocket in 5p coins. How many coins do I have?	**Missing numbers** 24 = $\square$ x $\square$ Which pairs of numbers could be written in the boxes? **Making links** Cards come in packs of 4. How many packs do I need to buy to get 32 cards?	**Missing numbers** 72 = $\square$ x $\square$ Which pairs of numbers could be written in the boxes? **Making links** Eggs are bought in boxes of 12. I need 140 eggs; how many boxes will I need to buy?	**Missing numbers** 6 x 0.9 = $\square$ x 0.03 6 x 0.04 = 0.008 x $\square$ Which numbers could be written in the boxes? **Making links** Apples weigh about 170 g each. How many apples would you expect to get in a 2 kg bag?	**Missing numbers** 2.4 ÷ 0.3 = $\square$ x 1.25 Which number could be written in the box? **Making links**

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MENTAL CALCULATION					
		write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)	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	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed operations and large numbers
		Use a fact 20 x 3 = 60. Use this fact to work out 21 x 3 = 22 x 3 = 23 x 3 = 24 x 3 =	**Use a fact** 63 ÷ 9 = 7 Use this fact to work out 126 ÷ 9 = 252 ÷ 7 =	**Use a fact** 3 x 75 = 225 Use this fact to work out 450 ÷ 6 = 225 ÷ 0.6 = To multiply by 25 you multiply by 100 and then divide by 4. Use this strategy to solve 48 x 25 78 x 25 4.6 x 25	**Use a fact** 12 x 1.1 = 13.2 Use this fact to work out 15.4 ÷ 1.1 = 27.5 ÷ 1.1 =
	show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot		recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	*associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)* (copied from Fractions)

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Making links If one teddy has two apples, how many apples will three teddies have? Here are 10 lego people If 2 people fit into the train carriage, how many carriages do we need?	**Making links** Write the multiplication number sentences to describe this array X X X X X X What do you notice? Write the division sentences.	**Making links** 4 × 6 = 24 How does this fact help you to solve these calculations? 40 x 6 = 20 x 6 = 24 x 6 =	**Making links** How can you use factor pairs to solve this calculation? 13 x 12 (13 x 3 x 4, 13 x 3 x 2 x 2, 13 x 2 x 6)	**Making links** 7 x 8 = 56 How can you use this fact to solve these calculations? 0.7 x 0.8 = 5.6 ÷ 8 =	**Making links** 0.7 x 8 = 5.6 How can you use this fact to solve these calculations? 0.7 x 0.08 = 0.56 ÷ 8 =
WRITTEN CALCULATION					
	calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Mental Methods)	multiply two-digit and three-digit numbers by a one-digit number using formal written layout	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers	multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
				divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders	divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context

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<table>
<tr><td></td><td></td><td></td><td></td><td>appropriately for the context</td><td>divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))</td></tr>
<tr>
<td>Practical
If we put two pencils in each pencil pot how many pencils will we need?</td>
<td>Prove It
Which four number sentences link these numbers? 3, 5, 15?
Prove it.</td>
<td>Prove It
What goes in the missing box?<table><tr><td>x</td><td>?</td><td>?</td></tr><tr><td>4</td><td>80</td><td>12</td></tr></table>Prove it.

How close can you get?

□□ × □

Using the digits 2, 3 and 4 in the calculation above how close can you get to 100? What is the largest product? What is the smallest product?</td>
<td>Prove It
What goes in the missing box?

6 □ x 4 = 512
Prove it.

How close can you get?

□□□ X 7
Using the digits 3, 4 and 6 in the calculation above how close can you get to 4500? What is the largest product? What is the smallest product?</td>
<td>Prove It
What goes in the missing box?

12□3 ÷ 6 = 212

12□3 ÷ 7 = 212

22□3 ÷ 7 = 321 r 6

323 x □1 = 13243

Prove it.</td>
<td>Prove It
What goes in the missing box?

18□4 ÷ 12 = 157

38□5 ÷ 18 = 212.5

33□2 ÷ 8 = 421.5

38 x □.7 = 178.6

Prove it.

Can you find?
Can you find the smallest number that can be added to or subtracted from 87.6 to make it exactly divisible</td>
</tr>
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					by 8/7/18?
PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS					
			recognise and use factor pairs and commutativity in mental calculations (repeated)	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19	identify common factors, common multiples and prime numbers *use common factors to simplify fractions; use common multiples to express fractions in the same denomination* (copied from Fractions)
				recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	*calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3* (copied from Measures)
Spot the mistake Use a puppet to count but make some deliberate mistakes. e.g. 2 4 5 6 10 9 8 6	**True or false?** When you count up in tens starting at 5 there will always be 5 units.	**True or false?** All the numbers in the two times table are even. There are no numbers in the three times table that	**Always, sometimes, never?** Is it always, sometimes or never true that an even number that is divisible by 3 is also divisible by 6.	**Always, sometimes, never?** Is it always, sometimes or never true that multiplying a number always makes it bigger	**Always, sometimes, never?** Is it always, sometimes or never true that dividing a whole number by a half makes the answer twice

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See if the pupils can spot the deliberate mistake and correct the puppet		are also in the two times table.	Is it always, sometimes or never true that the sum of four even numbers is divisible by 4.	Is it always, sometimes or never true that prime numbers are odd. Is it always, sometimes or never true that when you multiply a whole number by 9, the sum of its digits is also a multiple of 9 Is it always, sometimes or never true that a square number has an even number of factors.	as big. Is it always, sometimes or never true that when you square an even number, the result is divisible by 4 Is it always, sometimes or never true that multiples of 7 are 1 more or 1 less than prime numbers.
ORDER OF OPERATIONS					
					use their knowledge of the order of operations to carry out calculations involving the four operations
					Which is correct? Which of these number sentences is correct? 3 + 6 x 2 =15 6 x 5 – 7 x 4 = 92 8 x 20 ÷ 4 x 3 = 37

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INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS					
		estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)	*estimate and use inverse operations to check answers to a calculation* (copied from Addition and Subtraction)		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
	Use the inverse Use the inverse to check if the following calculations are correct: 12 ÷ 3 = 4 3 x 5 = 14	**Use the inverse** Use the inverse to check if the following calculations are correct 23 x 4 = 82 117 ÷ 9 = 14 **Size of an answer** Will the answer to the following calculations be greater or less than 80 23 x 3= 32 x 3 = 42 x 3 = 36 x 2=	**Use the inverse** Use the inverse to check if the following calculations are correct: 23 x 4 = 92 117 ÷ 9 = 14 **Size of an answer** Will the answer to the following calculations be greater or less than 300 152 x 2= 78 x 3 = 87 x 3 = 4 x 74 =	**Use the inverse** Use the inverse to check if the following calculations are correct: 4321 x 12 = 51852 507 ÷ 9 = 4563 **Size of an answer** The product of a two digit and three digit number is approximately 6500. What could the numbers be?	**Use the inverse** Use the inverse to check if the following calculations are correct: 2346 x 46 = 332796 27.74 ÷ 19 = 1.46 **Size of an answer** The product of a single digit number and a number with two decimal places is 21.34 What could the numbers be?

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<table>
<tr><th colspan="6">PROBLEM SOLVING</th></tr>
<tr>
<td rowspan="3">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</td>
<td rowspan="3">solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</td>
<td rowspan="3">solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects</td>
<td rowspan="3">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</td>
<td>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</td>
<td>solve problems involving addition, subtraction, multiplication and division</td>
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<tr>
<td>solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</td>
<td></td>
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<tr>
<td>solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates</td>
<td>solve problems involving similar shapes where the scale factor is known or can be found
(copied from Ratio and Proportion)</td>
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