

# Number sense

- This section investigates the pupil's sense of number.
- It checks whether they have a feel for the size of a quantity of objects without counting them one by one. It explores early knowledge of the way the number system is structured in groups of tens.
- Does the pupil have a counting strategy?

Questions	Star/tick	Comments
<p>Subitising</p> <p>2 4</p>		
<p>Estimating</p> <p>5 to 10 counters</p> <p>estimate count</p>		
<p>10 to 20 counters</p> <p>estimate count</p>		
<p>More than 20 counters</p> <p>estimate move or touch as they count</p>		
<p>Put counters into a line with a small gap after each 10</p>		

- Fingers     
  Subvocalising     
  Counting all     
  Counting on  
 Step-counting     
  Looking into space     
  Reasoning from known facts     
  Can't explain

# Counting and the number system

- Counting forms the basis of all calculation.
- Counting should be fluent without undue hesitation or pauses.
- The pupil should be able to count on from any number.

Questions	Star/tick	Comments
<p>Counting forwards in ones</p> <p>In ones forward from 1</p> <p>In ones forward from arbitrary points 7, 16, 29</p>		
<p>Counting backwards in ones</p> <p>From 10 back to 0</p> <p>From 15 back to 0</p> <p>From 20 back to 0</p> <p>From 60 back to 0</p>		

- Fingers
- Subvocalising
- Counting all
- Counting on
- Step-counting
- Looking into space
- Reasoning from known facts
- Can't explain

# Counting: across the decades and step-counting

- The pupil should be able to count across the decade boundaries.
- They should be able to step-count in tens, twos and fives.
- They should be able to count forwards and short distances backwards.

Questions	Star/tick	Comments
<p>Decade boundaries</p> <p>7</p> <p>16</p> <p>29</p> <p>76</p> <p>96</p>		
<p>Step-counting</p> <p>Counting forwards in tens</p> <p>In tens forwards to 100 or beyond</p>		
<p>Counting backwards in tens</p> <p>If starting from 50 is easy, ask them to count in 10s from a number such as 54</p>		
<p>Counting forwards in fives</p> <p>In fives forwards from 5 to 100 or beyond</p>		
<p>Counting backwards in fives</p>		
<p>Counting forwards in twos</p> <p>In 2s beyond 20</p> <p>In 2s from 7</p>		
<p>Counting backwards in twos</p>		

- Fingers     
  Subvocalising     
  Counting all     
  Counting on  
 Step-counting     
  Looking into space     
  Reasoning from known facts     
  Can't explain

# Writing and reading numbers

- Writing numbers: writing numbers is harder than reading numbers and so precedes the reading numbers section. Remember to stop after two or three errors.
- Reading numbers: find the level of their automatic knowledge. Stop after responses cease to be automatic.

Questions	Star/tick	Comments
<p><b>Writing numbers</b></p> <p>Write numbers to 10 Write numbers to 20</p>		
<p><input type="checkbox"/> 27 <input type="checkbox"/> 34 <input type="checkbox"/> 68 <input type="checkbox"/> 72, <input type="checkbox"/> 90 <input type="checkbox"/> 100  <input type="checkbox"/> 101 <input type="checkbox"/> 104 <input type="checkbox"/> 110 <input type="checkbox"/> 140 <input type="checkbox"/> 238 <input type="checkbox"/> 984  <input type="checkbox"/> 1,000 <input type="checkbox"/> 1,001 <input type="checkbox"/> 1,947 <input type="checkbox"/> 2,056 <input type="checkbox"/> 3,709</p>		
<p><b>Higher numbers</b></p> <p>If all correct continue with higher numbers. Vary zero position.</p> <p><input type="checkbox"/> 84,294 <input type="checkbox"/> 73,501 <input type="checkbox"/> 60,183 <input type="checkbox"/> 90,067  <input type="checkbox"/> 195,647 <input type="checkbox"/> 408,756 <input type="checkbox"/> 1,593,486  <input type="checkbox"/> 8,602,684</p>		
<p><b>Reading numbers</b></p> <p>Teacher writes numbers one at a time. Pupil reads each one. Stop after responses cease to be automatic.</p> <p><input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 7 <input type="checkbox"/> 11 <input type="checkbox"/> 13 <input type="checkbox"/> 30 <input type="checkbox"/> 17  <input type="checkbox"/> 70 <input type="checkbox"/> 84 <input type="checkbox"/> 91 <input type="checkbox"/> 100 <input type="checkbox"/> 147 <input type="checkbox"/> 207  <input type="checkbox"/> 476 <input type="checkbox"/> 670 <input type="checkbox"/> 817</p> <p>If all correct then:</p> <p><input type="checkbox"/> 2,943 <input type="checkbox"/> 7,240 <input type="checkbox"/> 16,835 <input type="checkbox"/> 70,068  <input type="checkbox"/> 956,327</p>		

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 Step-counting     
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  Can't explain

# Early calculation: addition +1

- Investigate flexibility of counting on one more from any number.
- Start with numbers under 10. Only proceed to numbers between 10 and 20 if the pupil is successful with single-digit numbers.
- Use the terms 'more than', 'add', 'plus' to express addition in this part of the assessment.

Questions	Star/tick	Comments
<p><b>Addition</b></p> <p>Understands: more add plus</p>		
<p><b>Oral addition: +1</b></p> <p>1 more than 5 4 add 1 7 plus 1 6 and 1</p> <p>1 more than 11 12 plus 1 14 and 1</p> <p>1 more than 36 49 and 1 70 plus 1</p>		
<p><b>Written addition: +1</b></p> <p>4 + 1 = 6 + 1 =</p> <p>28 + 1 = 39 + 1 = 80 + 1 =</p>		

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 Step-counting     
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  Can't explain

# Early calculation: addition +2

- Investigate flexibility of counting on two.
- Start with numbers under 10. Only proceed to numbers between 10 and 20 if the pupil is successful with single-digit numbers.
- Use the terms 'more than', 'add', 'plus' to express addition in this part of the assessment.

Questions	Star/tick	Comments
<p><b>Oral addition: +2</b></p> <p>2 more than 6 5 plus 2</p> <p>2 more than 13 17 add 2</p> <p>2 more than 39 67 add 2</p>		
<p><b>Written addition: +2</b></p> <p>5 + 2 = 7 + 2 =</p> <p>11 + 2 = 13 + 2 =</p> <p>43 + 2 = 29 + 2 = 59 + 2 =</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Early calculation: subtraction -1 and -2

- Investigate flexibility of counting back one or two from any number.
- Start with numbers under 10. Only proceed to numbers between 10 and 20 if the pupil is successful with single-digit numbers.
- Use the terms 'less than', 'take away', 'minus' to express subtraction in this part of the assessment.

Questions	Star/tick	Comments
<p><b>Oral subtraction: -1</b></p> <p>1 less than 3 7 take away 1 6 minus 1</p> <p>1 less than 14 19 minus 1 16 take away 1</p>		
<p><b>Written subtraction: -1</b></p> <p>3 - 1 = 8 - 1 = 16 - 1 = 20 - 1 =</p>		
<p><b>Oral subtraction: -2</b></p> <p>2 less than 8 5 take away 2 17 minus 2</p>		
<p><b>Written subtraction: -2</b></p> <p>9 - 2 = 15 - 2 =</p> <p>47 - 2 = 51 - 2 = 70 - 2 =</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Doubles

- A double is a number that is added to itself to obtain another number e.g.  $2 + 2$ .
- Check rote knowledge or automatic recall of doubles facts.

Questions	Star/tick	Comments
<p>Written doubles</p> <p><math>2 + 2</math> <math>2 + 3</math> <math>3 + 3</math> <math>4 + 4</math> <math>5 + 5</math> Another example</p>		
<p>Oral doubles</p> <p>7 plus 7 9 plus 9 8 plus 8</p> <p>20 plus 20 30 plus 30 50 plus 50</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |



# Dot pattern knowledge

- Check if the pupil can recognise and draw the dot patterns (1-6) as found on a conventional dice. (Note if they can recognise the patterns without counting.)
- Encourage the pupil to use their knowledge of dot patterns (1-6) to create new patterns of their own for the numbers 7, 8, 9 and 10.

Questions	Star/tick	Comments
<p><b>Dot Patterns</b></p> <p>Pupil recognises 3            Pupil recognises 5            Pupil recognises 6            Pupil draws pattern for 4            Pupil draws pattern for 6</p>		
<p><b>Look at the doubles patterns in 4 and 6.</b></p> <p>Pupil draws new doubles patterns.</p> <p>Doubles pattern for 8</p> <p>Doubles pattern for 10</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Number bonds 1 to 9

- Number bonds are two numbers that are combined to make another number:  $2 + 3 = 5$ .
- Investigate the pupil's knowledge of the structure of the numbers from 1 to 9.
- Key number bonds are doubles and near doubles.
- Other number bonds are the rest of the bonds for the numbers 1 to 9.

Questions	Star/tick	Comments
<p><b>Key number bonds</b></p> <p>Addition (missing addends)</p> <p><math>2 + \square = 3</math>  <math>2 + \square = 5</math>  <math>4 + \square = 8</math>  <math>3 + \square = 7</math>  <math>3 + \square = 6</math>  <math>4 + \square = 9</math></p> <p>Subtraction</p> <p><math>4 - 2 =</math>  <math>6 - 3 =</math>  <math>7 - 3 =</math>  <math>9 - 5 =</math></p>		
<p><b>Other number bonds</b></p> <p>Addition (missing addends)</p> <p><math>4 + \square = 6</math>  <math>2 + \square = 9</math>  <math>1 + \square = 5</math>  <math>3 + \square = 8</math></p> <p>Subtraction</p> <p><math>9 - 7 =</math>  <math>5 - 4 =</math>  <math>8 - 2 =</math>  <math>7 - 5 =</math></p>		

- Fingers     
  Subvocalising     
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  Counting on  
 Step-counting     
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  Can't explain

# Number bonds of 10 and above to 100

- The bonds of 10 are the pairs of numbers that add together to make 10.
- Bonds of 10 facts underpin calculation throughout the number system.
- It is very important to spend sufficient time investigating the pupil's knowledge of bonds of 10 and transference of knowledge of the bonds of 10 to higher numbers.

Questions	Star/tick	Comments
<p><b>Bonds of 10</b></p> <p>Addition (missing addend)</p> <p><math>9 + \square = 10</math>  <math>8 + \square = 10</math>  <math>5 + \square = 10</math>  <math>3 + \square = 10</math>  <math>4 + \square = 10</math></p> <p>Subtraction</p> <p><math>10 - 7 = \square</math>  <math>10 - 2 = \square</math>  <math>10 - 8 = \square</math>  <math>10 - 6 = \square</math></p>		
<p><b>Bonds through the decades</b></p> <p>Addition</p> <p><math>16 + \square = 20</math>  <math>24 + \square = 30</math>  <math>37 + \square = 40</math>  <math>52 + \square = 60</math></p> <p>Subtraction</p> <p><math>20 - 4 = \square</math>  <math>30 - 6 = \square</math>  <math>60 - 7 = \square</math>  <math>100 - 7 = \square</math></p>		
<p><b>Bonds of 100</b></p> <p>Addition</p> <p><math>90 + \square = 100</math>  <math>70 + \square = 100</math>  <math>30 + \square = 100</math></p> <p>Subtraction</p> <p><math>100 - 90 = \square</math>  <math>100 - 70 = \square</math>  <math>100 - 20 = \square</math></p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Place value: ten plus a single digit and bridging

- Check that they understand that in the place-value system units are added to units, tens to tens, and hundreds to hundreds.
- Transference of knowledge of 'ten plus a single digit' to higher numbers.
- Ability to use the strategies based on bridging and partitioning.

Questions	Star/tick	Comments
<p>Ten plus number</p> <p>10 + 4 = 10 + 7 =</p>		
<p>Tens plus number</p> <p>20 + 3 = 30 + 5 = 50 + 7 = 80 + 4 =</p>		
<p>Bridging</p> <p>Bridging forwards through ten</p> <p>9 + 3 = 8 + 4 = 7 + 5 = 6 + 5 =</p> <p>Bridging through tens</p> <p>19 + 3 = 28 + 4 = 36 + 5 = 87 + 6 =</p>		

- Fingers     
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 Step-counting     
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  Can't explain

# Place value: the value of digits

- Investigate understanding of the value of the digits in the place-value system.
- Use of place-value knowledge to calculate.
- Ability to use the strategies based on partitioning.

Questions	Star/tick	Comments
<p><b>Partitioning</b></p> <p>21 + 34 = 42 + 31 =</p>		
<p><b>Unit subtraction</b></p> <p>36 - 6 = 48 - 8 = 53 - 3 = 64 - 4 =</p>		
<p><b>Adding 1s, 10s, 100s, 1000s</b></p> <p>172 + 10 = 367 + 100 = 236 + 1 = 1354 + 1000 = 462 + 1000 =</p>		
<p><b>Subtracting 1s, 10s, 100s, 1000s</b></p> <p>135 - 1 = 142 - 10 = 356 - 100 = 2473 - 1000 =</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Place value: subtraction strategies

- Investigate the application of calculation strategies: doubles, bridging back, counting up (complementary addition).

Questions	Star/tick	Comments
<p>Doubles subtraction</p> <p>14 - 7 =            18 - 9 =            12 - 6 =            16 - 8 =</p>		
<p>Subtracting back (bridging back)</p> <p>23 - 4 =            52 - 5 =            63 - 5 =            73 - 6 =</p>		
<p>Counting on (complementary addition, the shopkeeper's method)</p> <p>73 - 65 =            26 - 17 =            52 - 37 =            27 - 15 =</p>		

- Fingers     
  Subvocalising     
  Counting all     
  Counting on  
 Step-counting     
  Looking into space     
  Reasoning from known facts     
  Can't explain

# Multiplication tables

- Check which tables the pupil knows.
- Find out which words they use to talk about multiplication.

Questions	Star/tick	Comments
<p>The language of tables and reasoning ability</p> <p>2 x 3</p> <p>6 x 2 =</p> <p>10 x 3 =</p> <p>5 x 3 =</p> <p>6 x 3 =</p> <p>5 x 8 =</p> <p>6 x 8 =</p>		

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# Multiplication: counter demonstration

- Investigate whether the pupil understands what the tables represent.

Questions	Star/tick	Comments
<p>Counter demonstration</p> <p>Pupil shows 3x5 Pupil shows 3x2</p>		
<p>Give the pupil 10 counters.</p> <p>Ask them to show 3 twos.</p> <p>Ask them to show 2 threes.</p>		

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# Division

- Check automatic recall of division facts, and the use of vocabulary associated with division.
- Find out how the pupil solves division problems.
- Can they use the group concept correctly or do they always revert to sharing.

Questions	Star/tick	Comments
<p><b>Oral division</b></p> <p>How many twos make 8?</p> <p>How many threes do you need to build 15?</p> <p>What is 30 divided by 5?</p> <p>How many 5s in 30?</p>		
<p><b>Written division</b></p> <p>Ask the pupil to write the answer.</p> <p><math>10 \div 2 =</math></p> <p><math>20 \div 5 =</math></p> <p><math>12 \div 4 =</math></p> <p><math>42 \div 6 =</math></p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Word problems: addition, multiplication and subtraction

- Find out if the pupil can understand word problems and use the appropriate arithmetical operation to solve them.
- Keep the wording very simple to create a straightforward word problem of a particular type.

Questions	Star/tick	Comments
<p><b>Word problems</b></p> <p><b>Addition: combine</b>            Jon had 6 sweets. Mum gave him 3 more.            How many sweets does Jon have?</p>		
<p><b>Multiplication:</b>            repeated addition            There are 4 ponds.            2 ducks on each pond.            How many ducks are there?</p>		
<p><b>Subtraction: change</b>            There are 7 ducks on the pond.            A gun makes a bang. 3 ducks fly away.            How many ducks are there now?</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Word problems: division

- Find out if the pupil can understand division word problems and solve them by using the concept of grouping or sharing.
- Keep the wording very simple to create a straightforward word problem.

Questions	Star/tick	Comments
Grouping or sharing word problems		
Division by grouping  12 girls are told to get into teams with 3 in each team. How many teams will there be?		
Division by sharing  You have 24 apples to put into bags. You have 6 bags. How many apples in each bag?		

- Fingers
- Subvocalising
- Counting all
- Counting on
- Step-counting
- Looking into space
- Reasoning from known facts
- Can't explain

# Formal written numeracy: addition and subtraction

- Investigate how the pupil performs written maths problems.
- Observe the order in which the steps of the calculation are carried out.
- Note if they are able to apply the principle of exchange correctly.

Questions	Star/tick	Comments
<p><b>Addition</b></p> <p>Add 23 and 45.</p> <p>42 <u>36</u> +</p> <p>35 <u>47</u> +</p> <p>105 <u>657</u> +</p> <p>4067 <u>3425</u> +</p> <p>67 + 532 + 4</p>		
<p><b>Subtraction</b></p> <p>Write these on squared paper.</p> <p>27 <u>13</u> -</p> <p>64 <u>17</u> -</p> <p>134 <u>65</u> -</p> <p>1003 <u>539</u> -</p>		

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| <input type="checkbox"/> Step-counting | <input type="checkbox"/> Looking into space | <input type="checkbox"/> Reasoning from known facts | <input type="checkbox"/> Can't explain |

# Formal written numeracy: multiplication

- Check understanding of multiplication and division.
- Find out if they can use standard written algorithms.
- Check correct use of zero as a place holder.
- Observe the order in which procedures are carried out.

Questions	Star/tick	Comments
<p>Multiplication</p> <p>12 <u>6</u> x</p> <p>13 <u>6</u> x</p> <p>10 <u>8</u> x</p> <p>5 <u>8</u> x</p> <p>15 <u>8</u> x</p>		
<p>Long multiplication</p> <p>23 <u>10</u> x</p> <p>23 <u>15</u> x</p> <p>27 <u>4</u> x</p>		

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