In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.
Encourage children to choose and use the most efficient and appropriate method for the numbers and the situation.

	Addition	Subtraction	Multiplication	Division

Y5	Children should interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
	Children should be able to read, write and order numbers to at least 1,000,000 and determine the place value of each digit.
	They should recognise Roman numerals up to 1000 and recognise years written in Roman numerals.
	Children should recognise thousandths and relate them to tenths and hundredths and decimal equivalents.
	
	Children continue to use the following methods to help them with simple addition
	• Partitioning numbers to add them mentally
	• Using a number line to count on from the largest number
	• Using the expanded column method
	
	67 = 60 + 7
	+24 20 + 4
	    80 + 11 = 91
	• Using the compact method
	
	67 67 67
	+24 + 24 +24
	80 11 91
	11 80 1
	91 91
	
	Children should extend the compact method to numbers with at least four digits, including decimals (see below). They should then be able to add with numbers of more than 4 digits using the column method.
	
	  587 3587
	+ 475 + 675
	1062 4262
	 1 1 1 1 1
	
	Using similar methods, children will:
	✓ *add several numbers with different numbers of digits;*
	✓ *begin to add two or more decimal numbers with up to three digits and the same number of decimal places;*
	✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m – 280 cm.*
	
	Children should add mentally with larger numbers.
	Children should be able to make appropriate choices about which strategies that they can use in multi-step problems involving addition.
	Children should use rounding as a strategy to check answers to their calculations and to determine how accurate they are.
		Number lines
		Children should be able to subtract mentally with larger numbers.
		
		Children should be able to make appropriate choices about which strategies that they can use in multi-step problems involving subtraction.
		
		Counting on
		754-286. 'Find the difference by counting up'
		
		21.4cm – 18.6cm. 'Find the difference by counting up'
		
		Children should:
		✓ *be able to subtract numbers with different numbers of digits;*
		✓ *begin to find the difference between two decimal numbers with up to three digits and the same number of decimal places;*
		✓ *know that decimal points should line up under each other*
		✓ *be encouraged to record in the most efficient way: just two steps.*
		
		Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.
		
		1209 – 388 = 821
		
		Column Method (without decomposition)
		
		  3342
		– 1221
		  2121
		
		Partitioning and decomposition
		
		Step 1 754 = 700 + 50 + 4
		      – 286 – 200 + 80 + 6
		
		Step 2 700 + 40 + 14 *(adjust from T to U)*
		         – 200 + 80 + 6
		
		Step 3 600 + 140 + 14 *(adjust from H to T)*
		       – 200 + 80 + 6
		       400 + 60 + 8 = 468
		
		This would be recorded by the children as
		
		  600 140
		  7̶0̶0̶ + 5̶0̶ + ¹4
		– 200 + 80 + 6
		  400 + 60 + 8 = 468
			Children should be able to count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000.
			They should multiply numbers mentally drawing upon known facts.
			They should multiply whole numbers and those involving decimals by 10, 100 and 1000.
			
			Grid method (See Year 4 to link grid method with arrays)
			HTU x U
			(Short multiplication – multiplication by a single digit)
			346 x 9
			Children will approximate first
			346 x 9 is approximately 350 x 10 = 3500
			
			x 300 40 6
			9 2700 360 54 2700
			              + 360
			              + 54
			               3114
			                1 1
			
			TU x TU
			(Long multiplication – multiplication by more than a single digit)
			72 x 38
			Children will approximate first
			72 x 38 is approximately 70 x 40 = 2800
			
			x 70 2
			30 2100 60 2100
			8 560 16 + 560
			              + 60
			              + 16
			              2736
			               1
			
			Children should then go on to multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
			
			Using similar methods, they will be able to multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other.
			
			e.g. 4.9 x 3
			
			Children will approximate first
			4.9 x 3 is approximately 5 x 3 = 15
			
			x 4 0.9
			3 12 2.7 12
			            + 2.7
			             14.7
			
			Children should be able to identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
				Children should divide numbers mentally drawing upon known facts.
				They should divide whole numbers and those involving decimals by 10, 100 and 1000.
				
				Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
				
				Children will continue to use written methods to solve short division TU ÷ U.
				
				Children can start to subtract larger multiples of the divisor, e.g. 30x
				
				Solve division by chunking the dividend into known multiples of the divisor and illustrate on a number line.
				
				Short division HTU ÷ U
				
				196 ÷ 6
				
				        32 r 4
				6) 196
				 – 180 (30x)
				   16
				  – 12 (2x)
				    4
				
				Answer: 32 remainder 4 or 32 r 4
				
				Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.
				
				Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
				
				Children need to be able to decide what to do after division and round up or down accordingly.
				
				e.g. 196 ÷ 6
				
				6 x 30 6 x 2 r 4 = 32 r 4
				
				Children should solve problems involving division including using their knowledge of factors and multiples, squares and cubes.
				
				Children should solve problems involving division, including scaling by simple fractions.

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.
Encourage children to choose and use the most efficient and appropriate method for the numbers and the situation.

			Decomposition	They should know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.	**Vocabulary for addition in addition to that of previous years** column addition exchanging
			$\begin{array}{r} 614\,1 \\ 7\cancel{8}4 \\ -\ 286 \\ \hline 468 \end{array}$ Children should be able to subtract with 4 or more digits e.g. 6467 – 2684 14,362- 11,341 Children should use rounding as a strategy to check answers to their calculations and to determine how accurate they are.	e.g. The prime factors of 24 are 2x2x2x3 24 = 2³ x 3 A **composite** number is any positive number greater than one that is not a prime number. Children should establish whether a number up to 100 is prime and recall prime numbers up to 19. Children should recognise and use squared and cubed numbers and the notation for them (²) (³) . Children should solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes. Children should solve problems involving multiplication including scaling by simple fractions.	**Vocabulary for subtraction in addition to that of previous years** exchanging borrowing **Vocabulary for multiplication** grid method factor product **Vocabulary for division** chunking bus stop method dividend divisor

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.
Encourage children to choose and use the most efficient and appropriate method for the numbers and the situation.

Y6

Children should use negative numbers in context, and calculate intervals across zero.

They should read, write, order and compare numbers up to 10, 000, 000 and determine the value of each digit.

They should round any whole number to a required degree of accuracy.

They should perform mental calculations, including with mixed operations and large numbers.

They should use their knowledge of the order of operations to carry out calculations involving the four operations.

They should use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

They should solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Children should extend the carrying method to number with any number of digits.

7648	6584	42
+ 1486	+ 5848	6432
9134	12432	786
1 11	1 11	3
		+ 4681
		11944
		121

Using similar methods, children will
✓ *add several numbers with different numbers of digits;*
✓ *begin to add two or more decimal numbers with up to four digits and either one or two decimal places;*
✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 401.2 + 26.85 + 0.71.*
✓ *Use zeros as place holders to line up calculations when adding mixed amounts*

Number lines

6467-2684. 'Find the difference by counting up'

Children should:
✓ *be able to subtract numbers with different numbers of digits;*
✓ *be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;*
✓ *know that decimal points should line up under each other.*

Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.

3002 – 1997 = 1005

+1000
+3   +2
0   1997 2000   3000 3002
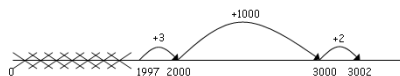
Decomposition (when children are ready)

```
  5 13 1
  6467
- 2684
  3783
```

They should use their knowledge of the order of operations to carry out calculations involving the four operations.

Children should perform mental calculations, including with mixed operations and large numbers.
They should identify common factors, common multiples and prime numbers.
They should use common factors to simplify fractions; use common multiples to express fractions in the same denomination. calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3

Th H T U x U
(Short multiplication – multiplication by a single digit)
4346 x 8
Children will approximate first
4346 x 8 is approximately 4346 x 10 = 43460

x	4000	300	40	6
8	32000	2400	320	48

```
  32000
+  2400
+   320
+    48
  34768
```

HTU x TU
372 x 24
Children will approximate first
372 x 24 is approximately 400 x 25 = 10000

x	300	70	2
20	6000	1400	40
4	1200	280	8

```
  6000
+ 1400
+ 1200
+  280
+   40
+    8
  8928
```

Using similar methods, they will be able to multiply decimals with up to two decimal places by a single digit number and then two digit numbers, approximating first. They should know that the decimal points line up under each other.
For example:
4.92 x 3
Children will approximate first
4.92 x 3 is approximately 5 x 3 = 15

x	4	0.9	0.02
3	12	2.7	0.06

```
  12
+  0.7
+  0.06
  12.76
```

If confident with this method, they will then be able to record their calculations using the compact method putting the place holder 0 in the second line of the calculation.

Children will continue to use written methods to solve short division TU ÷ U and HTU ÷ U.

Continue to use informal jottings on an empty number line to show chunking. E.g. 972 ÷ 36

Long division HTU ÷ TU

972 ÷ 36

```
        27
36 ) 972
   - 720    20x
     252
   - 252    7x
       0
Answer:  27
```

| 36 x 20 = 720 |
| 36 x 7= 252 |
| (720 + 252 =972) |

Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as 3 $^2/_{10}$ which could then be written as 3 $^1/_5$ in its lowest terms.

Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other.

87.5 ÷ 7

```
        12.5
7 ) 87.5
  - 70.0    10x
    17.5
  - 14.0    2x
     3.5
  -  3.5    0.5x
       0
Answer :  12.5
```

As a further extension for those children who are secure in their understanding, remainders need to be shown as decimals.

```
   13.4
5)67.00
  -50 ( 10 x 5 )
   17
  -15 (3 x 5 )
Remainder 2
```

They should divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context, divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.
Encourage children to choose and use the most efficient and appropriate method for the numbers and the situation.

			They should multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.	as whole number remainders, fractions, or by rounding, as appropriate for the context.

They should multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

```
    372
  X 24
  1488
  7440
  8928
```

They should solve problems involving similar shapes where the scale factor is known or can be found.

They should multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $1/4 \times 1/2 = 1/8$)

as whole number remainders, fractions, or by rounding, as appropriate for the context.

$5321 \div 15 = 354$ remainder 11

```
     0  3  5  4  r 11
15 | 5 53 82 71
```

Children should associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $3/8$).

They should use written division methods in cases where the answer has up to two decimal places.

They should compare and order fractions, including fractions >1.

They should recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

They should add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

They should divide proper fractions by whole numbers (e.g. $1/3 \div 2 = 1/6$)

Vocabulary for addition
column addition
exchanging

Vocabulary for subtraction
exchanging
borrowing

Vocabulary for multiplication
grid method
factor
product
long multiplication

Vocabulary for division
chunking
bus stop method

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them. Encourage children to choose and use the most efficient and appropriate method for the numbers and the situation.

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should not be made to go onto the next stage if:

        they are not ready.

        they are not confident.

Children should be encouraged to approximate their answers before calculating.

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.