

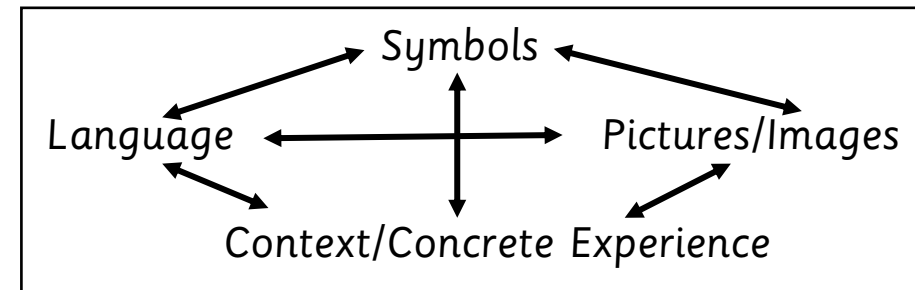
# Hawley Primary School Maths Calculation Policy



Children at Hawley Primary School are introduced to mental and written calculations through the **Concrete, Pictorial and Abstract** approach. This approach is not linear but supports children in communicating mathematically and promotes depth of understanding. Exposure to concrete resources allows children to form visual images. As pupils develop an understanding of new concepts through manipulatives, pictures, symbols and real-life contexts, the children develop their mental and written strategies to successfully solve mathematical problems. Children are taught to be mentally fluent in number facts which aids them in considering whether they have reached a solution in the most efficient way; whether that be through a mental strategy, written method or jottings.

The methods taught at Hawley Primary School aim to enable children to become:

- Accurate in their choosing of operations to solve a given problem;
- Efficient in their method;
- Able to check their answers for accuracy.



Haylock and Cockburn (2008)

This is supported by the children's journey to mastery encompassing **mathematical fluency, reasoning and problem solving**. It is important that the choosing of a mathematical strategy is underpinned by a secure conceptual understanding of mathematics. Children should apply their mathematical understanding and make connections to other domains, rather than viewing their strategies as procedures which are solved in isolation from each other.

Through collaboration with the MathsHub, our medium-term plans are devised based on a series of small steps for each domain from Years 1 - 6. To support children with their understanding of mathematical concepts and procedures, some learners engage in 'sneaky peek' sessions as a form of pre-teaching intervention to increase children's confidence during maths lessons. In EYFS, children are taught to develop a deep understanding of numbers to 10 and recognise patterns in number and shape through explicit teaching and practical experiences in provision.

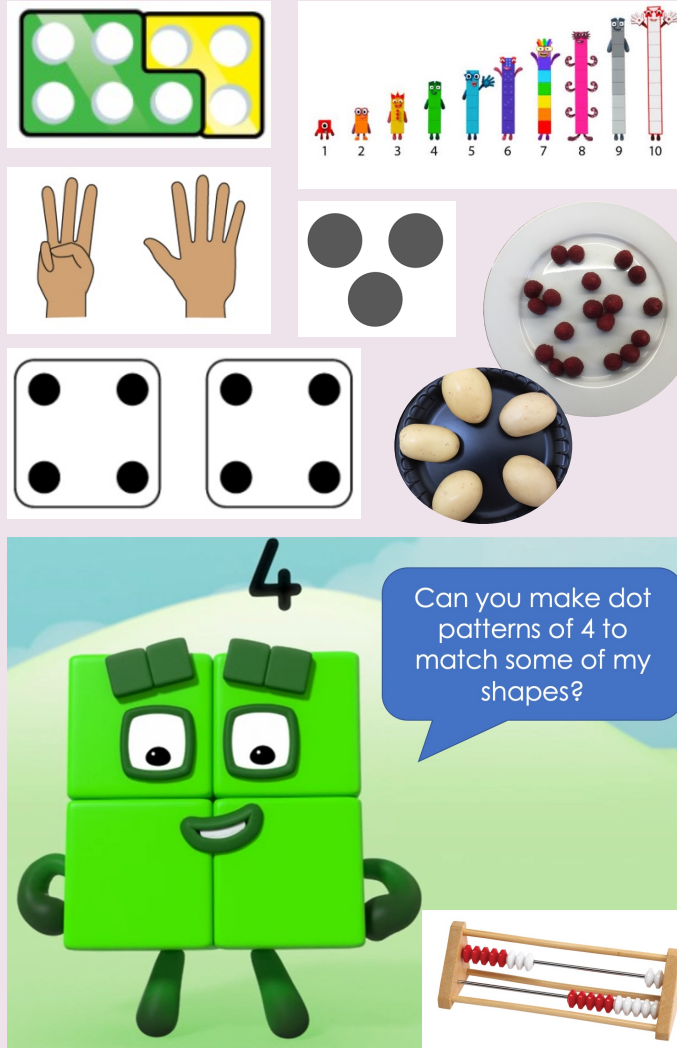
## Maths in the EYFS focuses on two areas: 1) number; 2) numerical patterns

### National Curriculum (development matters)

- Count objects, actions and sounds.
- Subitise.
- Link the number symbol (numeral) with its cardinal number value.
- Count beyond ten.
- Compare numbers
- Understand the 'one more than/one less than' relationship between consecutive numbers.
- Explore the composition of numbers to 10.
- Automatically recall number bonds for numbers 0–5 and some to 10.
- Select, rotate and manipulate shapes to develop spatial reasoning skills.
- Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.
- Continue, copy and create repeating patterns.
- Compare length, weight and capacity.

*The EYFS use the Mastering Number Programme and embed rich contextual links through small group, adult directed time.*

### Written Methods and Pictorial Representations



### Vocabulary

#### Key Words:

**ADDITION** add, more, and, make, sum, total, altogether, subitise, score, double, one more, two more, ten more..., how many more to make... ?, how many more is... than...?

**SUBTRACTION** take (away), leave, how many are left/left over?, how many have gone?, one less, two less... ten less..., how many fewer is... than...?, difference between, is the same as

**MULTIPLICATION** group, lots of, double

**DIVISION** halve, half, share, share equally, groups

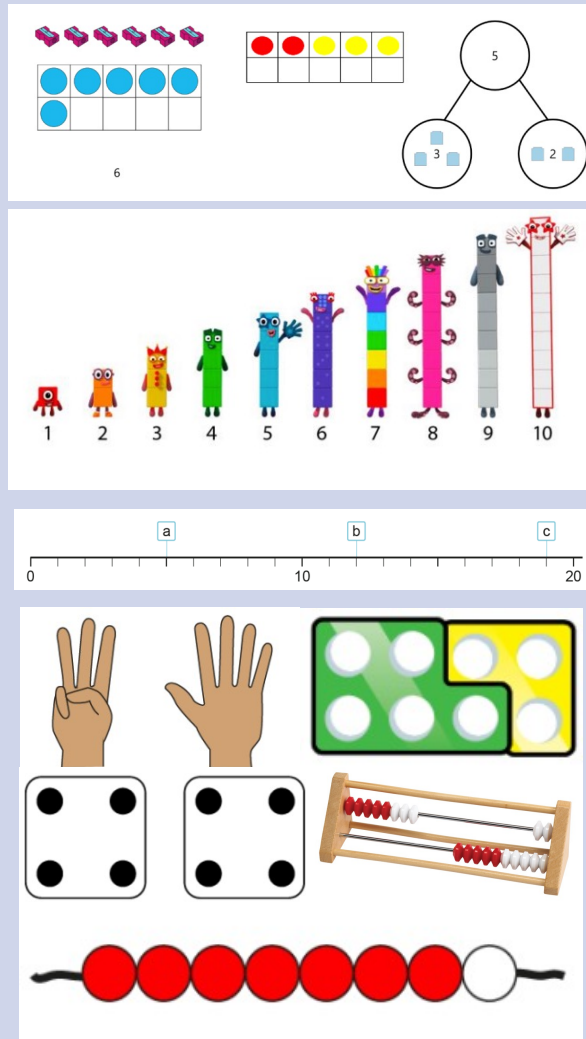
## Addition

### NC Ready-to-Progress

- **1NF-1** Develop fluency in addition facts within 10.
- **1NPV-2** Reason about the location of numbers to 20 within the linear number system, including comparing using  $<$   $>$  and  $=$
- **1AS-2** Read, write and interpret equations containing addition (+) and equals (=) symbols
- **1AS-1** Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts.

Adding 1-digit numbers within 10.  
 Add 2-digit numbers to 20, including 0.  
 Represent and use number bonds and related facts to 20.  
 Solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: number bonds, add, more, plus, make, sum, total, altogether, inverse double, near double, equals

Number word names; ‘one, two, ...’ etc ‘There are more ... than...’  
 There are the same number of .... as...’

“I know that double 3 is equal to 6, so 4 plus 3 is equal to 7.”

“a is 5 because it is halfway between 0 and 10.” “b is 12 because it is 2 more than 10.”  
 “c is 19 because it is one less than 20.”

”We can write this as 4 plus 6 is equal to/the same as 10”

### Mental Strategies

- Know addition can be carried out in any order (commutative)
- Add 1 and 2 digit numbers to 20 including 0
- Number bonds to 20
- Doubles of numbers up to and including double 10
- Adding 10 to a single digit number
- Identify 1 more than a given number

## Subtraction

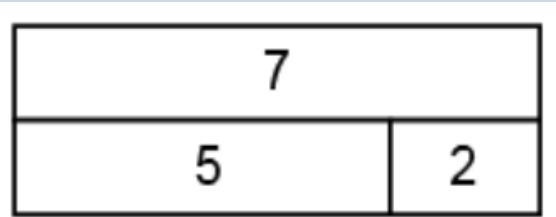
### NC Ready-to-Progress

- **1NF-1** Develop fluency in subtraction facts within 10.
- **1NPV-2** Reason about the location of numbers to 20 within the linear number system, including comparing using  $<$   $>$  and  $=$
- **1AS-2** Read, write and interpret equations containing subtraction (-) and equals (=) symbols
- **1AS-1** Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts.

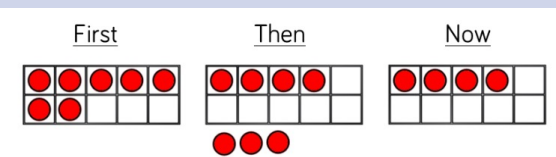
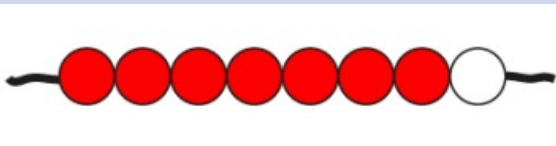
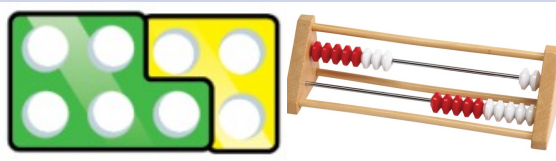
Subtracting 1-digit numbers within 10.  
Subtract 2-digit numbers within 20.  
Represent and use number bonds and related facts to 20.

Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems.

### Written Methods and Pictorial Representations



$$7 - 2 = 5$$



### Vocabulary

Key Words: take (away), leave, how many are left/left over?, one less, two less... ten less..., difference between,

How many counters were there at first? How many were taken away? How many are there now? 'There are fewer...than...'  
Can you draw an image to show this? What else could we use to represent the cars? How many will you start with? Why? How many will you take away? Why?

What is the same and different about the calculations?

"We can write this as 7 minus 5 is equal to 2."

### Mental Strategies

- Subtract 1 and 2 digit numbers to 20 including 0
- To know that subtraction is not commutative and that the larger number must always come first
- Use knowledge of number bonds to 10 and 20 to reason ( $9 + 1 = 10$  so  $10 - 9 = 1$  and  $10 - 1 = 9$ )

## Multiplication

### NC Ready-to-Progress

- **1NF–2** Count forwards and in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards through the odd numbers.

Recording equal groups using concrete manipulatives.

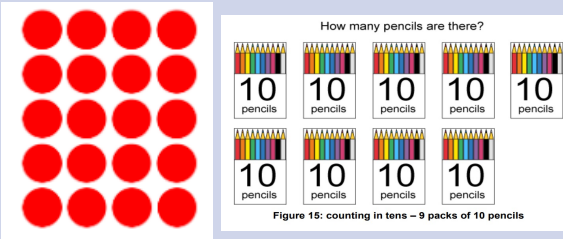
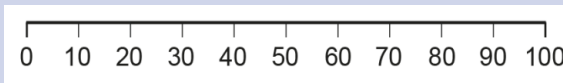
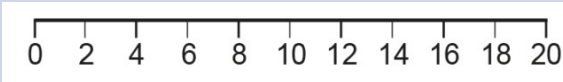
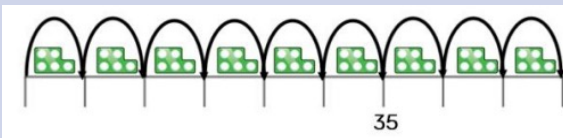
Supported by a number line, introduce multiplication as repeated addition.

$$2 + 2 + 2 = 6$$

### Written Methods and Pictorial Representations



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



### Vocabulary

Key Words: odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times? lots of, groups of, once, twice, five times, ten times, multiple of, times, multiply, multiply by, array, row, column, double

“There are \_\_\_ socks in total.”

Can you see any patterns when you count in 2s?

“The pencils are in groups of 10, so we will count in tens.”

“1 group of 10, 2 groups of 10, 3 groups of 10...” In time, shortened to: “1 ten, 2 tens, 3 tens...”

“If I subtract 2 from an even number I get the previous even number, so 6 minus 2 is equal to 4.”

### Mental Strategies

- Count forwards and backwards in multiples of 2s, 5s and 10s.
- Recall doubles of numbers up to and including 10.

## Division

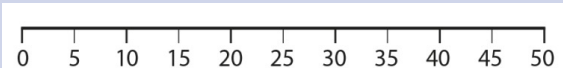
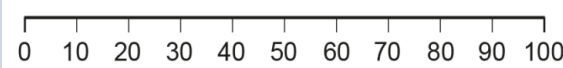
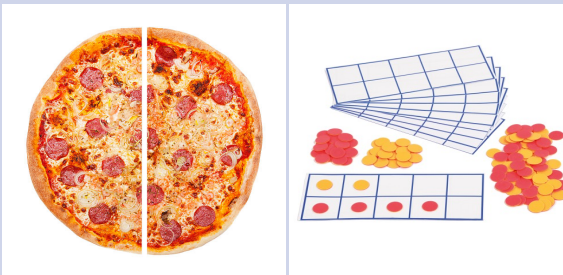
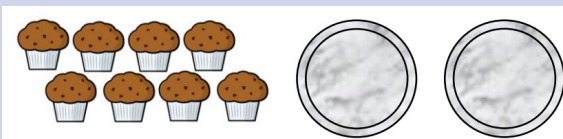
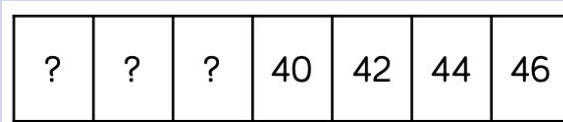
### NC Ready-to-Progress

- **1NF–2** Count backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count backwards through the odd numbers.

Recording equal groups using concrete manipulatives.

Supported by a number line, introduce division as repeated subtraction.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: halve, share, share equally, groups, equal groups of, divide, divided by, left, left over

How can I share the muffins equally?  
 How many muffins on this plate? How many on this plate? Are they equal? If I had 9 muffins what would happen?  
 How can I share the objects equally?  
 How many equal groups am I sharing the objects into? Are the groups equal? Are there any left over?

How can you tell if the groups are equal? How can you represent the equal groups? Do all numbers divide into equal groups of 2? How do you sort the cubes into equal groups? What would happen if there were 21 cubes? Have I got equal groups? How do you know? Does each group need to be arranged in the same way for it to be equal?

### Mental Strategies

- Recall division facts for the 2, 5 and 10 times tables
- Recall halves for even numbers up to and including 20.

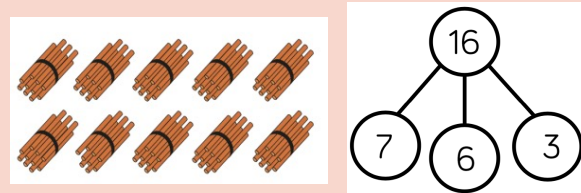
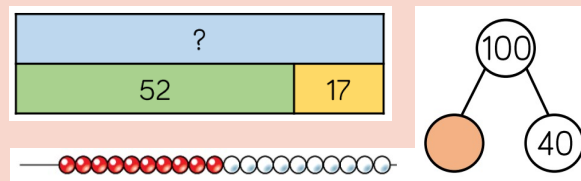
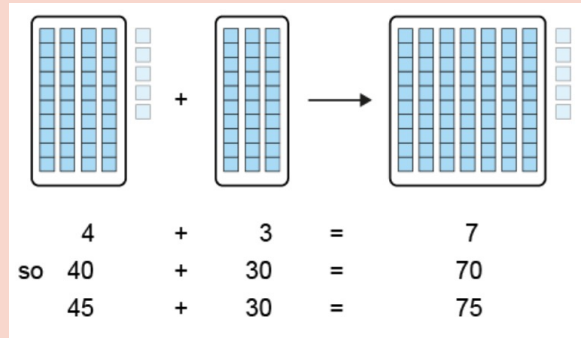
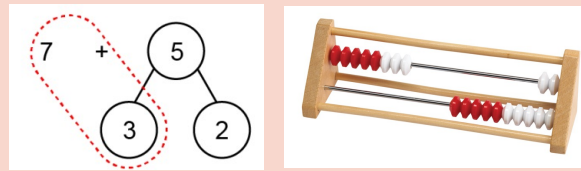
## Addition

### NC Ready-to-Progress

- **2NF-1** Secure fluency in addition facts within 10, through continued practice.
- **2AS-1** Add across 10.
- **2AS-3** Add within 100 by applying related one-digit addition facts: add only ones or only tens to/from a two digit number.
- **2AS-4** Add within 100 by applying related one-digit addition facts: add any 2 two digit numbers.

Please note: The formal written method for addition and subtraction is not encouraged until the Summer term of Year 3 to ensure children are not moving too formal, too soon.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more... ten more... one hundred more, tens, ones, number bonds

‘[6] is five and [1] more’

[5] and [5] is ‘double [5]’

Parts/ whole

‘a whole ten’

[15] is equal to 10 plus [5]

If I know ... then...

How could you represent the problem?

Can we exchange ten ones for one ten?

How can you partition a number and use your number bonds to 10 to help you?

### Mental Strategies

- Know that addition is the inverse of subtraction
- Add numbers mentally, including:
  - A 2-digit number and ones
  - A multiple of 10 to a 2-digit number
  - Two 2-digit numbers
  - Three 1-digit numbers
- Use knowledge of inverse to check calculations and solve missing number problems
- Use knowledge of number bonds to 10 to calculate numbers bonds to 100
- Count on in tens from any given number (E.g. 19 – 29 – 39 – 49 etc)

## Subtraction

### NC Ready-to-Progress

- **2NF-1** Secure fluency in subtraction facts within 10, through continued practice.
- **2AS-1** Subtract across 10.
- **2AS-2** Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more...?".
- **2AS-3** Subtract within 100 by applying related one-digit subtraction facts: subtract only ones or only tens to/from a two digit number.
- **2AS-4** Subtract within 100 by applying related one-digit subtraction facts: subtract any 2 two digit numbers.

### Written Methods and Pictorial Representations

Partitioning:

Reduction:

Difference:

Ben is ten years old. Charlotte is three years old.

### Vocabulary

Key Words: subtract, minus, leave, how many are left/left over?, how many less is... than...?, how much fewer is...?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on , count back, one less, ten less... one hundred less.

Have we got enough ones to take away?

Can we exchange one ten for ten ones?

How many have we got left?

What is the difference between the numbers?

Do we always need to subtract the ones first? Why do we always subtract the ones first?

Which method is the most efficient to find the difference, subtraction or counting on?

### Mental Strategies

- To know that subtraction is the inverse of addition
- Use knowledge of inverse to check calculations and solve missing number problems
- Subtract numbers mentally, including:
  - Subtracting ones from a 2-digit number
  - Subtracting a multiple of 10 from a 2-digit number
  - Subtracting a 2-digit number from another 2-digit number
- Recall and use subtraction facts to 20 fluently
- Use knowledge of number bonds to 100 (multiples of 10) to reason ( $40 + 60 = 100$  so  $100 - 60 = 40$  and  $100 - 40 = 60$ )

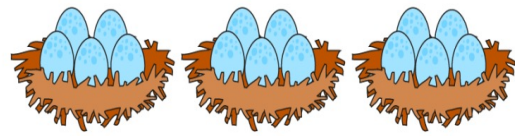
## Multiplication

### NC Ready-to-Progress

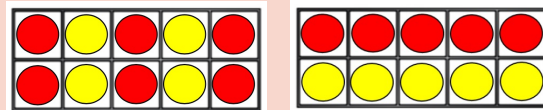
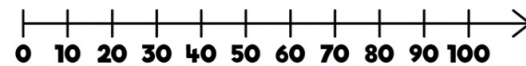
- **2MD–1** Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables.
- **2MD–2** Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor.

### Written Methods and Pictorial Representations

$$5 + 5 + 5 = 3 \times 5$$



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
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41	42	43	44	45	46	47	48	49	50



### Vocabulary

Key Words: odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, factor, product array, row, column, double.

“There are 3 equal groups of eggs.”

“There are 5 eggs in each group.”

“There are 3 groups of 5.”

“The 3 represents the number of groups.”

“The 5 represents the number of eggs in each group.”

“The 15 represents the total number of eggs.”

### Mental Strategies

- Count forwards and backwards in multiples of 3.
- Know the 2, 5 and 10 times tables (in and out of order)
- Recognise odd and even numbers.
- Recognise the equivalence between a repeated addition expression and a multiplication expression.

## Division

### NC Ready-to-Progress

- **2MD–2** Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotitive division).

### Written Methods and Pictorial Representations

### Vocabulary

Key Words: groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse.

*We can represent this as five divided between five.*

*Five divided by five is equal to one each.*

*Ten divided between 5 is equal to two each.*

### Mental Strategies

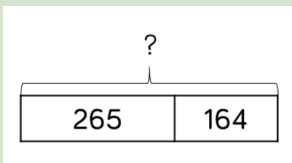
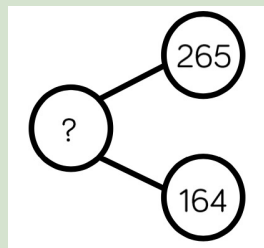
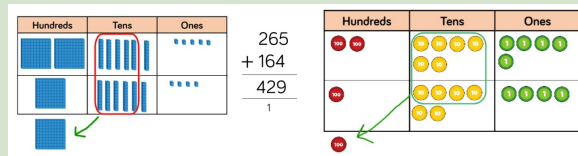
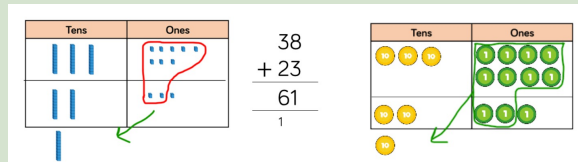
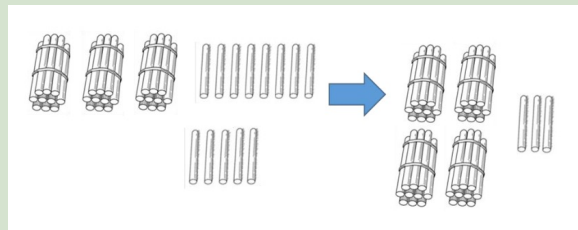
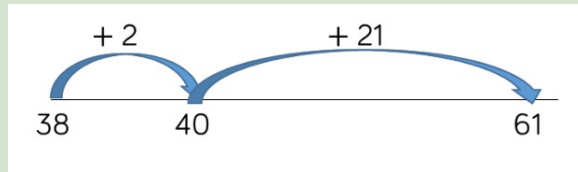
- To know that division is the inverse of multiplication.
- Recall division facts for the 2, 5 and 10 times tables
- Recall halves for even numbers up to and including 20

## Addition

### NC Ready-to-Progress

- **3NPV-2** Recognise the place value of each digit in three-digit numbers, and compose and decompose three-digit numbers using standard and non-standard partitioning.
- **3NPV-3** Reason about the location of any three-digit number in the linear number system, including identifying the previous and next multiple of 100 and 10.
- **3NF-1** Secure fluency in addition facts that bridge 10, through continued practice.
- **3NF-3** Apply place-value knowledge to known additive number facts (scaling facts by 10).
- **3AS-1** Calculate complements to 100.
- **3AS-2** Add up to three-digit numbers using columnar methods.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: add, increase, total, plus, sum, more, altogether, column addition, estimate, inverse, double, near double, one more, ten more... one hundred more, thousand, exchange

How many more to make ...?  
 How many more is... than ...?  
 How much more is...?

### Mental Strategies

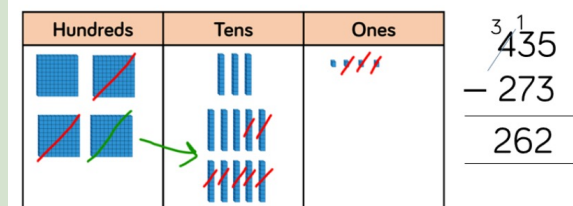
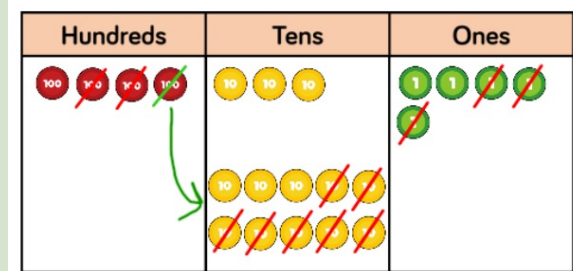
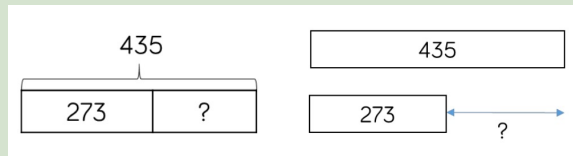
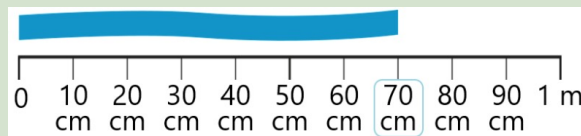
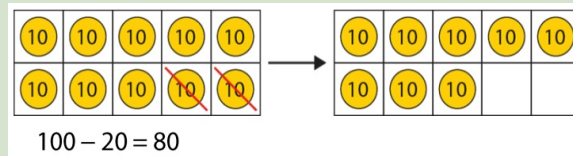
- Add numbers mentally, including:
  - a three-digit number and a single digit number
  - a 3-digit number and multiples of 10
  - a 3-digit number and multiples of 100
- Estimate the answer to a calculation and use inverse operations to check answers
- Know number pairs that total 1000 (multiples of 100)
- Calculate 10 or 100 more than any given number

## Subtraction

### NC Ready-to-Progress

- **3NF-1** Secure fluency in subtraction facts that bridge 10, through continued practice.
- **3AS-3** Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part-part-whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: subtract, minus, leave, how many are left/left over?, how many less is... than...?, how much fewer is...?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on, count back, one less, ten less... one hundred less.

### Mental Strategies

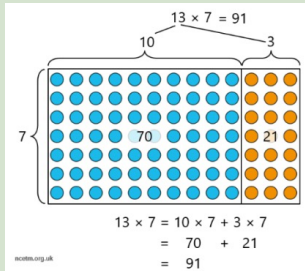
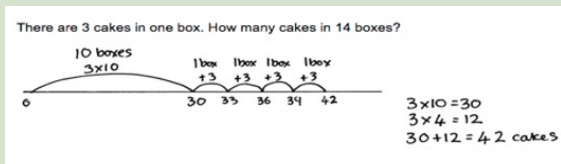
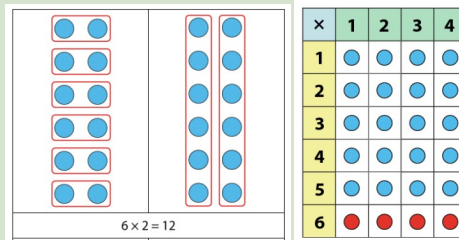
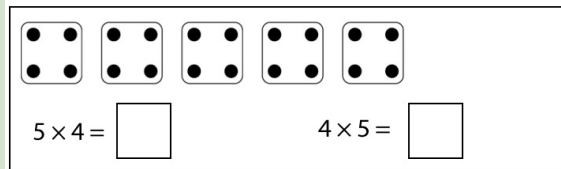
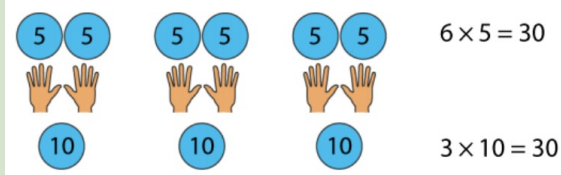
- Subtract numbers mentally, including:
  - Subtracting a single digit number from a 3-digit number
  - Subtracting a multiple of 10 from a 3-digit number
  - Subtracting a multiple of 10 from a 3-digit number
- Estimate the answer to a calculation and use inverse operations to check answer.

## Multiplication

### NC Ready-to-Progress

- **3NPV-1** Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three-digit multiples of 10.
- **3NF-2** Recall multiplication facts in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number
- **3NF-3** Apply place-value knowledge to known multiplicative number facts (scaling facts by 10).
- **3MD-1** Apply known multiplication facts to solve contextual problems.

### Written Methods and Pictorial Representations



Children will learn the grid method, underpinned by use of arrays, progressing to the standard algorithm in UKS2.

### Vocabulary

Key Words: odd, even, twos, fives, tens, threes, lots of, equal groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, commutative, repeated addition, factor, product, array, row, column, double, inverse.

Half of 8 is equal to \_\_\_\_\_.

Double \_\_\_\_\_ is equal to 8.

What if both factors are the same number?

When zero is a factor, the product is zero.

*'Six times two can represent six groups of two.'*

*'It can also represent two groups of six (or six, two times)*

### Mental Strategies

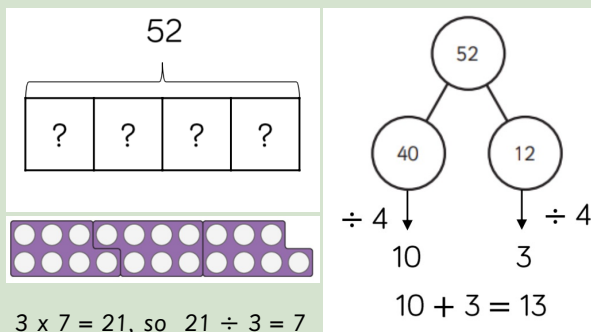
- Count forwards and backwards in multiples of 4, 8, 50 & 100
- Know the 3, 4 and 8 times tables (in and out of order)
- Connect the 2, 4 and 8 times tables through doubling
- Use knowledge of place value to calculate multiplication (e.g.  $2 \times 2 = 4$ ,  $2 \times 20 = 40$ ,  $2 \times 200 = 400$ )

## Division

### NC Ready-to-Progress

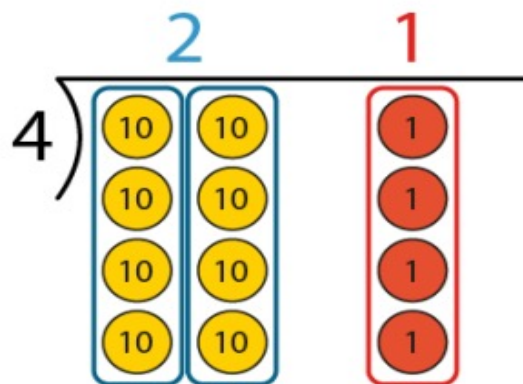
- **3NPV-4** Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts.
- **3NF-2** Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.
- **3MD-1** Apply known division facts to solve contextual problems with different structures, including quotitive and partitive division.

### Written Methods and Pictorial Representations



8	162	12	72	31	34	480	223	99	5	700
---	-----	----	----	----	----	-----	-----	----	---	-----

Can be divided by 2	Can't be divided by 2



### Vocabulary

Key Words: groups of, equal groups of, halve, share, share equally, triple, divide, divided by, divided into, short division, repeated subtraction, inverse, dividend, divisor, quotient, repeated subtraction.

*"If I know... I also know..."*

$$84 \div 4 = 21$$

dividend  $\div$  divisor = quotient

$$\begin{array}{r} 21 \\ 4 \overline{) 84} \end{array}$$

quotient  
divisor  $\overline{)}$  dividend

### Mental Strategies

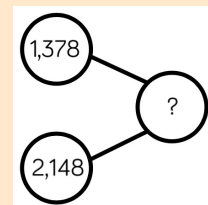
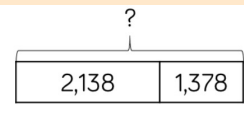
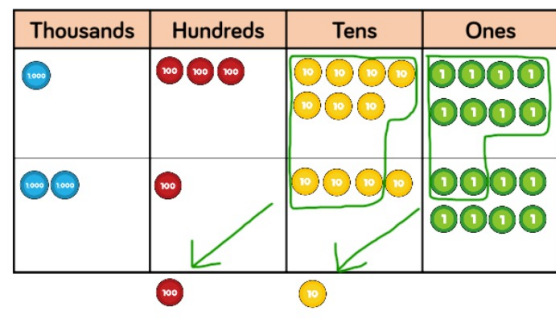
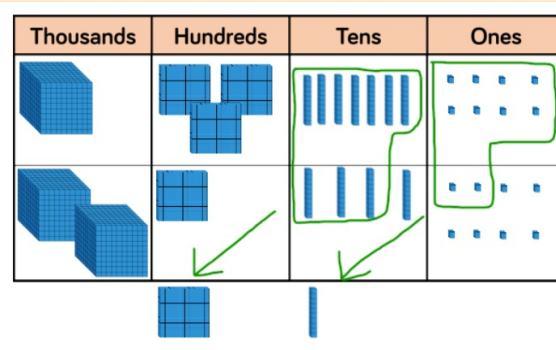
- To know that division is the inverse of multiplication
- Know the division facts from the 3, 4 and 8 times tables
- Use knowledge of place value to calculate division (e.g.  $14 \div 2 = 7$ ,  $140 \div 2 = 70$ ,  $1400 \div 2 = 700$ )

## Addition

### NC Ready-to-Progress

- **4NPV–2** Recognise the place value of each digit in four-digit numbers, and compose and decompose four-digit numbers using standard and nonstandard partitioning.
- **4NPV–3** Reason about the location of any fourdigit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each.
- **4NF–3** Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100)

### Written Methods and Pictorial Representations



	1	3	7	8
+	2	1	4	8
<hr/>				
	3	5	2	6
		1	1	

### Vocabulary

#### Key Words:

add, addition, more, plus, increase, sum, total, altogether, score, double, near double, tens column, hundreds column, thousands column, inverse, thousand, accurate, exact

### Mental Strategies

- Add numbers mentally, including:
  - a four digit number and multiples of one thousand
- Use knowledge of doubles to derive related facts ( $15 + 16 = 31$  because  $15 + 15 = 30$  and  $30 + 1 = 31$ )
- Know number pairs that total 1000 (multiples of 10)
- Estimate the answer to a calculation and use inverse operations to check answers

## Subtraction

### NC Ready-to-Progress

- **4NPV-3** Reason about the location of any four-digit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each.

### Written Methods and Pictorial Representations

Thousands	Hundreds	Tens	Ones

Thousands	Hundreds	Tens	Ones

### Vocabulary

Key Words: leave, subtract, less, minus, column subtraction, inverse, decomposition, exchange, how many are left/left over?, difference between, how many more/fewer is... than...?, how much more/less is...?, is the same as, equals.

### Mental Strategies

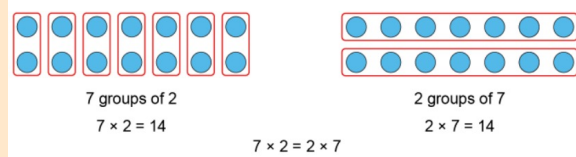
- Subtract numbers mentally, including:
  - Subtracting multiples of one thousand from a 4-digit number
- Use of number pairs that total 1000 (multiples of 10) to calculate subtraction (1000 – 300 = 700)
- Estimate the answer to a calculation and use inverse operations to check answers

## Multiplication

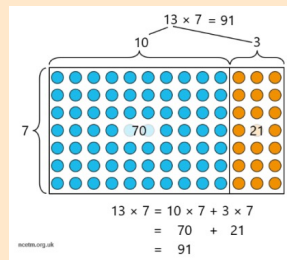
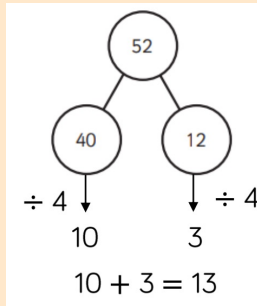
### NC Ready-to-Progress

- **4NPV-1** Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100.
- **4NF-1** Recall multiplication facts up to  $12 \times 12$ , and recognise products in multiplication tables as multiples of the corresponding number.
- **4MD-1** Multiply whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size.
- **4MD-2** Manipulate multiplication equations, and understand and apply the commutative property of multiplication.
- **4MD-3** Understand and apply the distributive property of multiplication.

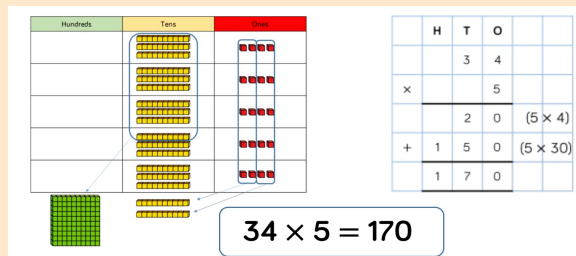
### Written Methods and Pictorial Representations



$0 \times 6 = 0$	$+6$	$6 \times 0 = 0$	$+6$
$1 \times 6 = 6$	$+6$	$6 \times 1 = 6$	$+6$
$2 \times 6 = 12$	$+6$	$6 \times 2 = 12$	$+6$
$3 \times 6 = 18$	$+6$	$6 \times 3 = 18$	$+6$
$4 \times 6 = 24$	$+6$	$6 \times 4 = 24$	$+6$
$5 \times 6 = 30$	$+6$	$6 \times 5 = 30$	$+6$
$6 \times 6 = 36$		$6 \times 6 = 36$	
$7 \times 6 = 42$		$6 \times 7 = 42$	
$8 \times 6 = 48$		$6 \times 8 = 48$	
$9 \times 6 = 54$		$6 \times 9 = 54$	
$10 \times 6 = 60$		$6 \times 10 = 60$	
$11 \times 6 = 66$		$6 \times 11 = 66$	
$12 \times 6 = 72$		$6 \times 12 = 72$	



Children will learn the grid method, underpinned by use of arrays and manipulatives, progressing to the standard algorithm in UKS2.



### Vocabulary

Key Words: multiply, multiplied by, product, short multiplication, partition, distributive law, commutative, groups of, repeated addition, multiply, times, multiples, inverse.

### Mental Strategies

- Know all times tables up to and including  $12 \times 12$  (by the end of Year 4)
- Recognise and use factor pairs (factor pairs for numbers up to and including 10)
- Know that  $10 \times 5$  is  $10 \times 10$  then divide by 2 ( $18 \times 5 = (18 \times 10) \div 2 = 90$ ) OR  $9 \times 90 = 10$
- Know that  $10 \times 9$  is  $10 \times 10$  then subtract  $10$  ( $18 \times 9 = (18 \times 10) - 18 = 162$ ).

## Division

### NC Ready-to-Progress

- **4NPV-4** Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts.
- **4NF-1** Recall division facts up to  $12 \times 12$ .
- **4NF-2** Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, and interpret remainders appropriately according to the context.
- **4MD-1** Divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size.
- **4MD-2** Manipulate division equations, and understand and apply the commutative property of multiplication.

### Written Methods and Pictorial Representations

Partitive division

Quotitive division

$73 \div 3 = ?$

### Vocabulary

Key Words: factor, divisor, divided by, divided into, remainders, divisible by, equivalent, short division, derive, dividend, divisor, quotient, inverse, repeated subtraction, remainder, multiples, exchange.

*Eight tens and four ones divided between four is equal to two tens and one one.  
Each child gets twenty-one sticks.*

$$84 \div 4 = 21$$

dividend  $\div$  divisor = quotient

$$\begin{array}{r} 21 \\ 4 \overline{) 84} \end{array}$$

quotient  
divisor  $\overline{)}$  dividend

### Mental Strategies

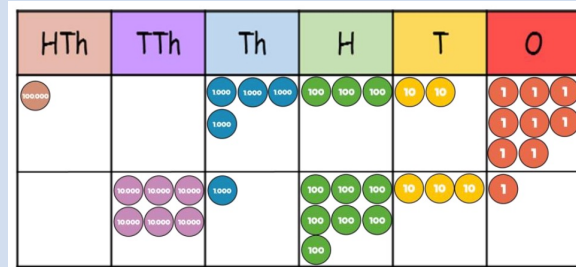
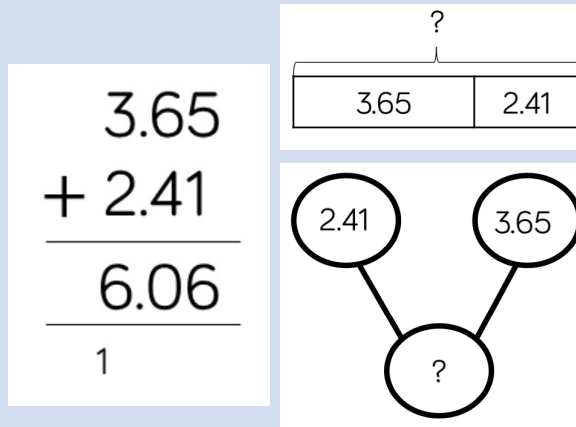
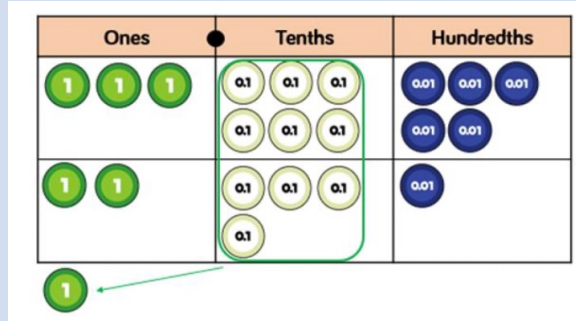
- To know that division is the inverse of multiplication
- Know all related division facts for all times tables up to 12 times table (by the end of Year 4)

## Addition

### NC Ready-to-Progress

- **5NPV-2** Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and nonstandard partitioning.
- **5NPV-3** Reason about the location of any number with up to 2 decimal places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.
- **5NF-2** Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth).

### Written Methods and Pictorial Representations



### Vocabulary

Key Words:  
Efficient written method, add, addition, more, plus, increase, sum, total, altogether, score, ones column, tens column, hundreds column, tenths hundredths, inverse.

### Mental Strategies

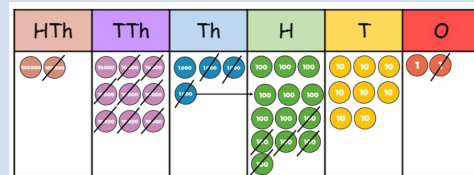
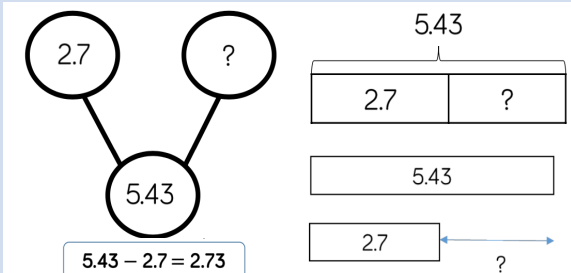
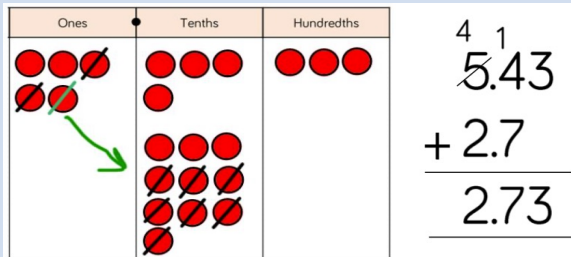
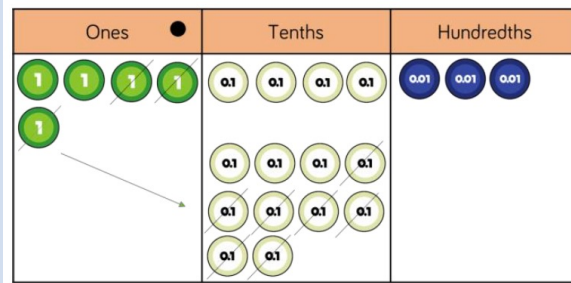
- Add numbers mentally with increasingly large numbers ( $10,162 + 2,300 = 12,462$ )
- Mentally add tenths ( $0.2 + 0.6 = 0.8$ ) and 1-digit whole numbers and tenths ( $8 + 0.3 = 8.3$ )
- Use number bonds to 100 knowledge to calculate complements to one using hundredths ( $0.83 + 0.17 = 1$ )
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

## Subtraction

### NC Ready-to-Progress

- **5NPV-3** Reason about the location of any number with up to 2 decimal places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: subtract, minus, leave, how many are left/left over?, how many less is... than...?, how much fewer is...?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on, count back, one less, ten less... one hundred less.

### Mental Strategies

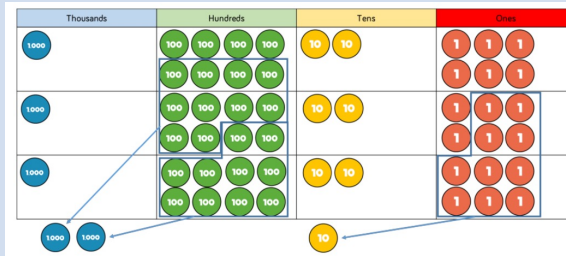
- Subtract increasingly large numbers mentally ( $12$ ,  $654 - 1,341 = 11, 213$ )
- Mentally subtract tenths ( $0.7 - 0.5 = 0.2$ ) and 1-digit whole numbers and tenths ( $8 - 0.3 = 7.7$ )
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

## Multiplication

### NC Ready-to-Progress

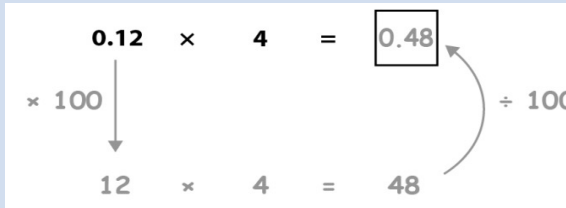
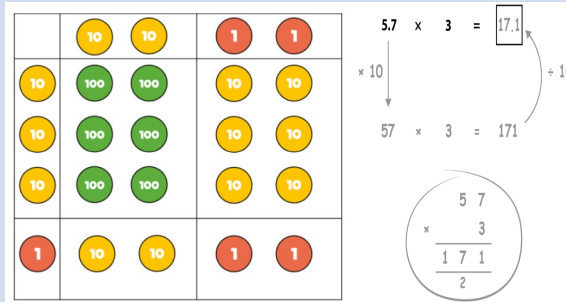
- **5NPV-1** Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.
- **5NF-1** Secure fluency in multiplication table facts, through continued practice.
- **5MD-1** Multiply numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size.
- **5MD-2** Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors.
- **5MD-3** Multiply any whole number with up to 4 digits by any one-digit number using a formal written method.

### Written Methods and Pictorial Representations



	Th	H	T	O
	1	8	2	6
x				3
	5	4	7	8
	2		1	

x	20	2
30	600	60
1	20	2



### Vocabulary

Key Words: composite numbers, prime number, prime factor, cube number, square number, derive, factor pairs, formal written method, times, multiply, multiplied by, multiple of, product, short multiplication, partition, long multiplication, scaling, decimal point, ones, tenths and hundreds.

### Mental Strategies

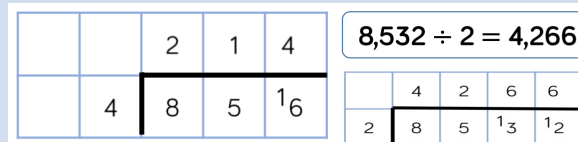
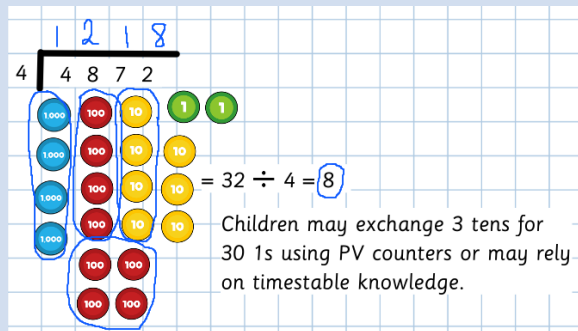
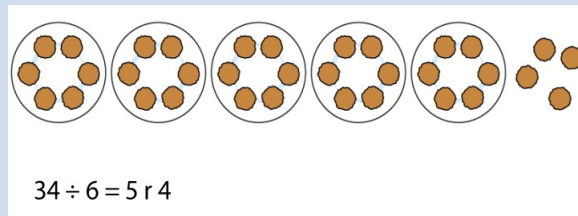
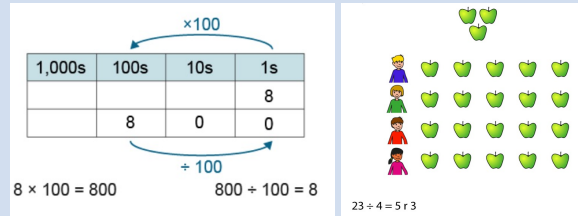
- Recognise and calculate factor pairs for any number
- Use times table knowledge to derive multiples of any number
- Establish whether a number is a prime number (up to 100) or a composite number (not prime) and recall prime numbers up to 19
- To know what a square number is and recall all square numbers (up to and including 144)
- To know what a cube number is and recall the first 5 cube numbers.

## Division

### National Curriculum

- **5NPV-3** Reason about the location of any number with up to 2 decimal places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each
- **5NF-1** Secure fluency in division facts, through continued practice.
- **5MD-1** Divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size.
- **5MD-4** Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context.

### Written Methods and Pictorial Representations



### Vocabulary

Key Words: divide, divided by, divided into, divisible by, remainder, dividend, divisor, quotient, inverse, decomposing, factor, decimal place, ones, tenths, scaling, short division.

*The '34' represents the total number of biscuits. The '6' represents the number of biscuits on each plate. The '5' represents the number of plates of biscuits. The '4' represents the number of biscuits left over.*

$$84 \div 4 = 21$$

dividend ÷ divisor = quotient

$$\begin{array}{r} 21 \\ 4 \overline{) 84} \end{array}$$

quotient  
divisor } dividend

### Mental Strategies

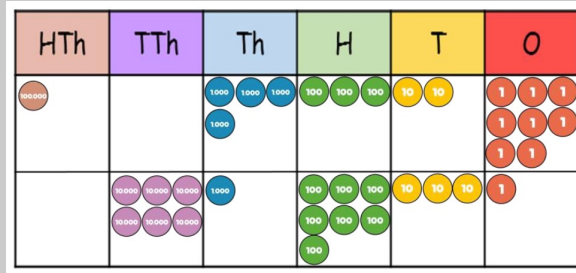
- To know that division is the inverse of multiplication
- Multiply and divide numbers mentally drawing upon known facts
- Associate fractions with division

## Addition

### NC Ready-to-Progress

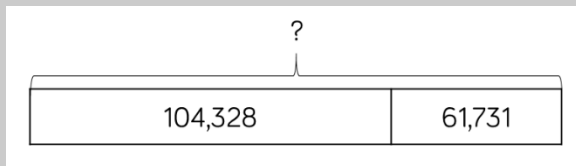
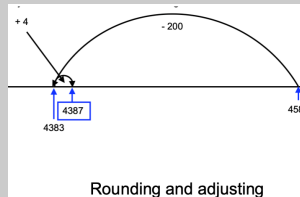
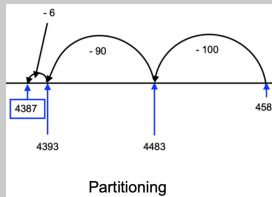
- **6NPV-2** Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and nonstandard partitioning.
- **6AS/MD-1** Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number).
- **6AS/MD-2** Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.
- **6AS/MD-3** Solve problems involving ratio relationships.
- **6AS/MD-4** Solve problems with 2 unknowns.

### Written Methods and Pictorial Representations



1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9

1



At this stage, children should be encouraged to use the abstract, using column methods to support efficiency. Concrete and pictorial representations will continue to be used to embed the understanding of core mathematical concepts.

### Vocabulary

#### Key Words:

Column addition, add, in total, altogether, answer, tens column, hundreds column, thousands column, millions, tenths, hundredths, decimal place, inverse, accurate, estimate, how much, exact.

### Mental Strategies

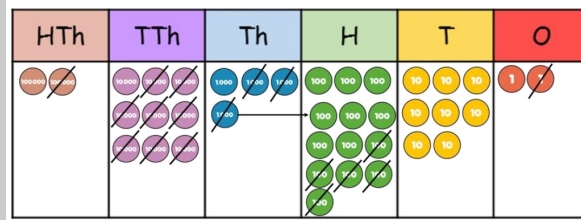
- Add numbers mentally with increasingly large numbers ( $10,162 + 2,300 = 12,462$ )
- Add decimal numbers mentally (up to 2 decimal places)
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

## Subtraction

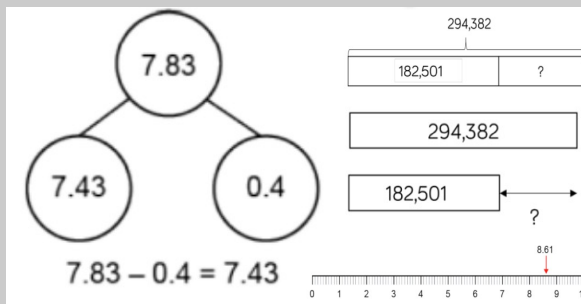
### NC Ready-to-Progress

- **6AS/MD–3** Solve problems involving ratio relationships.
- **6AS/MD–4** Solve problems with 2 unknowns.

### Written Methods and Pictorial Representations



	2	9	<del>3</del> 4	13	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1



At this stage, children should be encouraged to use the abstract, using column methods to support efficiency. Concrete and pictorial representations will continue to be used to embed the understanding of core mathematical concepts.

### Vocabulary

#### Key Words:

Tenths, hundredths, subtract, less than, fewer, inverse

The previous whole number is \_\_\_\_.

The previous multiple of 0.1 is \_\_\_\_.

### Mental Strategies

- Subtract increasingly large numbers mentally (12, 654 – 1,341 = 11, 213)
- Subtract decimal numbers mentally (up to 2 decimal places)
- Application of number bonds to larger numbers.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.



## Multiplication

### NC Ready-to-Progress

- **6NPV-1** Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply by 10, 100 and 1,000).
- **6AS/MD-1** Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number).
- **6AS/MD-2** Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.
- **6AS/MD-3** Solve problems involving ratio relationships.
- **6AS/MD-4** Solve problems with 2 unknowns.

### Written Methods and Pictorial Representations

	H	T	O		TTh	Th	H	T	O
		2	2			2	7	3	9
x		3	1		x			2	8
		2	2		2	1	9	1	2
	6	6	0		2	5	3	7	
	6	8	2		5	4	7	8	0
					7	6	6	9	2

	100	100	10	10	10	1	1	1	1	Th	H	T	O
											2	3	4
										x		3	2
											4	6	8
										7	0	2	0
										7	4	8	8

x	200	30	4
30	6,000	900	120
2	400	60	8

$$2,739 \times 28 = 76,692$$

### Vocabulary

Key Words: common factors, multiples, prime, formal written method, multiply, multiplied by, multiple of, product, short and long multiplication, partition, scaling, decimal place, ones, tenths and hundredths.

### Mental Strategies

- Use scaling to solve decimal number problems as whole number problems using the rule: 'the number of decimal digits in the question is the same as the number of decimal digits in the answer'
- Identify common factors, common multiples and prime numbers
- Use common factors to simplify fractions mentally
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy



## Division

### NC Ready-to-Progress

- **6NPV-1** Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (divide by 10, 100 and 1,000).
- **6NPV-4** Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.
- **6AS/MD-3** Solve problems involving ratio relationships.
- **6AS/MD-4** Solve problems with 2 unknowns.

### Written Methods and Pictorial Representations

		0	3	6	
1	2	4	3	2	(x30)
		-	3	6	0
			7	2	(x6)
			-	7	2
					0

$12 \times 1 = 12$   
 $12 \times 2 = 24$   
 $12 \times 3 = 36$   
 $12 \times 4 = 48$   
 $12 \times 5 = 60$   
 $12 \times 6 = 72$   
 $12 \times 7 = 84$   
 $12 \times 8 = 96$   
 $12 \times 9 = 108$   
 $12 \times 10 = 120$

$432 \div 12 = 36$

		0	4	8	9		
15	7	3	3	5	(x400)		
		-	6	0	0		
			1	3	5	(x80)	
			-	1	2	0	
				1	3	5	(x9)
				-	1	3	5
							0

$1 \times 15 = 15$   
 $2 \times 15 = 30$   
 $3 \times 15 = 45$   
 $4 \times 15 = 60$   
 $5 \times 15 = 75$   
 $10 \times 15 = 150$

$7,335 \div 15 = 489$

			2	4	$\frac{4}{5}$
1	5	3	7	2	
		-	3	0	0
			7	2	
			-	6	0
				1	2

$372 \div 15 = 24 \frac{4}{5}$

$730 \div 25 = ?$

	2	9	$\frac{5}{25}$
25	7	3	0
	5	0	
	2	3	0
	2	2	5
			5

		5	$\frac{5}{20}$
20	1	0	5
	1	0	0
			5

### Vocabulary

Key Words: divide, divided by, divided into, divisible by, remainder, factor, dividend, divisor, quotient, inverse, decimal place, ones, tenths, hundredths, scaling, formal written methods.

$$84 \div 4 = 21$$

dividend  $\div$  divisor = quotient

$$\begin{array}{r} 21 \\ 4 \overline{) 84} \end{array}$$

quotient  
divisor  $\overline{)}$  dividend

$5 \div 20 = \frac{5}{20}$   
 → 'Write " $\frac{5}{20}$ " after the ones column of the answer line.'

Simplify the fraction:

$$\frac{5}{20} = \frac{1}{4}$$

So,  $105 \div 20 = 5 \frac{1}{4}$

### Mental Strategies

- To know that division is the inverse of multiplication
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Calculate a fraction of an amount



# Reference List

- Whiterose  
<https://whiterosemaths.com/resources>
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