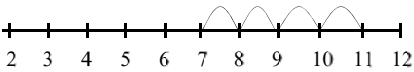
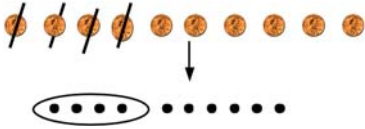
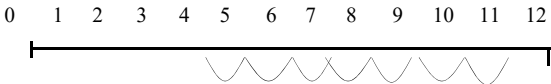
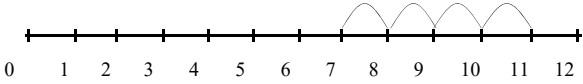
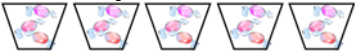





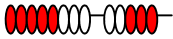
St Gregory's Calculation Policy

Updated January 2017 | Mr. R Heard, Mathematics Coordinator

Calculation Policy: Year 1

| Addition | Subtraction |
|---|--|
| <p>The + and = signs and missing numbers</p> <p>Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.</p> <p>Example $2 = 1 + 1$ $2 + 3 = 4 + 1$ $3 = 3$ $2 + 2 + 2 = 4 + 2$</p> <p>Missing numbers need to be placed in all possible places.</p> $3 + 4 = \quad = 3 + 4$ $3 + \quad = 7 \quad 7 = \quad + 4$ $\quad + 4 = 7 \quad 7 = 3 + \quad$ <p>Use of prepared number lines and concrete objects</p>  <p>Children are encouraged to record by drawing jumps on prepared lines.</p> | <p>The - and = signs and missing numbers</p> <p>The notes opposite are relevant here.</p> $7 - 3 = \quad = 7 - 3$ $7 - \quad = 4 \quad 4 = \quad - 3$ <p>Use of pictures, marks and concrete objects. Sam spent 4p. What was his change from 10p?</p>  <p>Number Lines Example- Counting Back/Down</p> $11 - 7$  <p>Example- Counting On/Up The difference between 7 and 11</p>  <p>Children are encouraged to record by drawing jumps on prepared lines and constructing their own lines.</p> |
| Multiplication | Division |
| <p>Use of pictures and objects There are 3 sweets in one bag. How many sweets are there in 5 bags?</p>  <p>Count in multiples of one, two, five and ten</p> | <p>Use of pictures and objects or marks 12 children get into teams of 4 to play a game. How many teams are there?</p>  |

Counting steps using bead string and on prepared number lines.



Counting in multiples using a range of objects, e.g. pairs of legs on animals; fingers in gloves etc.

Use of arrays

Counting in rows and columns



Two groups of three is six
Three groups of two is six

So $6 = 2 + 2 + 2$ or $6 = 3 + 3$

Sharing

6 bugs are shared between 2 spiders. How many do they have each?



Make use of practical activities involving sharing, e.g. distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.

Calculations Policy: Year 2

Addition

The + and = signs and missing numbers

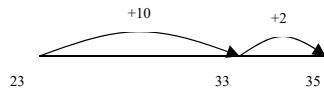
Continue using a range of equations (See Year 1) but with appropriate, larger numbers as specified in Year 2 level standards, i.e. extend to $14 + 5 = 10 +$ and $32 + + = 100$ $35 = 1 + + 5$.

Partition into tens and ones and recombine

$$\begin{aligned} 12 + 23 &= 10 + 2 + 20 + 3 \\ &= 30 + 5 \\ &= 35 \end{aligned}$$

Partitioning the second number only

$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$



Example: Add 9 or 11 by adding 10 and adjusting by 1

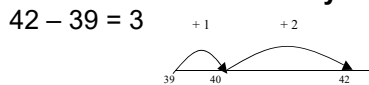
$35 + 9 = 44$ ($35 + 10 = 45$ Therefore $45 - 1$)

Subtraction

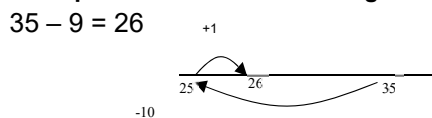
The – and = signs and missing numbers

Continue using a range of equations (See Year 1) but with appropriate numbers in relation to Year 2 level standards, i.e. extend to $14 + 5 = 20 - 1$.

Find a small difference by counting up



Example: Subtract 9 or 11 & begin to add/subtract 19 or 21



Use known number facts and place value to subtract

(Partition second number only) $37 - 12 = 27$

$$\begin{aligned} &= 37 - 10 - 2 \\ &= 27 \end{aligned}$$

$= 25$

Multiplication

The x and = signs and missing numbers

$$\begin{aligned} 7 \times 2 &= &= 2 \times 7 \\ 7 \times &= 14 \\ \times 2 &= 14 & 14 \\ &= 2 \times \end{aligned}$$

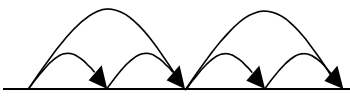
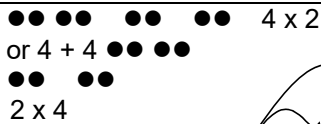
Use materials, arrays, repeated addition (including solving problems in context)

Division

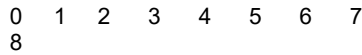
MD2.1, MD2.2 & MD2.4 The ÷ and = signs and missing numbers

$$\begin{aligned} 6 \div 2 &= &= 6 \div 2 \\ 6 \div &= 3 & 3 = 6 \div \\ \div 2 &= 3 & 3 = \div 2 \end{aligned}$$

MD2.5 Use materials, arrays, repeated addition (including solving problems in context)
Use of sharing and grouping

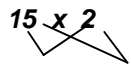


Or repeated addition



$2 + 2 + 2 + 2$

Partitioning



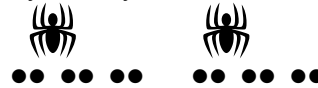
OR

| | | |
|---|----|----|
| x | 10 | 5 |
| 2 | 20 | 10 |

$20 + 10 = 30$

Sharing

6 bugs are shared between 2 spiders. How many do they have each?



Grouping

There are 6 sweets.

How many people can have 2 each? (How many 2's make

6?)



Find and name fractions of length, shape and sets of objects and quantities

Use of diagrams- count all equal parts to determine denominator. Link to division into equal groups/parts.

Calculations Policy: Year 3

Addition

The + and = signs and missing numbers

Continue using a range of equations as in Year 1 and Year 2 but with appropriate larger numbers specified in the level standards.

Progression in mental calculations with larger numbers

Calculate HTU + U

Calculate HTU + TU

Calculate HTU + HTU

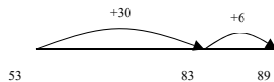
Progress from no crossing of boundaries to crossing of boundary.

Partition into tens and ones and recombine

Develop from Year 2- partitioning both numbers and recombining.

Refine to partitioning the second number only:

$36 + 53 = 53 + 30 + 6$
 $= 83 + 6$
 $= 89$



Add a near multiple of 10 to a two-digit number

Continue work from Year 2 but with appropriate numbers: $35 + 19$ is the same as $35 + 20 - 1$.

Formal methods of column addition to add numbers with up to three digits

285
 $+73$
 8
 150
 200
 358

Subtraction

The - and = signs and missing numbers

Continue using a range of equations as in Year 1 and Year 2 but with appropriate larger numbers specified in the level standards.

Find a small difference by counting up

Continue from Year 2 but with appropriate numbers, e.g. $102 - 97 = 5$

Subtract mentally a 'near multiple of 10' to or from a two-digit number, extending to three digit numbers

Continue as in Year 2 but with appropriate numbers e.g. $78 - 49$ is the same as $78 - 50 + 1$

Progression in mental calculations with larger numbers

Calculate HTU - U

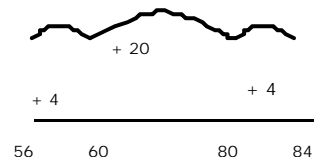
Calculate HTU - T

Calculate HTU - H

Progress from no crossing of boundaries to crossing of boundary.

Complementary addition

$84 - 56 = 28$



Formal methods of column subtraction to subtract numbers with up to three digits

See Appendix 1 examples in Year 5 and Year 6 section of this document.

Extend to decimals in the context of money

$$\begin{array}{r} \pounds 2.50 + \pounds 1.75 \\ \pounds 2.50 \\ + \pounds 1.75 \\ \hline \pounds 4.25 \\ 1 \end{array}$$

The expanded method should be used if children experience persisting difficulties.

*From Year 3 onwards, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.

*From Year 3 onwards, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.

Multiplication

The x and = signs and missing numbers Continue using a range of equations as in Year 2 but with appropriate numbers in relation to grade-level standards.

TU x U

Use known facts x3, x4, x8 (Year 3 grade-level standards) and x2, x5 and x10 (Year 2 grade-level standards).

| | | | | | |
|---|----|----|---|----|---|
| x | 30 | 5 | x | 30 | 2 |
| 2 | 60 | 10 | 3 | 90 | 6 |

At Year 3, children progress to using more formal written methods. In this case, the grid method drawing on knowledge of place value, multiplication facts and their ability to recombine partitioned numbers to derive an answer.

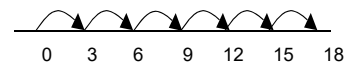
*From Year 3 onwards, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.

Division

The ÷ and = signs and missing numbers Continue using a range of equations as in Year 2 but with appropriate numbers in relation to grade-level standards.

TU ÷ U Grouping

How many 3s make 18?



Remainders

$16 \div 3 = 5 \text{ r}1$

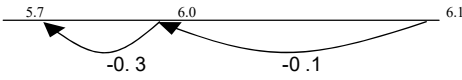
Sharing – There are 16 sweets shared between 3, how many left over?

Grouping – How many 3s make 16, how many left over?



Children with secure knowledge of multiplication facts and subtraction may progress to ‘chunking’ where TU are divided by U.

*From Year 3 onwards, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.

| Addition | Subtraction |
|---|---|
| <p>The + and = signs and missing numbers Continue using a range of equations as in Key Stage 1 and Year 3 but with appropriate numbers.</p> <p>Partition into hundreds, tens and ones and recombine Either partition both numbers and recombine or partition the second number only e.g. $358 + 73 = 358 + 70 + 3$ $= 428 + 3$ $= 431$</p> <p>Add or subtract the nearest multiple of 10 or 100, then adjust Continue as in Year 2, 3 and 4 but with appropriate numbers e.g. $458 + 79$ is the same as $458 + 80 - 1$</p> <p>Addition of numbers with at least four digits using formal method of columnar addition</p> $ \begin{array}{r} 358 \\ + \\ \underline{7} \\ \underline{3} \\ \underline{4} \\ \underline{3} \\ \underline{1} \\ 111 \end{array} $ $ \begin{array}{r} 3587 \\ + \underline{67} \\ \underline{5} \\ \underline{426} \\ \underline{2} \\ 111 \end{array} $ <p>The formal, efficient method of columnar addition will involve crossing of boundaries (at the tens, hundreds and/or thousands). Take a systematic approach to teaching this looking at crossing each boundary in turn before mixed practice.</p> <p>Revert to expanded method if children experience difficulties.</p> <p>Extend addition to decimals (same number of decimals places) and adding several numbers (with different numbers of digits).</p> <div data-bbox="137 1664 756 1883" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>As specified in Year 3, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.</p> </div> | <p>The – and = signs and missing numbers Continue using a range of equations as in Key Stage 1 and Year 3 but with appropriate numbers.</p> <p>Differences Find a difference by counting up, e.g. $8006 - 2993 = 5013$. This can be modelled on an empty number line.</p> <p>Use known number facts and place value to subtract $6.1 - 0.4 = 5.7$</p>  <p>Subtraction with at least four digits using formal method of columnar subtraction For instance, $6467 - 2684 = 3783$ Using expanded column subtraction where children experience difficulty with decomposition and need to 'see' this.</p> <p>Extend subtraction to decimals (same number of decimals places) and adding several numbers (with different numbers of digits)</p> <div data-bbox="821 1070 1422 1323" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>As specified in Year 3, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.</p> </div> |
| Multiplication | Division |
| <p>The x and = signs and missing numbers Continue using a range of equations but with appropriate numbers for Year 4.</p> | <p>The ÷ and = signs and missing numbers Continue using a range of equations but with appropriate numbers for Year 4.</p> |

TU x U (See Year 3) and HTU x U

(Introduced in Year 4 grade-level standards).

Partition

$$23 \times 4 = 92$$

$$\begin{aligned} 23 \times 4 &= (20 \times 4) + (3 \times 4) \\ &= (80) + (12) \\ &= 92 \end{aligned}$$

Use the grid method of multiplication

23 x 7 is approximately 20 x 10 = 200

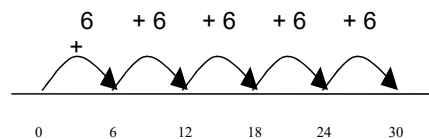
| | | |
|---|-----|----|
| x | 20 | 3 |
| 7 | 140 | 21 |

As specified in Year 3, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.

Sharing and grouping $30 \div 6$

6 can be modelled as:

Grouping – groups of 6 taken away and the number of groups counted e.g.

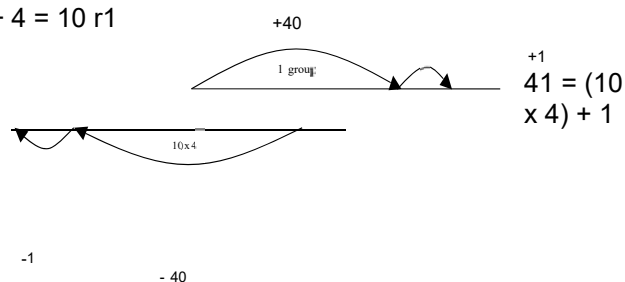


Sharing – sharing among 6, the number given to each person.

Remainders

Note three approaches below:

$$41 \div 4 = 10 \text{ r}1$$



TU ÷ U

$72 \div 5$ lies between $50 \div 5 = 10$ and $100 \div 5 = 20$

$$\begin{array}{r} 72 \\ - 50 \quad (10 \text{ groups}) \text{ or } (10 \times 5) \\ \hline 22 \\ - 20 \quad (4 \text{ groups}) \text{ or } (4 \times 5) \\ \hline 2 \end{array} \quad \text{Answer: } 14 \text{ remainder } 2$$

HTU ÷ U

Can progress from no remainder to remainders. Where remainders are involved, care needs to be taken to ensure they are interpreted correctly in context of problems.

$256 \div 7$ lies between $210 \div 7 = 30$ and $280 \div 7 = 40$

$$\begin{array}{r} 256 \\ - 70 \quad (10 \text{ groups}) \text{ or } (10 \times 7) \\ \hline 186 \\ - 140 \quad (20 \text{ groups}) \text{ or } (20 \times 7) \\ \hline 46 \\ - 42 \quad (6 \text{ groups}) \text{ or } (6 \times 7) \\ \hline 4 \end{array} \quad \text{Answer: } 36 \text{ remainder } 4$$

As specified in Year 3, teachers need to keep in mind the methods specified in grade-level standards for end of Key Stage 2 (See Year 5 and Year 6 Calculation Policy Document). Children should be developing their capacity to use formal written methods for all four number operations.

Calculations Policy: Year 5 and Year 6

Addition & Subtraction

Column Addition & Subtraction

789 + 642 becomes

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline \end{array}$$

Answer: 1431

874 - 523 becomes

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \\ \hline \end{array}$$

Answer: 351

932 - 457 becomes

$$\begin{array}{r} \overset{8}{9} \overset{12}{3} \overset{1}{2} \\ - 457 \\ \hline 475 \\ \hline \end{array}$$

Answer: 475

932 - 457 becomes

$$\begin{array}{r} \overset{1}{9} \overset{1}{3} \overset{1}{2} \\ - 457 \\ \hline 475 \\ \hline \end{array}$$

Answer: 475

Multiplication & Division

Short Multiplication

24 × 6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ \hline \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ \hline \end{array}$$

Answer: 16 446

Short Division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 45 \text{ r}1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$$

Answer: 45 $\frac{1}{11}$

Long Multiplication

24 × 16 becomes

$$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$$

Answer: 3224

Long Division

432 ÷ 15 becomes

$$\begin{array}{r}
 28 \text{ r } 12 \\
 15 \overline{) 432} \\
 \underline{300} \\
 132 \\
 \underline{120} \\
 12
 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r}
 28 \\
 15 \overline{) 432} \\
 \underline{300} \quad 15 \times 20 \\
 132 \\
 \underline{120} \quad 15 \times 8 \\
 12
 \end{array}$$

$$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$$

Answer: $28 \frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r}
 28.8 \\
 15 \overline{) 432.0} \\
 \underline{300} \quad \downarrow \\
 132 \\
 \underline{120} \quad \downarrow \\
 120 \\
 \underline{120} \\
 0
 \end{array}$$

Answer: 28.8