

# Number: Operations (Addition, Subtraction, Multiplication and Division)

| NUMBER BONDS   |   |   |  |  |   |
|--|---|---|--|--|---|
| Year 1   | Year 2  | Year 3  | Year 4   | Year 5   | Year 6  |
| represent and use number bonds and related subtraction facts within 20   | recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100  |   |  |  |   |
| MENTAL CALCULATION   |   |   |  |  |   |
| add and subtract one-digit and two-digit numbers to 20, including zero   | add and subtract numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> <li>* a two-digit number and ones</li> <li>* a two-digit number and tens</li> <li>* two two-digit numbers</li> <li>* adding three one-digit numbers</li> </ul>  | add and subtract numbers mentally, including: <ul style="list-style-type: none"> <li>* a three-digit number and ones</li> <li>* a three-digit number and tens</li> <li>* a three-digit number and hundreds</li> </ul> |  | add and subtract numbers mentally with increasingly large numbers  | perform mental calculations, including with mixed operations and large numbers  |
| read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)                           | show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot  |   |  |  | use their knowledge of the order of operations to carry out calculations involving the four operations  |
| WRITTEN METHODS  |   |   |  |  |   |
| read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)                        |   | add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction   | add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate | add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) |   |
|  | recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.   | estimate the answer to a calculation and use inverse operations to check answers  | estimate and use inverse operations to check answers to a calculation  | use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy                       | use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.   |
| PROBLEM SOLVING + and -  |   |   |  |  |   |
| solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$ | solve problems with addition and subtraction: <ul style="list-style-type: none"> <li>* using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li> <li>* applying their increasing knowledge of mental and written methods <i>solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change</i> (copied from Measurement)</li> </ul> | solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction   | solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why                   | solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why               | solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why<br><br>Solve problems involving addition, subtraction, multiplication and division |
| MULTIPLICATION & DIVISION FACTS  |   |   |  |  |   |

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|  |  |   |  |  |   |
|--|--|---|--|--|---|
| <i>count in multiples of twos, fives and tens (copied from Number and Place Value)</i> | <i>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)</i><br><br>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers | <i>count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value)</i><br><br>recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables  | <i>count in multiples of 6, 7, 9, 25 and 1 000 (copied from Number and Place Value)</i><br><br>recall multiplication and division facts for multiplication tables up to $12 \times 12$   | <i>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)</i>  |   |
| <b>MENTAL CALCULATION</b>  |  |   |  |  |   |
|  | show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot  | 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, know and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers<br><br>recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers) | multiply and divide numbers mentally drawing upon known facts<br><br>multiply and divide whole numbers and those involving decimals by 10, 100 and 1000  | perform mental calculations, including with mixed operations and large numbers<br><br><i>associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. <math>\frac{3}{8}</math>) (copied from Fractions)</i>   |
| <b>WRITTEN CALCULATIONS</b>  |  |   |  |  |   |
|  | calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) 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<br><br>divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context | multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication<br><br>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<br>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 |
| <b>PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS</b>      |  |   |  |  |   |

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|   |   |   |  |  |   |
|---|---|---|--|--|---|
|   | *   |   | recognise and use factor pairs and commutativity in mental calculations (repeated)   | <p>identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.</p> <p>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</p> <p>recognise and use square numbers and cube numbers, and the notation for squared ( )<sup>2</sup> and cubed ( )<sup>3</sup></p>      | <p>identify common factors, common multiples and prime numbers</p> <p><i>calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm<sup>3</sup>) and cubic metres (m<sup>3</sup>), and extending to other units</i></p> <p>use their knowledge of the order of operations to carry out calculations involving the four operations</p> |
| <b>INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS</b>  |   |   |  |  |   |
|   |   | <i>estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)</i>  | <i>estimate and use inverse operations to check answers to a calculation (copied from Addition and Subtraction)</i>  |  | use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy  |
| <b>PROBLEM SOLVING X and /</b>  |   |   |  |  |   |
| 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 | solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts | 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 | 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 | <p>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</p> <p>solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</p> <p>solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates</p> | solve problems involving addition, subtraction, multiplication and division   |