

# Number: Addition and Subtraction with Reasoning

| NUMBER BONDS                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                             |        |        |        |        |
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| 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                                                                                                                                                                                                                                                    |        |        |        |        |
| <p><b>Continue the pattern</b><br/> <math>10 + 8 = 18</math><br/> <math>11 + 7 = 18</math><br/>                     Can you make up a similar pattern for the number 17?<br/>                     How would this pattern look if it included subtraction?</p> <p><b>Missing numbers</b><br/> <math>9 + \square = 10</math><br/> <math>10 - \square = 9</math></p> <p>What number goes in the missing box?</p> | <p><b>Continue the pattern</b><br/> <math>90 = 100 - 10</math><br/> <math>80 = 100 - 20</math><br/>                     Can you make up a similar pattern starting with the numbers 74, 26 and 100?</p> <p><b>Missing numbers</b><br/> <math>91 + \square = 100</math><br/> <math>100 - \square = 89</math></p> <p>What number goes in the missing box?</p> |        |        |        |        |

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| MENTAL CALCULATION                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                 |
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| 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:<br>* a two-digit number and ones<br>* a two-digit number and tens<br>* two two-digit numbers<br>* adding three one-digit numbers                                                                                                                        | add and subtract numbers mentally, including:<br>* a three-digit number and ones<br>* a three-digit number and tens<br>* a three-digit number and hundreds                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                | add and subtract numbers mentally with increasingly large numbers                                                                                                                                                                                                                                                                                    | perform mental calculations, including with mixed operations and large numbers                                                                                                                                                                                                                                                  |
| <b>Working backwards</b><br>Through practical games on number tracks and lines ask questions such as “where have you landed?” and “what numbers would you need to throw to land on other given numbers?”<br><br><b>What do you notice?</b><br>$11 - 1 = 10$<br>$11 - 10 = 1$<br>Can you make up some other number sentences like this involving 3 different numbers? | <b>True or false?</b><br>Are these number sentences true or false?<br>$73 + 40 = 113$<br>$98 - 18 = 70$<br>$46 + 77 = 123$<br>$92 - 67 = 35$<br>Give your reasons.<br><br><b>Hard and easy questions</b><br>Which questions are easy / hard?<br>$23 + 10 =$<br>$93 + 10 =$<br>$54 + 9 =$<br>$54 + 1 =$<br>Explain why you think the hard questions are hard? | <b>True or false?</b><br>Are these number sentences true or false?<br>$597 + 7 = 614$<br>$804 - 70 = 744$<br>$768 + 140 = 908$<br>Give your reasons.<br><br><b>Hard and easy questions</b><br>Which questions are easy / hard?<br>$323 + 10 =$<br>$393 + 10 =$<br>$454 - 100 =$<br>$954 - 120 =$<br>Explain why you think the hard questions are hard? | <b>True or false?</b><br>Are these number sentences true or false?<br>$6.7 + 0.4 = 6.11$<br>$8.1 - 0.9 = 7.2$<br>Give your reasons.<br><br><b>Hard and easy questions</b><br>Which questions are easy / hard?<br>$13323 - 70 =$<br>$12893 + 300 =$<br>$19354 - 500 =$<br>$19954 + 100 =$<br>Explain why you think the hard questions are hard? | <b>True or false?</b><br>Are these number sentences true or false?<br>$6.17 + 0.4 = 6.57$<br>$8.12 - 0.9 = 8.3$<br>Give your reasons.<br><br><b>Hard and easy questions</b><br>Which questions are easy / hard?<br>$213323 - 70 =$<br>$512893 + 300 =$<br>$819354 - 500 =$<br>$319954 + 100 =$<br>Explain why you think the hard questions are hard? | <b>True or false?</b><br>Are these number sentences true or false?<br>$6.32 + \square = 8$<br>$\square = 1.68$<br>Give your reasons.<br><br><b>Hard and easy questions</b><br>Which questions are easy / hard?<br>$213323 - 70 =$<br>$512893 + 37 =$<br>$8193.54 - 5.9 =$<br>Explain why you think the hard questions are hard? |

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|                                                                                                                                                  | <p><b>Other possibilities</b></p> <p><math>\square + \square + \square = 14</math></p> <p>What single digit numbers could go in the boxes? How many different ways can you do this?</p> |  |  |  |                                                                                                        |
| 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 |

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| <p><b>Fact families</b><br/>Which four number sentences link these numbers? 12, 15, 3</p> <p><b>What else do you know?</b><br/>If you know this:<br/><math>12 - 9 = 3</math><br/>what other facts do you know?</p> <p><b>Missing symbols</b><br/>Write the missing symbols (+ - =) in these number sentences:<br/>17 <input type="text"/> 3 <input type="text"/> 20<br/>18 <input type="text"/> 20 <input type="text"/> 2</p> | <p><b>Fact families</b><br/>Which four number sentences link these numbers?<br/>100, 67, 33</p> <p><b>What else do you know?</b><br/>If you know this:<br/><math>87 = 100 - 13</math><br/>what other facts do you know?</p> <p><b>Missing symbols</b><br/>Write the missing symbols (+ - =) in these number sentences:<br/>80 <input type="text"/> 20 <input type="text"/> 100<br/>100 <input type="text"/> 70 <input type="text"/> 30<br/>87 <input type="text"/> 13 <input type="text"/> 100</p> |  |  |  | <p><b>Missing symbols</b><br/>Write the missing signs (+ - x ÷) in this number sentence:<br/><math>6 \bigcirc 12.3 = 61.9 \bigcirc 11.9</math></p> <p><b>What else do you know?</b><br/>If you know this:<br/><math>86.7 + 13.3 = 100</math><br/>what other facts do you know?</p> |
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# Number: Addition and Subtraction with Reasoning

| WRITTEN METHODS                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |                                                                                                                                                                            |
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| read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs<br>(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)                                                                                                               |                                                                                                                                                                            |
| <p><b>Convince me</b><br/>In my head I have two odd numbers with a difference of 2. What could they be?<br/>Convince me</p> <p><b>Missing numbers</b><br/>Fill in the missing numbers (using a range of practical resources to support)<br/> <math>12 + \square = 19</math><br/> <math>20 - \square = 3</math></p> | <p><b>Convince me</b><br/>What digits could go in the boxes?<br/> <math>7 \square - 2 \square = 46</math><br/>                     Try to find all of the possible answers.<br/>                     How do you know you have got them all?<br/>                     Convince me</p> | <p><b>Convince me</b><br/> <math>\square \square + \square \square + \square \square</math><br/>                     The total is 201<br/>                     Each missing digit is either a 9 or a 1. Write in the missing digits.<br/>                     Is there only one way of doing this or lots of ways?<br/>                     Convince me</p> | <p><b>Convince me</b><br/> <math>\square \square \square - 666 = 8 \square 5</math><br/>                     What is the largest possible number that will go in the rectangular box?<br/>                     What is the smallest?<br/>                     Convince me</p> | <p><b>Convince me</b><br/> <math>\square \square \square + 1475 = 6 \square 24</math><br/>                     What numbers go in the boxes?<br/>                     What different answers are there?<br/>                     Convince me</p> | <p><b>Convince me</b><br/>                     Three four digit numbers total 12435.<br/>                     What could they be?<br/>                     Convince me</p> |

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## INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS

|                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                               |
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|                                                                                                                                                                                 | 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.                                                                                                                                                               |
| <b>Making an estimate</b><br>Pick (from a selection of number sentences) the ones where the answer is 8 or 9.<br><br><b>Is it true that?</b><br>Is it true that $3+4 = 4 + 3$ ? | <b>Making an estimate</b><br>Which of these number sentences have the answer that is between 50 and 60<br>$74 - 13$ $55 + 17$ $87 - 34$<br><br><b>Always, sometimes, never</b><br>Is it always, sometimes or never true that if you add three numbers less than 10 the answer will be an odd number | <b>Making an estimate</b><br>Which of these number sentences have the answer that is between 50 and 60<br>$174 - 119$<br>$333 - 276$<br>$932 - 871$<br><br><b>Always, sometimes, never</b><br>Is it always, sometimes or never true that if you subtract a multiple of 10 from any number the units digit of that number stays the same.<br>Is it always, sometimes or never true that when you add two numbers together you will get an even number | <b>Making an estimate</b><br>Which of these number sentences have the answer that is between 550 and 600<br>$1174 - 611$<br>$3330 - 2779$<br>$9326 - 8777$<br><br><b>Always, sometimes, never</b><br>Is it always sometimes or never true that the difference between two odd numbers is odd. | <b>Making an estimate</b><br>Which of these number sentences have the answer that is between 0.5 and 0.6<br>$11.74 - 11.18$<br>$33.3 - 32.71$<br><br><b>Always, sometimes, never</b><br>Is it always, sometimes or never true that the sum of four even numbers is divisible by 4. | <b>Making an estimate</b><br>Circle the number that is the best estimate to $932.6 - 931.05$<br>$1.3$ $1.5$ $1.7$ $1.9$<br><br><b>Always, sometimes, never</b><br>Is it always, sometimes or never true that the sum of two consecutive triangular numbers is a square number |

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| PROBLEM SOLVING                                                                                                                                                            |                                                                                                                                                                                                                                            |                                                                                                                               |                                                                                                                    |                                                                                                                      |                                                                                                                      |
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| 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:<br>* using concrete objects and pictorial representations, including those involving numbers, quantities and measures<br>* applying their increasing knowledge of mental and written methods | 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 |
|                                                                                                                                                                            | <i>solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change</i><br>(copied from Measurement)                                                                     |                                                                                                                               |                                                                                                                    |                                                                                                                      | Solve problems involving addition, subtraction, multiplication and division                                          |