

Newton Primary School

Calculations Policy

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Introduction

This Calculations Policy has been designed to support teachers, teaching assistants and parents in the progression of all four number operations (addition, subtraction, multiplication and division).

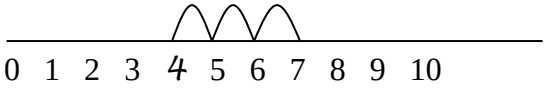
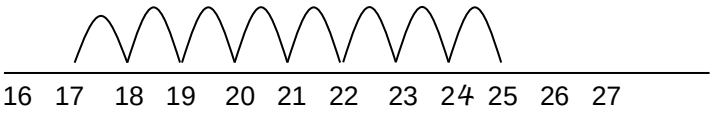
Year groups have been shown for each calculation technique to explain in detail, using what makes good, show the expected teaching level for the majority of children. More able pupils may embed the skills more quickly and therefore may be taught skills which are above their current year group; conversely, pupils who are less able may be working at a level below their year group. It should be noted that pupils should not move beyond the teaching for their year group until they have not only mastered the skill but can also apply the skills in a variety of contexts and real-life problems.

Recording of work

1. When using squared paper, one number should be placed in each square.
2. Sums are to be written down the page with one line left between each.
3. The decimal place should be put on the vertical line between 2 squares.
4. Pupils should always estimate the answer first before carrying out the calculation. At the end, the estimate should be checked against the answer so that unnecessary mistakes are not made.
5. When using number lines, addition jumps go above the line and subtraction jumps go below the line.
6. When writing vertical sums, the symbol should be placed on the left hand side.
7. If the sum can be done mentally then there is no need to show a formal written method.
8. Jottings should be shown in books (not done on white boards or scrap paper).
9. A number sentence refers to the calculation sum, i.e. 6 + 4 = 10, 7 x 8 = 56.
10. When labelling columns, the following notation should be used:

M	**,**	**H Th**	**T Th**	**Th**	**,**	**H**	**T**	**U**	**.**	**t**	**h**	**th**
Million		**Hundred Thousand**	**Ten Thousand**	**Thousands**		**Hundreds**	**Tens**	**Units**		**Tenth**	**Hundredth**	**thousandth**

11. Commas should be used to separate hundreds, thousands and millions. (Commas are associated to millions and thousands.)

YEAR	ADDITION
Nursery and Reception	Pupils start Foundation Phase by learning number names and the values of each digit with lots of pictorial representation and hands-on maths. They then learn to add by counting on using a number track. They learn to recognise one more or one less, initially up to 10 which is then extended up to 20 when pupils are ready before they move on to slightly bigger numbers. They find the total using counting on and record their calculations as a number sentence. **What Makes Good – Counting On (Nursery)** 1. Listen to instructions. 2. Point to every object and count each one. 3. Add one more object. 4. Count the objects again. 5. Show an adult your work. **What Makes Good – Counting On (Reception)** 1. Collect the number of objects you need. 2. Ask yourself how many there are altogether. 3. Count the number of objects aloud, point to each object in turn. 4. Show an adult your work. Pupils are introduced to the concept of number bonds/pairs to 10 and doubles up to 5 + 5.
YEAR 1	In Year 1, pupils learn how to add by counting on using either number lines, 100 squares, dienes cubes or Numicon. They learn how to add a single digit to 10 and then 20. Number bonds to 10, moving on to 20, also feature heavily in this year group as does learning number doubles to 10 + 10. **What Makes Good – Counting On Using a Number Line/Number Squares** 1. What do you have to do? (Count on) 2. Use the mathematical words you have heard. 3. Use a number line or number square. 4. Find the number that you are counting on from. 5. Cover the number with your finger. 6. Count on after your finger the number of moves you need. 7. Check your answer. **Counting On Using a Number Line** Example: 4 + 3 = 7  Example: 17 + 8 = 25  **Example of a Number Square**

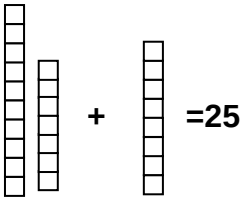
		3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What Makes Good – Counting On Using Equipment

1. Find the tiles / rods and cubes.
2. Use the mathematical words you have heard.
3. What do you have to do? (*Count on*)
4. Set up your number sentence.
5. Add to find the total.
6. Check your answer.

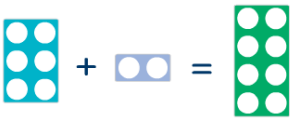
Counting On Using Dienes Cubes

Example: 17 + 8 = 25



Counting On Using Numicon

Example: 6 + 2 = 8



YEAR 2

Year 2 extend their knowledge of addition using the partitioning method to add 1 and 2-digit numbers up to 100 (and beyond for the more able). Pupils continue to use partitioning of numbers on number lines as well as 100 squares, pictorial representations, dienes cubes and Numicon. Also, pupils are expected to know their number bonds to 20.

What Makes Good – Counting On Using a Number Square

1. What do you have to do? (*Count on*)
2. Use the mathematical words you have heard.
3. Use a number square.
4. Find the number that you are counting on from.
5. Cover the number with your finger.
6. Count on after your finger the number of moves you need. Add the tens and then the units.
7. Check your answer.

		3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

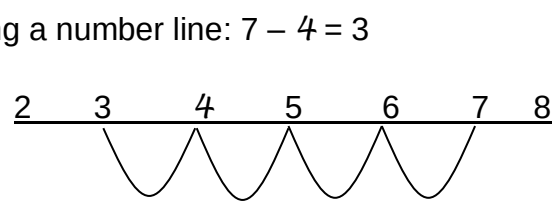
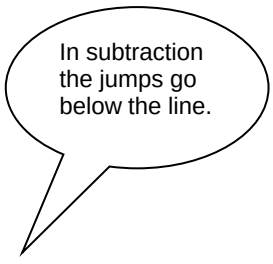
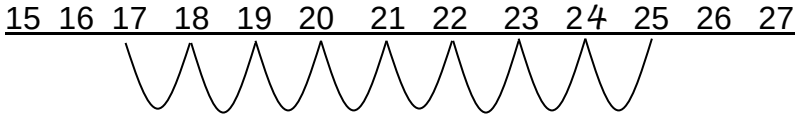
What Makes Good – Partitioning

1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Break down (partition) into tens and units.

	4. Add the tens. 5. Add the units. 6. Add the totals together to find the final answer. 7. Check your answer by looking at the estimate. **Partitioning** Example: 23 + 14 = 37 23 → 20 + 3 14 → 10 + 4 20 + 10 = 30 3 + 4 = 7 30 + 7 = 37
YEAR 3	Year 3 move on to the standard written method of addition. **What Makes Good – Standard Written Method** 1. Estimate the answer by rounding. 2. Use the mathematical words you have heard. 3. Write the 2 numbers vertically, the biggest number is on the top. 4. Put the add sign on the left hand side of the sum. 5. Keep the digits in their HTU column. 6. Start with the units and add them, putting the answer below the line. 7. Add the tens digits together and put the answer under the units answer. 8. Add the two numbers together. 9. Underline the answer and then check against the estimate. **Standard Written Method** Example: 42 + 35 = 77 Estimate: 40 + 40 = 80 42 + 35 7 (5 + 2) 70 (40 + 30) 77 Example: 76 + 47 = 123 Estimate: 80 + 50 = 130 76 + 47 13 (6 + 7) 110 (70 + 40) 123
YEAR 4	Year 4 consolidate the standard written method taught in year 3 and move onto addition sums which lead to 'carrying over'. Pupils work with 2 and 3 digit numbers. **What Makes Good – Standard Written Method (carrying)**: 1. Estimate the answer by rounding. 2. Use the mathematical words you have heard. 3. Write the 2 numbers vertically where the biggest number is on the top. 4. Put the add sign on the left hand side of the sum. 5. Keep the digits in their HTU column. Draw two lines

	6. Start with the units and add the 2 together, putting the answer below the first line. (If the total is greater than 9, then carry the tens into the next column, putting the answer below the second line.) 7. Add the tens digits together and put the answer below the first line. Remember to add the tens you have carried over. (If the tens total is greater than 10 then carry the 100s into the next column, putting the answer below the second line.) 8. Add the hundreds digits together and put the answer below the first line. Remember to add the hundred you have carried over. 9. Check the answer against the estimate. **Standard Written Method** Example: 76 + 47 = 123 Estimate: 80 + 50 = 130 7 6 + 4 7 12 3 1 Children move on to 3 and 4 digit numbers when they are ready Example: 176 + 47 = 223 Estimate: 180 + 50 = 230 1 7 6 + 4 7 2 2 3 1 1 Example: 176 + 147 Estimate: 180 + 150 = 330 1 7 6 + 1 4 7 3 2 3 1 1 In addition year 4 extend learning into the skills of adding decimals, particularly with measures and money. **What Make Good – Standard Written Method with Decimals** 1. Estimate the answer by rounding. 2. Use the mathematical words you have heard. 3. Write one number in each square and put the decimal place on the vertical line between 2 squares. 4. Ensure whole numbers, tenths and hundredths are lined up. 5. Complete the sum as you would for whole numbers. **Standard Written Method** Example: £3.45 + £2.27 = £5.72 Estimate: £3.00 + £2.00 = £5.00 £ 3. 4 5 + £ 2. 2 7 £ 5. 7 2 1 Example: 16.2 cm + 8.5 cm = 24.7 cm Estimate: 16 cm + 9 cm = 25 cm 1 6. 2 cm + 8. 5 cm 2 4. 7 cm 1
YEAR 5	Year 5 consolidate the standard written method taught in year 4 and extend their skills to include multiple number addition sums. Pupils work with 3 and 4 digit numbers. In addition they learn to deal with mixed decimals. **What Makes Good – Standard Written Method (carrying)** 1. Estimate the answer by rounding. 2. Use the mathematical words you have heard. 3. Write the numbers vertically where the biggest number is on the top.

	4. Keep the digits in their ThHTU / HTU column. 5. Start with the units and add the 2 together, putting the answer below the first line. (If the total is greater than 9, then carry the tens into the next column, putting the answer below the second line.) 6. Add the tens digits together and put the answer below the first line. Remember to add the tens you have carried over. (If the tens total is greater than 10 then carry the 100s into the next column, putting the answer below the second line.) 7. Add the hundreds digits together and put the answer below the first line. Remember to add the hundreds digit you have carried over. (If the hundreds total is greater than 10 then carry the 1000s into the next column, putting the answer below the second line.) 8. Add the thousands digit together and put the answer below the first line. 9. Check the answer against the estimate. Example: 4,623 + 1,787 = 6,410 Estimate: 4,600 + 1,800 = 6,400 or 5,000 + 2,000 = 6,000 4 , 6 2 3 + 1 , 7 8 7 6 , 4 1 0 ~~1 1 1~~ **What Makes Good – Standard Written Method with Mixed Decimals** 1 Estimate the answer by rounding 2. Use the mathematical words you have heard. 3. Ensure all digits are in their place value columns and the decimal point is correctly positioned. 4. Add a zero to ensure both numbers have the same number of digits after the decimal place (to hold the place value) 5. Complete the sum as you would for normal decimals starting with the numbers on the right hand side. Example: 18.07 + 3.283 = 21.353 Estimate: 18 + 3 = 21 1 8. 0 7 **0** + 3. 2 8 3 2 1. ~~3~~ 5 3 ~~1~~
YEAR 6	In Year 6, pupils consolidate their knowledge of addition using a method of their choice. They will extend their skills to include adding 5 digit number.

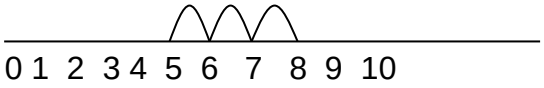
YEAR	SUBTRACTION
Nursery and Reception	Pupils start Foundation Phase by learning number names and the values of each digit with lots of pictorial representation and hands-on maths. They learn to remove a smaller number from a larger number and find how many are left by counting the objects that are left. Pupils learn to record their calculations as number sentences. **What Makes Good – Counting Back using a Number Line (Nursery)** 1. Count each object. 2. Take one away. 3. Count objects again. 4. Show adult your work. **What Makes Good – Counting Back using a Number Line (Reception)** 1. Collect the objects you need. 2. Take away the given amount. 3. Count the number of objects again. 4. Check your answer.
YEAR 1	In year 1, pupils learn how to subtract by counting on and back, using number lines, 100 squares, dienes cubes and Numicon. They learn how to subtract a single digit from10 and then 20 and understand the operation of subtraction as take away or difference. They also begin to recognise the relationship between addition and subtraction. **What Makes Good – Counting Back** 1. Use a number line or number square. 2. Use the mathematical words you have heard. 3. Find the number you are counting back from. 4. Cover the starting number with your finger. 5. Count back, before your finger, the moves you need. 6. Check your answer. Example using a number line: 7 – 4 = 3   Example using a number line: 25 – 8 = 17  **Example of a Number Square**

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What Makes Good – Counting On

1. Use a number line or number square.
2. Use the mathematical words you have heard.
3. Find the number you are counting on from.
4. Cover the number with your finger.
5. Count on, after your finger, the moves you need.
6. Check your answer by counting back from the number you found the moves you need.
7. Recognise the relationship between addition and subtraction.

Example using a number line: 8 – 5 = 3

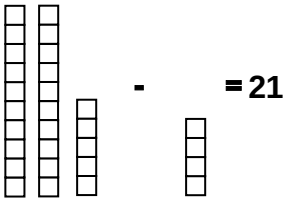


What Makes Good – Counting On and Back Using Equipment

As above replacing number line or number square with Dienes or Numicon.

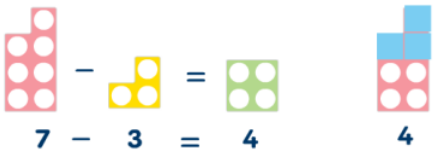
Counting Back Using Dienes Cubes

Example: 25 – 4 = 21



Counting Back Using Numicon

Example: 7 – 3 = 4



YEAR 2

Pupils in year 2 move on to counting on and back on an empty number line. They learn to subtract multiples of 10, without crossing 100, the more able will go beyond 100.

What Makes Good – Counting Back

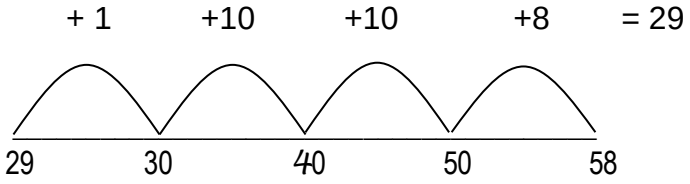
1. Estimate the answer *(Remember the number will be less).*
2. Ask yourself "What do I have to do?" *(Count back a given number.)*
3. Using the number square find the number you are counting back from, cover with your finger.
4. Start counting back from the number before your finger. Subtract the tens and then the units.
5. Check your answer by adding the number back on.
6. Check your answer against the estimate.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What Makes Good – Subtraction using a Number Line (with bigger numbers)

1. Estimate the answer *(Remember the number will be less).*
2. Draw a line – smallest number on left, largest number on right.
3. Count from the smallest to the first friendly ten.
4. Count on in ones (units) and then in tens to the largest number.
5. Add the tens and units.
6. Check your answer.

Example: 58 – 29 = 29



YEAR 3

In year 3, pupils start to learn a more formal written method which is the pre-cursor to vertical subtraction. They work with 2 and 3 digit numbers. In this, the numbers are partitioned so that pupils can recognise the technique.

What Makes Good – Subtraction with Partitioning

1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Write the 2 numbers vertically where the biggest number is on the top.
4. Partition the numbers keeping them in their place value columns.
5. Start with the units, subtract the bottom unit from the one above, putting the answer below the first line.
6. Subtract the bottom tens from the one above and put the answer below the first line. Continue if there are hundreds.
7. Check the answer using the estimate.

It is good practise to check by doing the inverse operation, so in the first example below the number sentence would be 32 + 43 = 75.

Subtraction using Partitioning

Example: 75 – 32 = 43

Estimate: 75 – 30 = 45

	70	5
-	30	2
	40	3 (40 + 3 = 43)

Example: 563 – 241 =322

Estimate: 560 – 240 = 320

or 600 – 200 = 400

	500	60	3	
-	200	40	1	
	300	20	2	(300 + 20 + 2 = 322)

If the pupils are confident in their knowledge of place value they will be reminded that they can do some sums mentally by either taking away the units then the tens or use their number bonds to count on.

The more able pupils move on to numbers that require decomposition, otherwise known as 'exchanging' or 'borrowing'. In this, the golden rule is that if a number is bigger on the bottom then you cannot take it away from a smaller number on the top.

What Makes Good – Subtraction Using Partitioning with Exchange

1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Write the 2 numbers vertically where the biggest number is on the top.
4. Partition the numbers keeping them in their place value columns.
5. Start with the units and subtract the bottom unit from the top unit, putting the answer below the first line. (If the units on the bottom are bigger than the top, exchange a ten so that the number on the top is now bigger.)
6. Subtract the bottom tens from the top ten, putting the answer below the first line.
7. Continue if there are hundreds, remembering to exchange a hundred if the tens on the bottom are bigger than the top.
8. Check the answer using the estimate.

Subtraction Using Partitioning with Exchange

Example: 75 – 38 = 37

Estimate: 75 – 40 = 35

	60	**15**
	~~70~~	~~5~~
-	30	8
	30	7

Example: 537 – 251 = 286

Estimate: 500 – 250 = 250

	~~4~~00	**130**	
	~~500~~	~~30~~	7
-	200	50	1
	200	80	6

YEAR 4

In year 4, pupils move on to the standard formal written method known as vertical subtraction. They work with 2 and 3 digit numbers.

What Makes Good – Standard Written Method

1. Estimate the answer using rounding.
2. Use the mathematical words you have heard.
3. Write the 2 numbers vertically where the biggest number is on the top.

4. Ensure the digits are kept in their HTU columns.
5. Start with the units and subtract the bottom unit from the top unit, putting the answer below the first line.
6. Subtract the bottom tens from the one above and put the answer below the first line. Continue if there are hundreds.
7. Check the answer using the estimate.

It is good practise to check by doing the inverse operation, so in the first example below the number sentence would be 225 + 32 = 257.

Subtraction: Standard Written Method
Example: 257 – 32 = 225
Estimate: 260 – 30 = 230

```
  2 5 7
-   3 2
  2 2 5
```

What Makes Good – Standard Written Method with Exchange
1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Write the 2 numbers vertically where the biggest number is on the top.
4. Keep the digits in their HTU column.
5. Start with the units and take the bottom unit away from the top unit, putting the answer below the first line. (If the bottom units are bigger than the top units, exchange a ten so that the number on the top is now bigger.)
6. Take the bottom tens away from the top tens and put the answer below the first line. (If the bottom tens are bigger than the top tens, exchange a hundred so that the number on the top is now bigger.)
7. Take the bottom hundred away from the top hundreds and put the answer below the first line.
9. Check the answer using the estimate.

It is good practise to check by doing the inverse operation, so in the first example below the number sentence would be 515 + 48 = 563.

Standard Written Method with Exchange

Example: 563 – 48 = 515
Estimate: 560 – 50 = 510

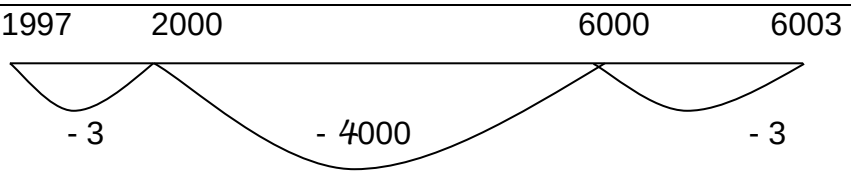
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    5
  5 6 13
-   4 8
  5 1 5
```

Example: 563 – 248 = 315
Estimate: 560 – 250 = 310

```
    5
  5 6 13
- 2 4 8
  3 1 5
```

As in year 3 pupils will be reminded that if they can do the sum mentally then it is better to do so.
In the example below, this would be quite awkward to do in the formal vertical method. In this case, it would be much easier to count on or back using a number line:

Subtraction: Using a mental maths method
Example: 6003 – 1,997 = 4,006
Estimate: 6000 – 2000 = 4000



YEAR 5

Pupils in year 5 consolidate the method used in year 4 and extend their skills in standard written method with exchange. They move on learn to deal with subtraction of decimals and mixed decimals.

What Makes Good – Standard Written Method with Exchange as in year 4

What Makes Good – Standard Written Method with Decimals

1. Estimate the answer first by rounding.
2. Use the mathematical words you have heard.
3. Ensure whole numbers, tenths and hundredths are in the correct column.
4. Fix the decimal place between the units and tenths digits and ensure they line up.
5. Write one number in each square, put the decimal place on the line between 2 squares.
6. Complete the sum as you would for whole numbers.
7. Check your answer using the estimate.

It is good practise to check by doing the inverse operation, so in the first example below the number sentence would be £2.27 + £1.18 = £3.45.

Example: £3.45 - £2.27
Estimate: £3.00 - £2.00 = £1.00

```
    3 1
  £ 3. 4 5
- £ 2. 2 7
  £ 1. 1 8
```

Example: 16.2 cm – 8.5 cm
Estimate: 16 cm – 9 cm = 7 cm

```
  0 15 1
    1 6. 2 cm
-   8. 5 cm
    7. 7 cm
```

What Makes Good – Standard Written Method with Mixed Decimals

The methods used is the same as with decimals except it is essential that there is a place value holder added if the numbers do not have the same number of decimal digits.

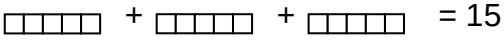
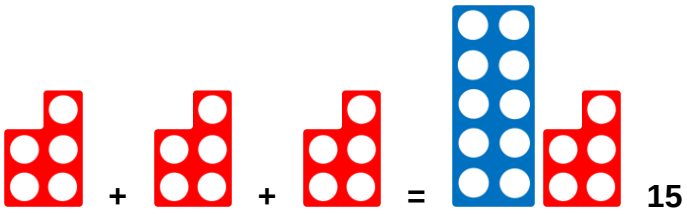
1. Estimate the answer first using rounding.
2. Use the mathematical words you have heard.
2. Ensure all digits are in their place value columns.
3. Add a zero to ensure both numbers have the same number of digits after the decimal place (to hold the place value)
4. Complete the sum as you would for normal decimals starting with the numbers on the right hand side.

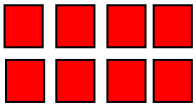
It is good practise to check by doing the inverse operation, so in the first example below the number sentence would be 15.427 + 3.283 = 18.07

Example: 18.67 - 3.243 = 15.427
Estimate: 18 – 3 = 15

```
      6 1
  1 8. 6 7 0
```

	- 3. 2 4 3 1 5. 4 2 7
YEAR 6	In Year 6, children consolidate their knowledge of subtraction and use the method of their choice.

YEAR	MULTIPLICATION
Reception	Pupils start by counting on in 2's and 10's in Reception. They also practise doubling and grouping numbers which is then linked to problem solving e.g. how many pieces of bread to make 5 sandwiches. To support pupils, teachers will use lots of physical equipment such as cubes, counters and other objects that the pupils can practise grouping and doubling.
YEAR 1	Pupils in year 1 continue counting on in 2's, 5's and 10's and more able count on and back using other numbers. Pupils also learn to double up to 10 + 10. The pupils continue to use physical equipment as well as diagrams, dienes cubes or Numicon. **Pupils learn to count in 2s, 10s and 5s.** **What Makes Good - Using Diagrams** 1. Use the mathematical words you have heard. 2. Count the number of objects in all the circles. **Multiplication Using Diagrams** Example: 3 x 5 ('3 sets of 5' or '3 lots of 5')  Leading to:  **What Makes Good - Using Equipment** 1. Find the tiles /rods and cubes. 2. Use the mathematical words you have heard. 3. Set up your number sentence. 4. Add the tiles/ rods and cubes. **Multiplication using Dienes Cubes**  **Multiplication using Numicon** 
YEAR 2	Pupils in Year 2 continue with hands on activities around grouping and doubling using diagrams, dienes cubes and Numicon. They also start to use informal pencil and paper procedures, particularly a number line. Pupils learn to recognise that multiplication is repeated addition. **Pupils learn multiplication tables for 2, 5 and 10.**

	What Makes Good using Diagrams and Equipment as in year 1 **What Makes Good - Repeated Addition** 1. Write out the sum using an add sign. 2. Use 'lots of' to write the sum again. 3. Use x to show it is a multiplication sum. **Multiplication - Repeated Addition** Example: 6 x 5 5 + 5 + 5 + 5 + 5 + 5 = 6 lots of 5 = 6 x 5 = 15
YEAR 3	In year 3, pupils consolidate their understanding that multiplication is repeated addition and that it can be described by arrays. The more able also start to work with bigger numbers and are introduced to multiplying 2-digit numbers by partitioning. **Pupils learn multiplication tables for 2, 3, 4, 5 and 10**. **What Makes Good – Arrays** 1. Draw arrays using dots – first number down the page and second number across the page. 2. Put the dots in the centre of the square. 3. Use the mathematical words you have heard. 4. Look carefully at the array, write two multiplication sums. 5. Find the answer by counting the dots, repeated addition or multiplication tables.  4 x 2 = 8 2 x 4 = 8 **What Makes Good – Informal Written Method by Partitioning** 1. Estimate the answer by rounding. 2. Use the mathematical words you have heard. 3. Partition the 2 digit number. 4. Multiple each number by the 1 digit number. 5. Add together the answers and check the final answer against the estimate. **Informal Written Method by Partitioning** Example: 13 x 5 = 65 Estimate: 10 x 5 = 50 13 / \ 10 3 10 x 5 = 50 3 x 5 = 15 50 + 15 = 65
YEAR 4	In year 4 pupils consolidate their learning from year 3 and extend their skills through the introduction of the grid method of multiplication, another type of informal written method. The more able will be introduced to the standard written

	method of partitioning. **Pupils learn the multiplication table for 2, 3, 4, 5, 6 and 10** **What Makes Good – Informal Written Method: Grid Multiplication (2-digit x 1-digit)** 1. Estimate the answer first by rounding. 2. Use the mathematical words you have heard. 3. Create the grid. 4. Put the single digit in front of the grid and partition the 2-digit number across the top of the grid. 5. Multiply the numbers across the top by the number in front and fill in the grid. 6. Add together the numbers in the grid. 7. Check answer against the estimate. **Informal Standard Written Method: Grid Multiplication (2-digit x 1-digit)** Example: 23 x 8 = 184 Estimate: 20 x 10 = 200 20 3 8 | 160 | 24 | 160 + 24 184
	What Makes Good – Standard Written Method: Partitioning (2 digit x 1 digit) 1. Estimate the answer first by rounding. 2. Use the mathematical words you have heard. 3. Line the numbers up vertically. 4. Keep the digits in the HTU columns. 4. Use the bottom digit and multiply it by both the top digits. 5. Write the calculations in brackets on the side. 6. Work out each multiplication sum and write the answers under the first line. 7. Add together the numbers to get the answer. 8. Check the answer using the estimate. *Note, once children have mastered the concept of this method, they can stop putting the sums in the brackets.* **Standard Written Method: Partitioning (2 digit x 1 digit)** Example: 13 x 5 = 65 Estimate: 10 x 5 = 50 13 x 5 50 (5 x 3) 15 (5 x 10) 65
YEAR 5	In Year 5, pupils consolidate their understanding of the grid method of multiplication and extend their skills by learning the short form standard written method, starting with 2 digit by 1 digit, then moving through progressive levels of difficulty of 3 digit by 1 digit to 2 digit by 2 digit. The more able will be introduced

to multiplying decimals.

Pupils learn multiplication tables for 2, 3, 4, 5, 6, 8 and 10.

The key skills taught are:

A) Pupils are using the digits and not their value, so the 8 in 84 is an 8 and not 80.
B) When completing 2 digit by 2 digit, pupils must remember to put in the magic 0. This is because they are multiplying all numbers by a multiple of 10 and all multiples of 10 end in a zero.

What Makes Good – Informal Written Method: Grid Multiplication (3-digit x 1-digit)

1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Create the grid.
4. Put the single digit in front of the grid and partition the 3-digit number across the top of the grid.
5. Multiply the numbers across the top by the number in front and fill in the grid.
6. Add together the numbers in the grid.
7. Check the answer using the estimate.

Multiplication – Informal Written Method: Grid Method (3 digit x 1 digit)

Example: 346 x 9
Estimate: 300 x 9 = 2, 700

	300	40	6
9	2, 700	360	54

2,700
360
\+ 54
3,114

What Makes Good – Informal Written Method: Grid Method (2-digit x 2-digit)

1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Create the grid.
4. Partition both numbers and put one in front of the grid and one across the top of the grid.
5. Multiply the numbers down the side with the numbers on the top and fill in the grid.
6. Add together each row and create a vertical addition sum to the right.
7. Complete the addition sum to find the answer.
8. Check the answer using the estimate.

Multiplication – Informal Written Method: Grid Method (2-digit x 2-digit)

Example: 72 x 38
Estimate: 70 x 40 = 2800

	30	8	
70	2,100	560	2, 660

2	60	16	+ 76
			2,736

What Makes Good - Short Form of Standard Written Method (3 digit x 1 digit and 2 digit x 2 digit)

1. Estimate the answer by rounding.
2. Use the mathematical words you have heard.
3. Line the numbers up vertically. Keep the digits in the HTU columns.
4. Start with the bottom right hand number and multiply that with the top right hand number.
5. Write the sum on the right hand side.
5. Put the answer below the line.
6. Continue with the bottom right hand number and multiply that with the other digits on the top. Remember to write the sum each time.

(If multiplying by 2 digit numbers repeat steps 4 – 6 using the bottom left hand number.)

7. Underline the answer.
8. Check the answer using the estimate.

Multiplication – Short Form of Standard Written Method

3 digit x 1 digit

Example: 236 x 4 = 944

Estimate: 200 x 4 = 800

```
  236
x   4
  24   (4 x   6)
 120   (4 x  30)
 800   (4 x 200)
 944
```

Leading to

```
  2 3 6
x     4
  9 4 4
 1 2
```

2-digit x 2-digit

Example: 36 x 24 = 864

Estimate: 40 x 20 = 800

```
  3 6
x 2 4
    2 4   ( 4 x   6)
  1 2 0   ( 4 x  30)
  1 2 0   (20 x   6)
  6 0 0   (20 x  30)
  8 6 4
```

Leading to

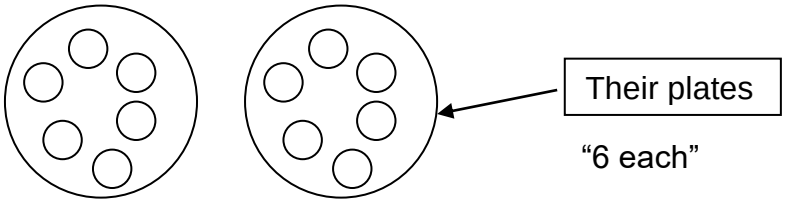
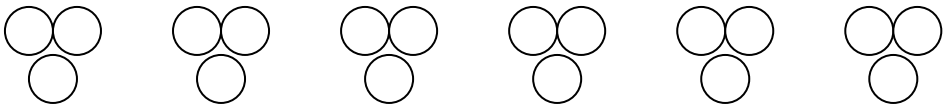
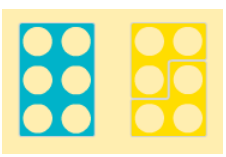
```
  3 6
x 2 4
  1 4 4
  7 2 0
  1
```

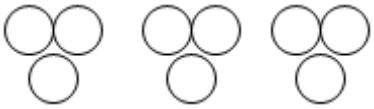
Remember magic zero

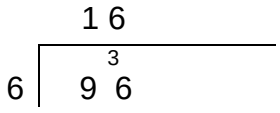
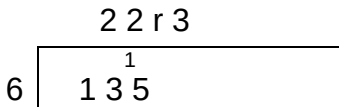
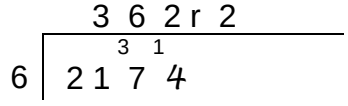
What Makes Good – Short Form of Standard Written Method with Decimals (2 decimal places)

1. Estimate the answer first using rounding.
2. Use the mathematical words you have heard.
3. Put the number with the most digits on the top and the other number below.
4. Forget the decimal places exist for the moment. Complete the sum as you would without the decimals.
5. When you have an answer, identify how many digits were after the decimal place(s) in the original sum. Put the decimal point in the correct place..

	Example: £2.36 x 4 = £9.44 £ 2.3 6 · 4 x 9 4 4 1 2 With the figure of 944, you then check how many digits there are after the decimal place which is 2 digits (.36) so the decimal place is moved two places in the answer to 9.44
Year 6	In Year 6, children consolidate their knowledge of subtraction and use the method of their choice. **Pupils learn multiplication tables up to 10 x 10.**
Multiplying by 10, 100, 1000	Throughout the Key Stages when multiplying a number by 10, 100 or 1000 the pupils are taught that each digit moves to the left. **What Makes Good – Multiplying by 10, 100 and 1000** 1. Write out the place value chart. 2. Use the mathematical words you have heard. 3. Put the digits in the correct columns. 4. Move the digits to the left. 5. When multiplying the number by 10 move each digit once. When multiplying the number by 100 move each digit twice. When multiplying the number by 1000 move each digit three times. *(Look at the number of zeros to help you remember how many places the digits need to move)* If you are multiplying a decimal number remember the decimal point **never** moves.

YEAR	DIVISION
Nursery and Reception	Pupils in Nursery and Reception learn to group / share numbers using physical apparatus. **What Makes Good – Grouping / Sharing** 1. Put one cube (object) into each hoop. 2. Share the objects until you have not got any left. **Division: Grouping / Sharing** Example: "12 sweets shared between 3 children" 
YEAR 1	Pupils in year 1 continue grouping / sharing numbers by using physical equipment as well as diagrams, dienes cubes and Numicon. They also learn to halve numbers up to 20. **What Makes Good – Grouping / Sharing** 1. Use the mathematical words you have heard. 2. Collect the objects. 3. Share with your friends. 4. Use all the objects. 5. Have your friends got the same number as you? **Division: Grouping / Sharing** Example: 18 grouped in 3's = "6 groups"  **What Makes Good – Sharing (Halving)** 1.Use the mathematical words you have heard. **Division: Sharing (Halving) using Equipment** 1. **Division: Sharing (Halving) Using Numicon** Example: Half of 6 is 3 
YEAR 2	Pupils in year 2 continue grouping / sharing numbers by using physical equipment as well as diagrams, dienes cubes and Numicon. They also learn to halve

	numbers up to 20. To extend their skills they also learn that multiplication and division are inverse operations of each other. They use number lines, 100 squares and physical apparatus to practise division as repeated subtraction. They also learn there may be numbers left over or remainders. **What Makes Good** 1. Use the mathematical words you have heard. 2. What do I need to do? 3. Sharing – will I have more or less? 4. Share into equal groups, use pictures to help you. 5. Write a sum. (for example 9 ÷ 3) 6. Check the answer using the inverse relationship. **Division Using Pictures** **9 ÷ 3 = 3** 
YEAR 3	In Year 3, pupils continue with informal methods of division using physical equipment and diagrams. **What Makes Good – Division Using Grouping** 1. Use the mathematical words you have heard. 2. Read the number sentence. (For example 12 ÷ 4 is twelve divided by four or how many fours are there in twelve) 3. Collect the number of cubes you need. 4. Share the cubes into groups and build towers. 5. How many towers do you have? 6. Write the sum. 7. Check the answer using inverse relationship. **Division Using Grouping** Example: 15 ÷ 3 = 5 
YEAR 4	In Year 4, children develop their knowledge of using a written method of short division, sometimes know as the 'bus stop' method. **What Makes Good – Standard Written Method: Short Division** 1. Use the mathematical words you have heard. 2. Set out the bus stop with the number you are dividing (the numerator) inside and the number you are dividing by (the denominator) to the left. 3. Calculate how many of the denominators go into the first digit of the numerator. If the first digit is smaller than the denominator then use the first 2 digits. 4. Put the answer above the bus stop and carry the remainder to the next digit. 5. Repeat until you reach the final digit. There may or may not be a remainder. 6. Put the answer back into the number sentence and check the answer using inverse relationship.

	Example:96÷6 = 16  Example:134÷ 5 = 22 r 3 
YEAR 5	In Year 5, pupils continue to use a written method of short division. **What Makes Good – Standard Written Method: Short Division** 1. Use the mathematical words you have heard. 2. Set out the bus stop with the number you are dividing (the numerator) inside and the number you are dividing by (the denominator) to the left. 3. Calculate how many of the denominators go into the first digit of the numerator. If the first digit is smaller than the denominator then use the first 2 digits. 4. Put the answer above the bus stop and carry the remainder to the next digit. 5. Repeat until you reach the final digit. There may or may not be a remainder. *Note, the remainder can be shown as a fraction with the denominator (for example 2/6ths).* 6. Put the answer back into the number sentence and check the answer using inverse relationship. **Division Using Standard Written Method: Short Division** Example: 2,174 ÷ 6 = 32 r 4 

YEAR 6

In Year 6, pupils learn to deal with remainders as decimals as well as numbers that have decimals in them. They also learn long division which is any number divided by a 2-digit number.

What Makes Good – Standard Written Method using Short Division (with decimals)

1. Use the mathematical words you have heard.
2. Set out the bus stop with the number you are dividing (the numerator) inside and the number you are dividing by (the denominator) to the left.
3. Calculate how many of the denominators go into the first digit of the numerator. If the first digit is smaller than the denominator then use the first 2 digits.
4. Put the answer above the bus stop and carry the remainder to the next digit.
5. Repeat until you reach the final digit.
6. When you reach the final digit and have a remainder, instead of stopping there, add a decimal place and as many zeros as you may need (this does not change the number)
7. Add the remainder to the first zero and carry on.
8. You probably will not need to go further than 2 or 3 decimal places.

Division: Standard Written Method using Short Division (with Decimals)

Example: **196 ÷ 5 = 39.2**

```
      3 9 . 2
    1 4   1
5 | 1 9 6 . 0 0 0 0
```

If the decimal part of the answer keeps repeating (recurring) then show 2 digits the same and put a dot above the second digit. So one third would be shown as

.
0.33

What Makes Good – Long Division

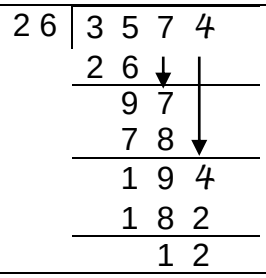
1. Use the mathematical words you have heard.
2. Lay out the sum as for short division.
3. See how many of the denominator go into the first 2 digits. If the first 2 digits are smaller than the denominator then use the first 3 digits.

(Use a multiplication fact box to help you)

4Write the answer to the first part above the 'bus stop'.
5. Show how many multiples of the denominator were used by writing this under the numerator (for example, 1 lot of 26 so write 26).
6. Take the numbers away from each other and put the remainder under the line.
7. Drop the next digit (7) down to join the remainder.
8. See how many of the denominator go into this number and put above the line.
9. Continue until you reach the decimal place to leave a remainder, or continue adding zeros after the decimal place to calculate a decimal answer.

3,574 ÷ 26 = 137 r 12

1 3 7 r 12

		**Note** The arrows are only to illustrate the movement of the numbers.
Dividing by 10, 100 and 1000	Throughout the Key Stages when dividing a number by 10, 100 or 1000 the pupils are taught that each digit moves to the right. **What Makes Good – Dividing by 10, 100 and 1000** 1. Use the mathematical words you have heard. 2. Write the place value chart. 3. Put the digits in the correct columns. 4. Move each digit to the right. 5. When dividing the number by 10 move each digit once. When dividing the number by 100 move each digit twice. When dividing the number by 1000 move each digit three times. (Look at the number of zeros to help you remember how many places the digits need to move.) If you are dividing a decimal number remember the decimal point **never** moves.	

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