

# Viking Academy Trust



## Calculation Policy Chilton Primary School

Approved by the Trust:

Reviewed annually:

Last review date:

Signed:

Chair of Trustees

# **CALCULATION POLICY**

## **The Viking Academy Trust**

Schools in the Viking Academy Trust (VAT)

**Chilton Primary School**

**Ramsgate Arts Primary School**

**Upton Junior School**

This 'Calculation' policy is specifically for **Chilton Primary School**

### **1. Rationale:**

At the Viking Academy Trust, we believe all employees must ensure their mathematical subject knowledge is relevant conditional to current methodologies and expectations in teaching mathematics.

### **2. Purpose:**

To establish an accessible document that clearly outlines the progression through each of the four calculations within mathematics; addition, subtraction, multiplication and division. With the help of concrete, pictorial and abstract representations, teachers are able to use this document in order to plan a succession of effective lessons regarding the conceptualised teaching and learning of calculation.

### **3.1 Guidelines:**

This policy is separated firstly into the four calculations and then additionally by year group in order to show a clear route of development through years 3 to 6 in addition, subtraction, multiplication and division; including the expected formal abstract written methods, visual representations and links to other areas of the curriculum.

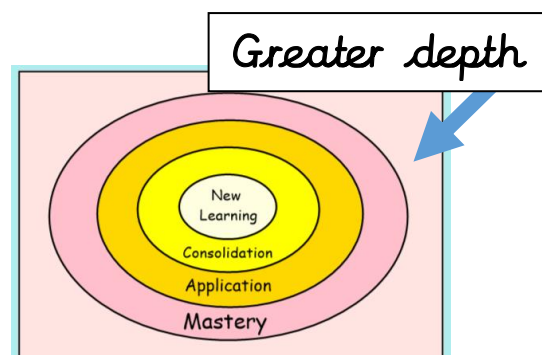
This policy should be used alongside other school mathematics initiatives such as **Primary Advantage Maths** in which a further wealth of concrete, pictorial and abstract representations of the four calculations can be found.

### **4. Technical Terms:**

**4.1 Mastery:** to acquire a solid enough understanding of maths that's been taught to enable him/her to move on to more advanced material. Teachers keep the class working together on the same topic, whilst at the same time addressing the need for all pupils to master the curriculum and for some to gain greater depth of proficiency and understanding. Mastery of the curriculum requires that all pupils: have sufficient depth

of knowledge and understanding to reason and explain mathematical concepts and procedures and use them to solve a variety of problems.

**4.2 Greater depth:** Beyond mastery. Greater depth still means the same expected standard (curriculum level), but at a deeper level. These children will most likely be children who 'grasp concepts quickly' for these children we should provide 'rich and sophisticated problems' and we shouldn't just be getting them to move on to the next year group's work. Pupils to be working at greater depth should confidently and independently be able to deal with increases in complexity, deduction and reasoning.



#### **4.3 Fluency:**

Practise of different mathematical concepts taught. For example, practising addition or subtraction via calculations.

#### **4.4 Varied Fluency:**

Practising different methods through calculations, but which look different to what children are expecting. For example:

$$7 = 784 + 383$$

#### **4.5 Problem Solving:**

Problem solving is about engaging with real problems; guessing, discovering and making sense of mathematics (real problems don't have to be 'real world' applications, they can be within mathematics itself). The main criterion is that they should be unique and new to the student. Problem solving skills include: orking systematically, logical reasoning, spotting patterns, working backwards (inverse), spotting patterns, trial and improvement, visualising.

#### **4.7 Reasoning:**

Reasoning enables children to make use of all their other mathematical skills and so reasoning could be thought of as the 'glue' which helps mathematics makes sense.

1. When first encountering a new challenge.
2. When logical thinking is required.
3. When a range of starting points is possible.
4. When there are different strategies to solving a problem.
5. When there is missing information.
6. When selecting a **problem-solving** skill.
7. When evaluating a solution in context.
8. When there is more than one solution.

## 5 Formal Written Guidance.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Addition</b>	To add a 1 digit and a 2 digit number using the 'regrouping into tens and ones' strategy. Vertical addition with no regrouping. (2 digit + 1 digit not bridging 10)	To add numbers regrouping in ones (bridging 10) To add numbers regrouping in 10s (Bridging 100)	Column method without regrouping (up to 3 digits)  Begin regrouping when appropriate.	Column method with regrouping (up to 4 digits)	Column method with regrouping (up to 4 digits and beyond) Decimals - with the <b>same</b> amount of decimal places.	Column method with regrouping (up to 4 digits and beyond) Decimals - with <b>different</b> amounts of decimal places.
<b>Subtraction</b>	To subtract within 20 by regrouping into tens and ones Counting on and backwards.  To make number sentences	To subtract up to 2 digit numbers with no regrouping.  To subtract up to 2 digits with regrouping.	Column method without regrouping (up to 3 digits)  Begin regrouping when appropriate.	Column method with regrouping (up to 4 digits)	Column method with regrouping g (up to 4 digits and beyond) Decimals - with the <b>same</b> amount of decimal places.	Column method with regrouping (up to 4 digits and beyond) Decimals - with <b>different</b> amounts of decimal places.
<b>Multiplication</b>	Repeated addition, arrays, and multiplication stories.	Multiply using partitioning.  Using multiplication /division facts.  Bar model for multiplication	Counting in multiples. Repeated addition. Arrays - showing commutativity. Partitioning using the <b>grid method</b> .	<b>Column</b> (vertical) multiplication  (2 and 3 digit multiplied by 1 digit)	<b>Column</b> (vertical) multiplication Long multiplication  (up to 4 digit multiplied by 1 or 2 digits)	<b>Column</b> (vertical) multiplication Long multiplication  (multi digit up to 4 digits multiplied by 2 digits)
<b>Division</b>	Relate division to repeated subtraction. Use arrays to solve division problems. To make links multiplication and division.	Concrete and visual resources to reflect division. To divide with remainders- concrete and pictorial. Create number families.	Division with arrays. Division with a remainder. <b>Short division</b> (2 digit by 1 digit)	Division with arrays. Division with a remainder. <b>Short division</b> (up to 3 digits by 1 digit)	<b>Short division</b> (Up to 4 digits by 1 digit) Remainders can be interpreted in different ways.	<b>Short division</b> <b>Long division</b> (Up to 4 digits by 2 digits) Remainders interpreted as whole numbers, fractions or round.

## EYFS 2 Addition

**Key Vocabulary:** add, more, and, make, sum, total, altogether, score, double, one more, two more, how many more?

Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.

Represent and use number bonds and related subtraction facts within 10

Add and subtract one-digit and two-digit numbers to 20 including zero

Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as  $7 = \square - 9$

### Mental Maths

Use counting stick to ten and within twenty.

Recall doubles.

Use of songs and rhymes can help.

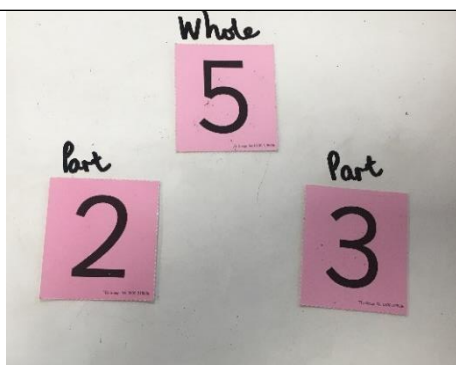


### Examples of models which can be used for some EYFS2 objectives.



Adding sets of objects which are the same.

Using part, part whole to add objects.

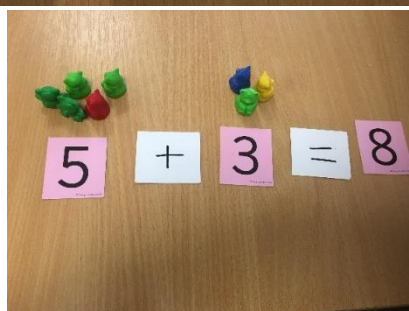


Adding sets of objects which are different.

### Progression into worded problems.



Use cubes to add quantities together.



Pair number cards with objects to add quantities.



## Year 1 Addition

**Key Vocabulary:** add, more, plus, make, sum, total, altogether, score, double, near double, one more, two more, ten more, how many more to make...?, how many more is... than...? How much more is...?

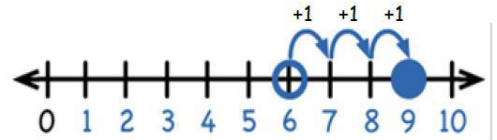
Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Represent and use number bonds and related subtraction facts within 20. Add and subtract one-digit and two-digit numbers to 20 including zero. Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems.

### Mental Maths



To add multiples of ten  
Add ten to any two digit number  
Count on from largest number  
Recall of number bonds

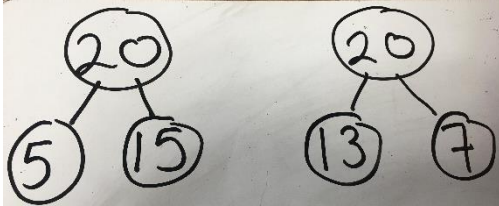
$$6 + 3 = 9$$



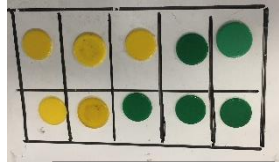
- Use a variety of equipment to solve addition problems, including counting equipment, everyday objects, number tracks etc.
- Read and write the addition (+) and equals (=) sign and use them in number sentences.

- Solve addition number sentences and missing number problems:  $7 + 4 = ?$ ,  $1 + 2 + 1 = ?$ ,  $? + ? = 9$  etc.
- Use bead strings or bead bars to visualise bridging through 10s e.g.  $8 + 5 =$  can be solved by counting on 2 then counting on 3.

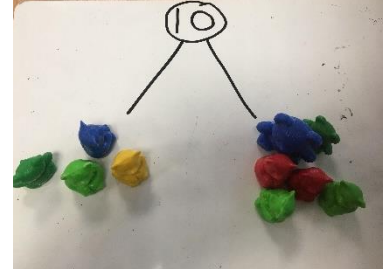
### Examples of resources which can be used with Year 1 objectives



Using part-part whole to work out number bonds to twenty.

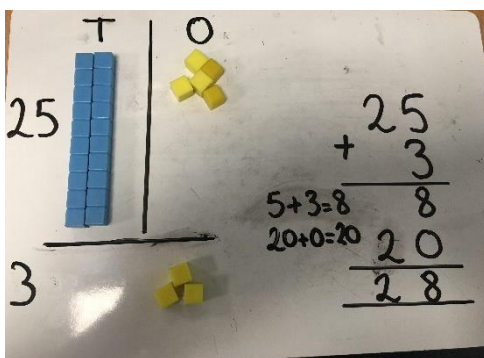


Use a tens grid to visualise number bonds.



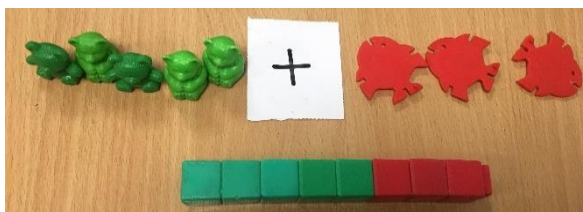
Use part-part whole to work out number bonds to ten

### Progression into written method



Use of dienes to set out tens and ones of a number.  
Vertical addition with no regrouping.

### Progression into worded problems.



## Addition Year 2

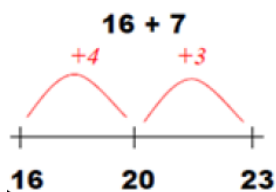
**Vocabulary:** add, more, plus, make, sum, total, altogether, score, double, near double, one more, two more, ten more, how many more to make...?, how many more is... than...? How much more is...?

**Key Skills:** subtract numbers using concrete objects, pictorial representations, and mentally, including: - A two digit number and ones - A two digit number and tens - Add two two-digit numbers - Adding three one digit numbers

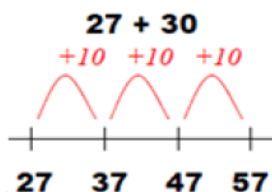
### Mental maths

Children should explore and understand how to use blank number lines to add using their knowledge of place value and how to partition numbers in different ways. Once confident they should move onto written partitioning methods.

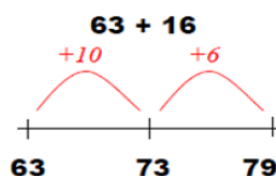
Adding a 2 digit number and units



Adding a 2 digit number and tens



Adding two 2 digit numbers



$$34 + 23 = 57$$

$$30 + 20 = 50$$

$$4 + 3 = 7$$

Partitioning should be started with 2 digit numbers that do not bridge the tens or hundreds so children become fully confident with the method itself

Once children are confident they can start using the partitioning method to add numbers that bridge the tens and hundreds boundaries.

$$246 + 132 = 378$$

$$200 + 40 + 6$$

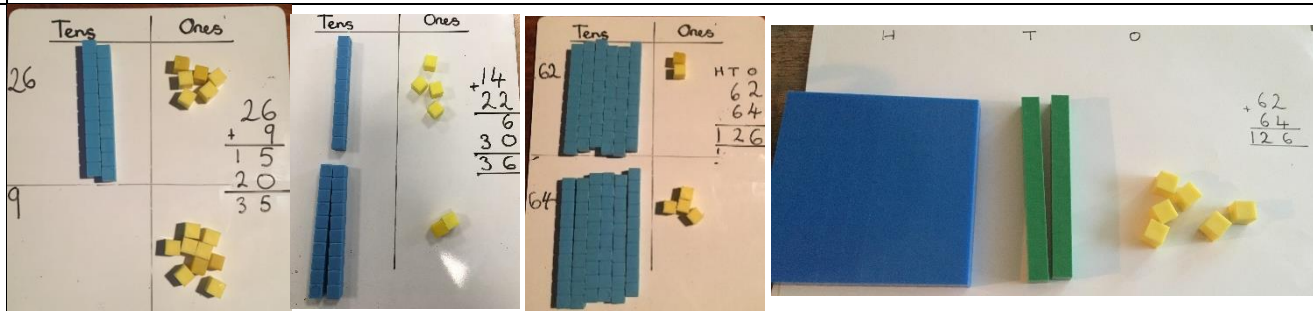
$$100 + 30 + 2$$

$$300 + 70 + 8 = 378$$

Introduce the partitioning column method with numbers that do not bridge so children become confident with the method itself.

Add units first!

### Vertical addition



### Bar Model



Jim has 12 blue cubes and Sally has 11 yellow cubes. How many cubes do they have altogether?

Addition Year 3		
<b>Key Vocabulary:</b> Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, numberline, sum, tens, units, partition, addition, column, tens boundary, <i>hundreds boundary, increase, vertical, carry, expanded, compact</i>		
<b>Key Skills:</b> To add a three digit number and tens without regrouping. To add 2 three-digit numbers without regrouping. To add three-digit numbers with regrouping. To add using place value counters. To develop and recognise patterns in addition. To estimate the answer to a calculation. To solve word problems		
<b>Mental calculations</b>	<p> <math>246 + 132 = 378</math>  <math>200 + 40 + 6</math>  <math>100 + 30 + 2</math>  <math>300 + 70 + 8 = 378</math> </p> <p> <math>337 + 188 = 525</math>  <math>300 + 30 + 7</math>  <math>100 + 80 + 8</math>  <math>400 + 110 + 15 = 525</math> </p>	<p>           Introduce the partitioning column method with numbers that do not bridge so children become confident with the method itself.         </p> <p>           Once confident, children can start using the partitioning column method to solve problems that bridge the tens and hundreds boundaries.         </p> <div data-bbox="588 667 943 943"> </div> <div data-bbox="1018 678 1473 880"> <div>           Mental Methods            Partitioning            Doubles and near doubles            Using number pairs to 10 and 100            Adding near multiples of ten         </div> </div>
<b>Written addition</b> TU + TU HTU + TU HTU + HTU	<div data-bbox="236 965 604 1232"> </div> <div data-bbox="604 972 887 1032"> <div>Without regrouping</div> </div> <div data-bbox="236 1227 737 1588"> </div> <div data-bbox="675 1469 916 1552"> <div>With regrouping</div> </div> <div data-bbox="943 1238 1473 1576"> </div>	
<b>Links to other strands</b>	Pupils should estimate the answers to a calculation and use inverse operations to check answers. Add amounts of money using both pounds (£) and pence (p) in practical and appropriate contexts. Measure, compare and add lengths (m/cm/mm), mass (kg/g) and volume/capacity (l/ml).	



## Year 4 Addition

**Key Vocabulary:** add, addition more, plus, increase, make, sum, total, altogether, score, double, near double, one more, two more, ten more, one hundred more, how many more to make...?, how many more is... than...? How much more is...?  
Tens boundary, hundreds boundary, inverse.

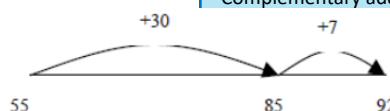
**Main learning intentions:** Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate. Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two step word problems in context, deciding which operations and methods to use and why.

### Mental Maths

Practise mental methods with increasingly large numbers.  
*See year 3 guidance*

Consolidate partitioning and re-partitioning  
Use compensation for adding too much/little and adjusting.  
Use straws, Dienes, place value counters, Empty number lines etc.

I know that  $63 + 29$  is the same as  $63 + 30 - 1$



#### Common mental calculation strategies:

Partitioning and recombining  
Doubles and near doubles  
Use number pairs to 10 and 100  
Adding near multiples of ten and adjusting  
Using patterns of similar calculations  
Using known number facts  
Bridging through ten and hundred  
Complementary addition (mental number line)

$$\begin{aligned} 55 + 37 &= 55 + 30 + 7 \\ &= 85 + 7 \\ &= 92 \end{aligned}$$

### Written methods

HTU + HTU  
ThHTU + HTU  
ThHTU + ThHTU



Compact vertical

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

$$789 + 642 = 1431$$

If not secure, children must use expanded methods alongside manipulatives.

Include decimal addition for money.

### Links to other strands

Add amounts of money using both pounds (£) and pence (p) in practical and appropriate contexts.  
Measure, compare and add lengths (m/cm/mm), mass (kg/g) and volume/capacity (l/ml).  
Calculate the perimeter of composite rectilinear shapes using different units of measurement.

## Year 5 Addition

**Key Vocabulary:** add, addition more, plus, increase, make, sum, total, altogether, score, double, near double, one more, two more, ten more, one hundred more, how many more to make...?, how many more is... than...? How much more is...? Tens boundary, hundreds boundary, inverse.

**Main learning intentions:** Add and subtract whole numbers with more than 4 digits, including formal written methods (columnar addition and subtraction). Add and subtract numbers mentally with increasingly large numbers. Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

**Mental Maths**

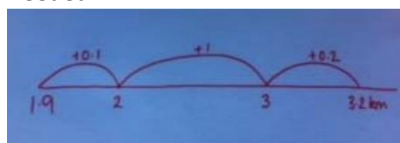
**Add numbers mentally with increasingly large numbers, e.g.  $12,462 + 2,300 = 14,762$**

**Mentally add tenths, and one-digit numbers and tenths.**

**Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of places, and complements of 1 (e.g.  $0.67 + 0.33 = 1$ )**

Children use representation of choice

Refer back to pictorial and physical representations when needed.



**Common mental calculation strategies:**

Partitioning and recombining

Doubles and near doubles

Use number pairs to 10 and 100

Adding near multiples of ten and adjusting

Using patterns of similar calculations

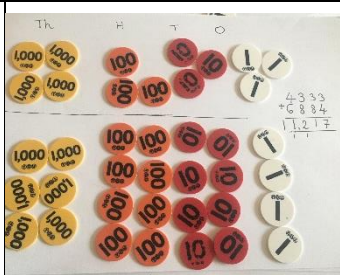
Using known number facts

Bridging through ten and hundred

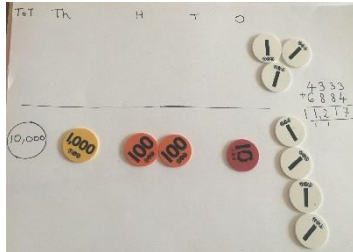
Complementary addition (mental number line)

**Written methods**

Add whole numbers >4 digits, including using formal written methods (columnar addition).

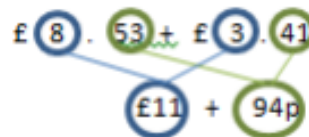


Decimals up to 2dp (eg  $72.5 + 45.7$ )



$$\begin{array}{r} \text{£ } 23.59 \\ + \text{£ } 7.55 \\ \hline \text{£ } 31.14 \end{array}$$

**Adding decimals including using part part whole method.**



**Links to other areas of curriculum**

Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.

To round, estimate and add numbers to solve worded problems.

To solve missing number calculations.

Use all four operations to solve problems involving measure (e.g. length, mass, volume/capacity, money, duration) using decimal notation.

Calculate the perimeter of composite rectilinear shapes using different units of measurement.

Use angle sum facts and other properties to make deductions about missing angles.

Solve comparison, sum and difference problems using information presented in a line graph.

## Year 6 Addition

**Key Vocabulary:** add, addition more, plus, increase, make, sum, total, altogether, score, double, near double, one more, two more, ten more, one hundred more, how many more to make...?, how many more is... than...? How much more is...? Tens boundary, hundreds boundary, inverse.

**Main learning intentions:** Perform mental calculations, including with mixed operations and large numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Solve problems involving addition, subtraction, multiplication and division. Use estimation to check answers to calculations and determine, the in context of a problem, an appropriate degree of accuracy.

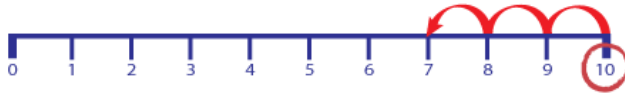
Mental Methods	<p><b>Perform mental calculations, including with mixed operations and large numbers</b> (<i>more complex calculations</i>)</p> <p>Children use representation of choice. Consolidate partitioning and re-partitioning. Use compensation for adding too much/little and adjusting. Refer back to pictorial and physical representations when needed.</p> <p><i>See years 3, 4 and 5 guidance for further scaffolding of less able.</i></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Common mental calculation strategies:</b></p> <ul style="list-style-type: none"> <li>Partitioning and recombining</li> <li>Doubles and near doubles</li> <li>Use number pairs to 10 and 100</li> <li>Adding near multiples of ten and adjusting</li> <li>Using patterns of similar calculations</li> <li>Using known number facts</li> </ul> </div>	
Written calculations	<p><b>Expanded</b> vertical  <math>3.243 + 18.070 = 21.313</math></p> $  \begin{array}{r}  3.243 \\  + 18.070 \\  \hline  0.003 \\  0.110 \\  0.200 \\  21.000 \\  \hline  21.313  \end{array}  $	<p>Children need to use their knowledge of the decimal point to line up their amounts correctly in the column. Zeroes should be added to support place value, showing that there is no value to add.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px;"> <math display="block">  \begin{array}{r}  81,059 \\  3,668 \\  15,301 \\  + 20,551 \\  \hline  120,579  \end{array}  </math> </div> <div style="border: 1px solid black; padding: 5px;"> <math display="block">  \begin{array}{r}  £563.14 \\  + £207.88 \\  \hline  £771.02 \\  \hline  111  \end{array}  </math> </div> <div style="text-align: center;"> <math display="block">  \begin{array}{r}  \square \Delta \\  \square \Delta \\  + \square \Delta \\  \hline  \bigcirc \square  \end{array}  </math> </div> </div>
Other strands	<p>Pupils should use their knowledge of the order of operations to carry out calculations involving the four operations (BIDMAS).</p> <p>Algebra: use symbols and letters to represent variables and unknowns <i>e.g. <math>a + b = b + a</math></i></p> <p>Solve problems involving the calculation and conversions of units of measure, using decimal notation of up to three decimal places where appropriate.</p> <p>Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature.</p> <p>Calculate and interpret the mean as an average.</p> <p>Interpret and construct pie charts and line graphs and use these to solve problems</p> <p>Find missing angles, and express geometry relationships algebraically (e.g. <math>d = 2xr</math>)</p>	

## Subtraction EYFS 2

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

Children count reliably with numbers from 1 to 20, place them in order (see number and place value) and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer

### Mental Maths



#### Mental calculation strategies

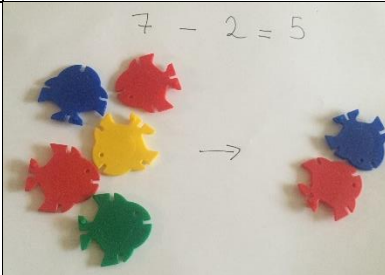
Say the number name that goes before a given number (one less)

Choose two groups of objects to make a given total.

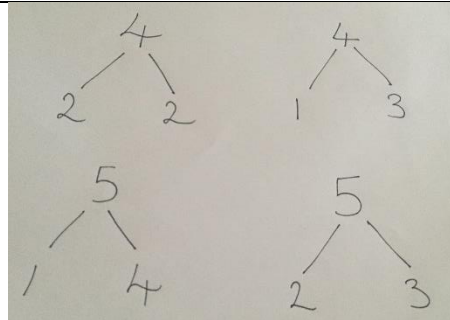
Say how many are left when some are taken away by counting how many are left. Say how many are left when some are taken away, by counting back from a number.

Find out how many have been removed by counting up to the larger number.

### Concrete/ Pictorial representations



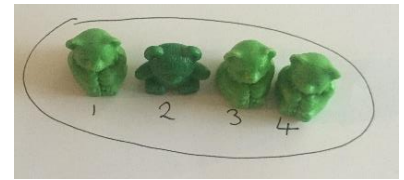
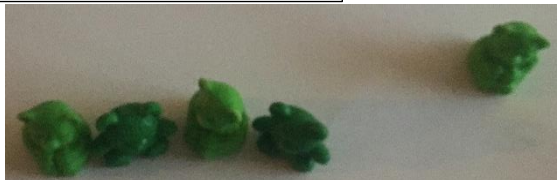
Using numbers & objects to represent subtraction sentences.



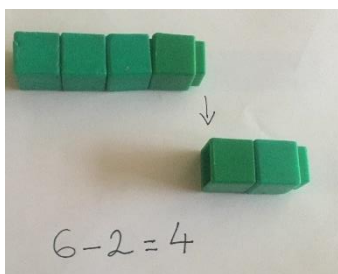
Part, part, whole number bonds.



Using cubes to compare amounts



### Progression to bar model



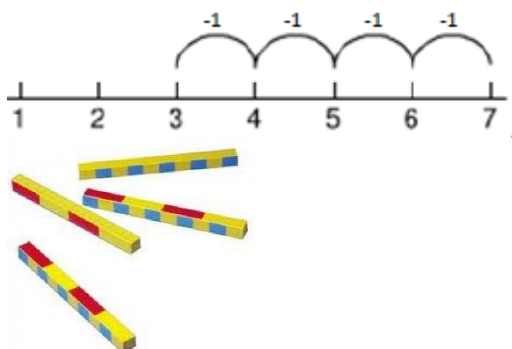
Paring number sentences and representing as concrete bar.

## Subtraction Year 1

**Vocabulary:** -, subtract, take (away), minus, leave, how many are left/left over?, how many have gone?, one less, two less, ten less, how many fewer is...than...?, how much less is...? Difference between, half, halve.

Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Represent and use number bonds and related subtraction facts within 20. Add and subtract one-digit and two-digit numbers to 20 including zero Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problem

### Mental Maths



#### Mental calculation strategies

Counting stick-counting forwards and backwards in steps.

To use 'count back from' strategies.

Find a small difference by counting up.

(When two numbers are close together i.e.  $15-12=3$  counting up from 12 to 15 gives 3.)

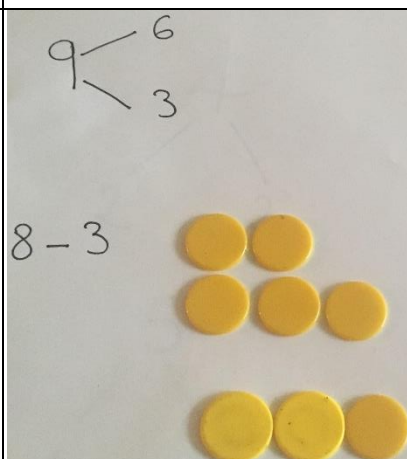
Subtract ten from a teens number

Subtract ten from any two digit number,

without crossing Subtract a pair of

multiples of ten without crossing 100

### Concrete/ Pictorial representations



9 is 3 and 6  
 $9-3=6$   
 $9-6=3$   
 How else can we  
 break up 9?

Count on from  
 three using  
 fingers or  
 counters.

$4-3=1$   
 4 and 3= 7  
 $7-3=4$   
 $7-4=3$



### Progression to bar model



What is 5 less than 7?



## Subtraction Year 2

**Vocabulary:** -, subtract, subtractions, take (away), minus, leave, how many are left/left over? , how many have gone?, one less, two less, ten less, one hundred less, how many fewer is...than...?, how much less is...? Difference between, half, halve, tens boundary, regroup.

Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Represent and use a two digit number and ones - A two digit number and tens - Add two two-digit numbers - Adding three one digit numbers

### Mental Maths

#### Mental calculation strategies

Number line  
Counting sticks  
Halving  
Counting up  
Partitioning  
Counting on to or back from largest number.

To know by heart all addition and subtraction facts for each number to 20

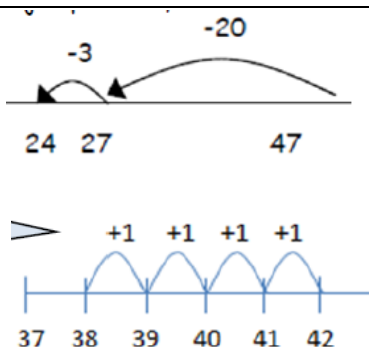
To use number bonds for mental subtraction

To add and subtract mentally a 'near multiple of ten' to or from a two digit number. To find pairs of numbers

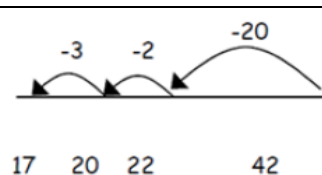
Use dienes, 100 square, number lines and cubes to assist with mental methods.



### Developing partitioning



Once children develop their confidence of counting back they will be able to select more efficient jumps to solve a problem and will not have to partition the tens and units numbers separately.



Once confident with efficient jumps, children are ready to subtract by bridging through 10, again partitioning is very important here and the children will need to be very confident with partitioning in different ways

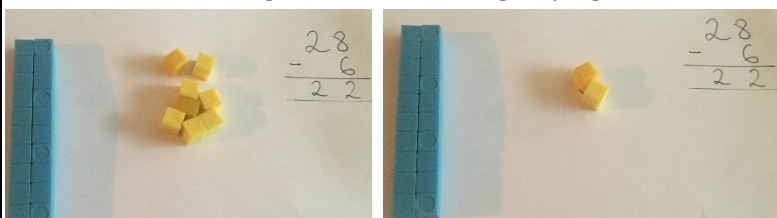
Use manipulatives to break numbers into parts for subtraction strategies.

### Progression to written method

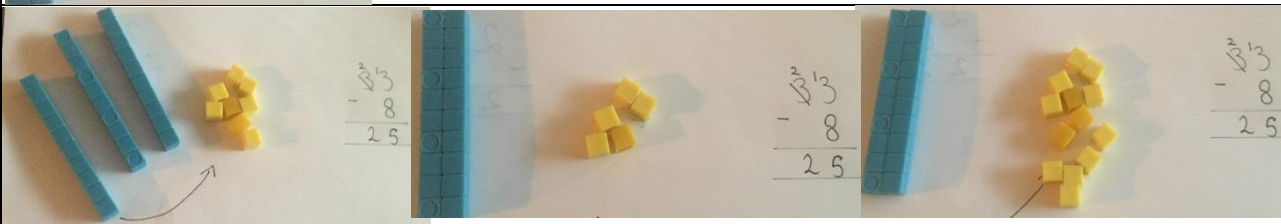
To subtract a one digit number from a two digit number without regrouping To subtract 2 two-digit numbers without regrouping.

To subtract a one digit number from a two digit number with regrouping

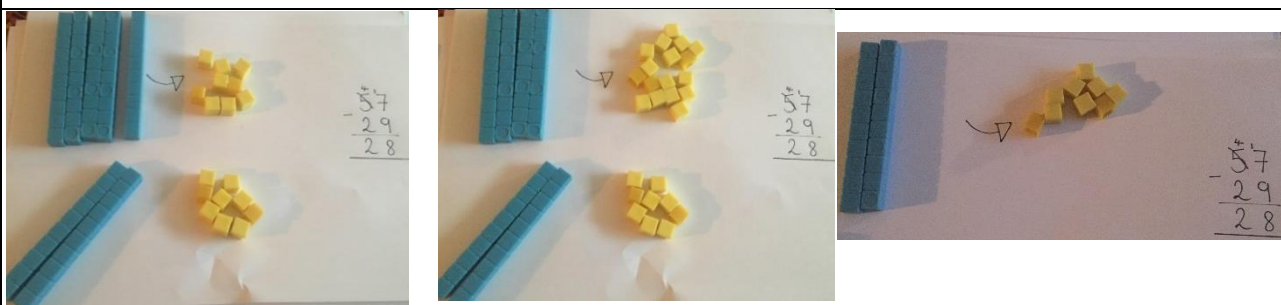
To subtract 2 two-digit numbers with regrouping



### 2 by 1 digit with exchanging



### 2 digit subtraction with exchanging



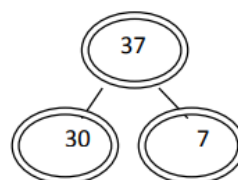
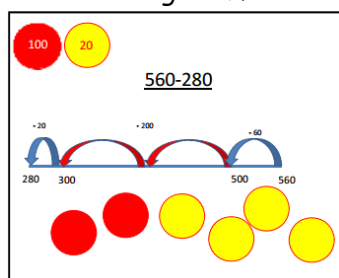
## Subtraction Year 3

A three-digit number and ones - A three-digit number and tens - A three-digit number and hundreds Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction Estimate the answer to a calculation and use inverse operations to check answers. Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction.

**Vocabulary:** -, subtract, subtractions, take (away), minus, leave, how many are left/left over? , how many have gone?, one less, two less, ten less, one hundred less, how many fewer is...than...?, how much less is...? Difference between, half, halve, tens boundary, hundreds boundary, regroup.

### Mental Maths

- A three-digit number and ones
- A three-digit number and tens
- A three-digit number and hundreds



**Mental calculation strategies**  
 Find differences by counting up  
 Partitioning  
 Applying known facts  
 Bridging through 10 and multiples of 10  
 Subtracting 9, 11 etc. by compensating  
 Counting on to, or back from the largest number  
**ROUNDING**

### Progression to written method

(1) Extended columnar - no exchange

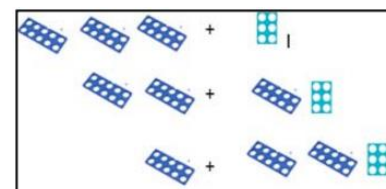
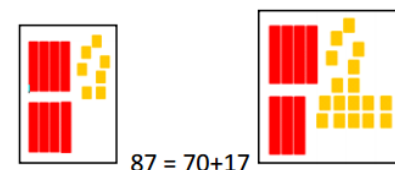
Extended method  $87 - 53 =$

$$\begin{array}{r} 80 \text{ and } 7 \\ - 50 \text{ and } 3 \\ \hline 30 \text{ and } 4 = 34 \end{array}$$

$$\begin{array}{r} 81 \\ 293 \\ -154 \\ \hline 139 \end{array}$$

(2) Extended columnar - with exchange:  
 $87 - 58$  becomes

$$\begin{array}{r} 70 + 17 \\ -50 + 8 \\ \hline 20 + 9 \end{array}$$



### Links to other strands

Money and duration of events

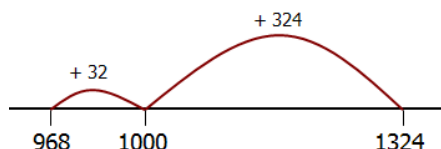
## Subtraction Year 4

Key vocab: take away, subtract, how many are left, how much left, difference between, how much more, how many more to make, decrease, inverse and the minus sign.

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate. Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two step word problems in context, deciding which operations and methods to use & why.

### Mental Maths

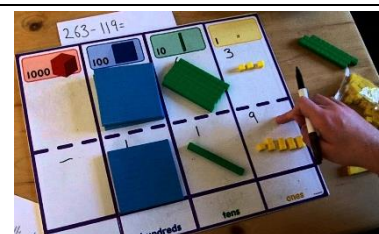
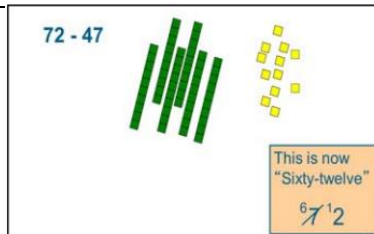
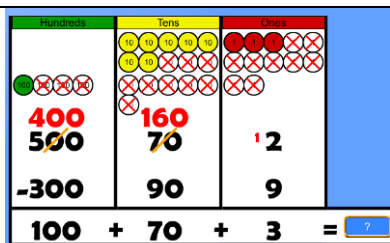
Continue to subtract increasingly large numbers.  
Consolidate partitioning and re-partitioning  
Use compensation for adding too much/little and adjusting.  
Use straws, Dienes, place value counters, Empty number lines etc.



### Mental calculation strategies

Find differences by counting up  
Partitioning  
Applying known facts  
Bridging through 10 and multiples of 10  
Subtracting 9, 11 etc. by compensating  
Counting on to, or back from the largest number  
**ROUNDING**

### Concrete/ Pictorial representations



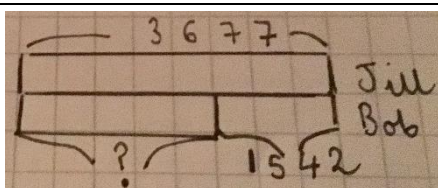
### Progression to written method

Subtract numbers with up to four digits, using formal written methods of columnar subtraction. Build on formal, extended method (see year 3) using exchange wherever necessary. Continue to use representations and manipulatives to develop understanding of place value.

$$\begin{array}{r} 300 + 70 + 2 \\ - 100 + 40 + 7 \\ \hline 200 + 20 + 5 \end{array}$$

$$\begin{array}{r} 6 \\ 1374 \\ - 968 \\ \hline 406 \end{array}$$

### Progression into word problems



3677 tickets are sold by Jim. Bob sells 1542 less tickets. How many tickets did Bob sell?

### Links to other strands

Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why. Solve simple measure and money problems involving fractions and decimals to 2dp. Estimate and use inverse operations to check. Estimate, compare and calculate different measures, including money in pounds and pence in context

## Subtraction Year 5

Add and subtract whole numbers with more than 4 digits, including formal written methods (columnar addition and subtraction). Add and subtract numbers mentally with increasingly large numbers. Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

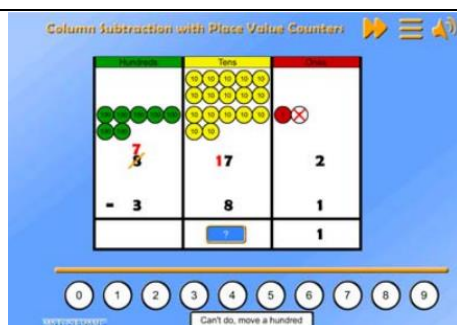
Key vocab: take away, subtract, how many are left, how much left, difference between, how much more, how many more to make, decrease, inverse and the minus sign.

### Mental Maths

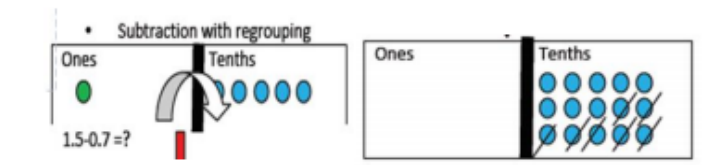
Continue to subtract increasingly large numbers.  
Consolidate partitioning and re-partitioning  
Use compensation for adding too much/little and adjusting.  
Use straws, Dienes, place value counters.

**Mental calculation strategies**  
Find differences by counting up  
Partitioning  
Applying known facts  
Bridging through 10 and multiples of 10  
Subtracting 9, 11 etc. by compensating  
Counting on to, or back from the largest number  
**ROUNDING**

### Concrete/ Pictorial representations



$$1.5 - 0.7 = 15 \text{ tenths} - 7 \text{ tenths} = 8 \text{ tenths} = 0.8$$

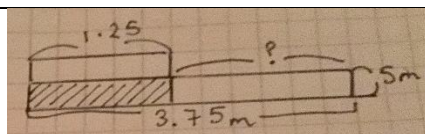


### Progression to written method

$$\begin{array}{r} \overset{2}{\cancel{2}} \overset{10}{\cancel{10}} \overset{0}{\cancel{0}} \overset{6}{\cancel{6}} \\ - \quad \quad 2 \quad 1 \quad 2 \quad 8 \\ \hline 2 \quad 8, 9 \quad 2 \quad 8 \end{array}$$

$$\begin{array}{r} \overset{6}{\cancel{6}} \overset{10}{\cancel{10}} \overset{6}{\cancel{6}} \overset{8}{\cancel{8}} \cdot \overset{0}{\cancel{0}} \\ - \quad \quad 3 \quad 7 \quad 2 \cdot 5 \\ \hline 6 \quad 7 \quad 9 \quad 6 \cdot 5 \end{array}$$

### Progression into word problems



the second piece of cloth?

A piece of 5m string is cut into two pieces. The first piece is 1.25m long. How much is

### Links to other strands

**Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.**  
Solve simple measure and money problems involving fractions and decimals to 2dp.  
Estimate and use inverse operations to check.  
Estimate, compare and calculate different measures, including money in pounds and pence in context

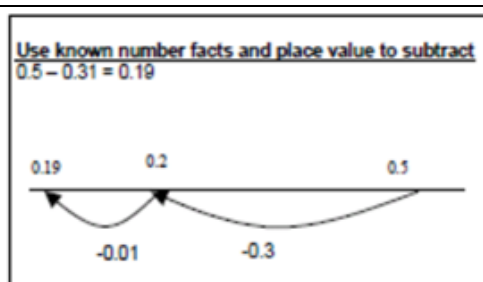
## Subtraction Year 6

Perform mental calculations, including with mixed operations and large numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Solve problems involving addition, subtraction, multiplication and division. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

**Key vocab:** -, subtract, subtractions, take (away), minus, leave, how many are left/left over?, how many have gone?, one less, two less, ten less, one hundred less, how many fewer is...than...?, how much less is...? Difference between, half, halve, tens boundary, hundreds boundary, regroup.

### Mental Maths

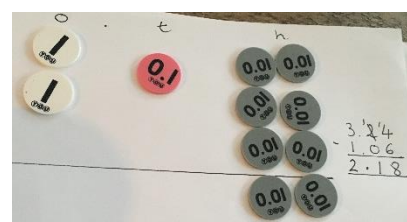
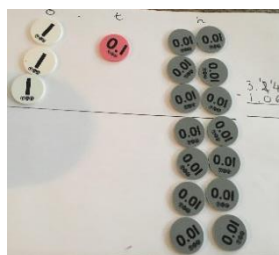
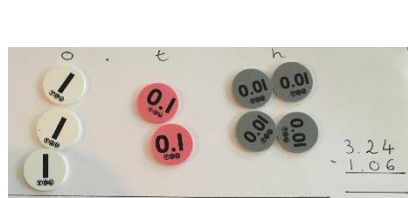
Perform mental calculations, including with mixed operations, increasingly large numbers and complex calculations.  
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.



**Mental calculation strategies**  
Find differences by counting up  
Partitioning  
Applying known facts  
Bridging through 10 and multiples of 10  
Subtracting 9, 11 etc. by compensating  
Counting on to, or back from the largest number

### Range of concrete representations

Use a range of concrete and pictorial representations alongside the column method



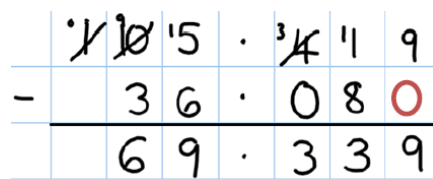
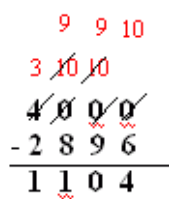
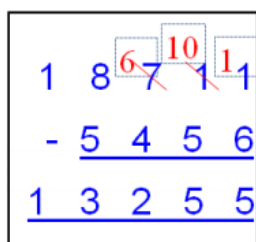
### Progression to written method

**Subtract whole numbers with more than four digits using the formal written columnar method. Practise subtracting numbers including decimals.**

(See year 3, 4 and 5) compare physical and/or pictorial representations and expanded algorithms alongside columnar methods. Ask the children what's the same and different?

Compare and discuss the suitability of different methods (mental or written), in context.

Revert to expanded methods whenever difficulties arise.



### Links to other strands

To solve any subtraction with numbers to 2 decimal places.

**Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.**

Solve simple measure and money problems involving fractions and decimals to 2dp.

Estimate and use inverse operations to check.

Estimate, compare and calculate different measures, including money in pounds and pence in context



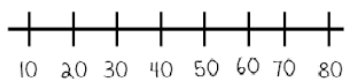
## Multiplication EYFS 2

**Key Vocab:** count in, double, halve, lots of, groups of, times, group in pairs, equal groups of.

Using quantities and objects, they add two single-digit numbers and count on or back to find the answer. They solve problems, including sharing, doubling and halving.

### Mental Maths

Count in tens (recite the sequence ten, twenty, thirty... one hundred.) Understand odd and even numbers linked to getting 'into pairs'.



### Mental calculation strategies

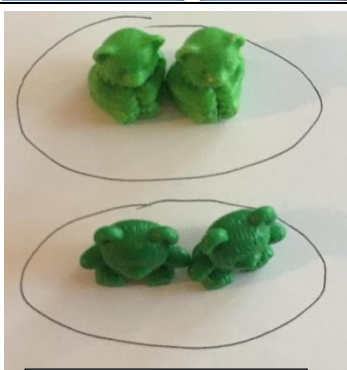
Say the tens number that goes before or after a given tens number.

Count from a given tens number and stop at another.

Count around in a circle of children

Count pairs

### Concrete/ Pictorial representations



Matching groups

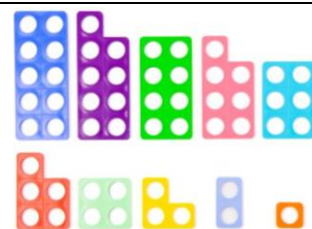


How many wheels on two trucks?

$$4+4=8$$

4, 5, 6, 7, and 8

Double 4=8



Numbers which can be put into pairs are even, numbers that can't are odd.



Doubling using cubes.

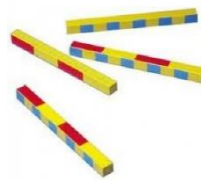
## Multiplication Year 1

**Key Vocab:** count in, double, halve, lots of, groups of, times, group in pairs, equal groups of, x, times, multiplied by, multiple of, one, twice, three times, ten times, repeated addition, array, row, column.

Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

### Mental Maths

To count in twos, fives and tens



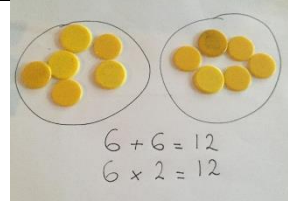
Use arrays and counting sticks to count backwards and forwards.

To count in twos, fives and tens Count forwards and backwards in 2s from any given number.  
Count forwards and backwards in 5s from any given number.  
Count forwards and backwards in 10s from any given number. Recognition of all odd and even numbers  
Rapid recall of doubles to 20

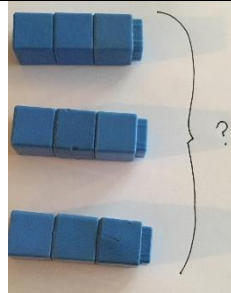
### Progression into written statements



$2+2+2=6$   
 $2 \times 3=6$   
3 multiplied by 2  
3 lots of 2

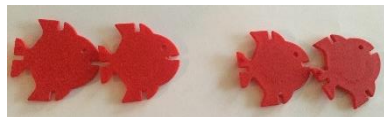


### Progression into worded problems



There are 3 children and each child has three sweets. How many sweets do they have altogether?

$3+3+3=9$   
 $3 \times 3=9$



Can you make a multiplication story about these fish?

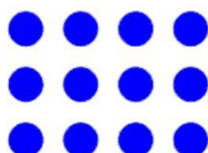
## Multiplication Year 2

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals ( $=$ ) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

**Key vocab:** count in, double, halve, lots of, groups of, times, group in pairs, equal groups of, x, times, multiplied by, multiple of, one, twice, three times, ten times, times as (big, long, wide... and so on) repeated addition, array, row, column

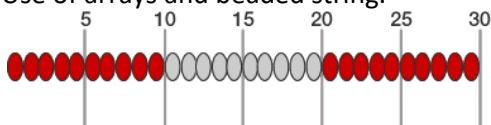
### Mental Maths

#### Rapid recall of 2,5 and 10 times tables



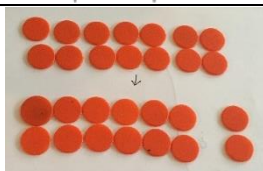
Count in 5s clockwise around a clock face/ anticlockwise around a clock face.  
Count forwards and backwards in 2s, 5s and 10s from any given number.  
To recall related multiplication and division facts linked to other multiplication tables.  
Rapid recall of doubles and their corresponding halves. (double 12 is 24, half 24 is 12)  
Rapid recall of half of all 2 digit even numbers. (half of 12, 18, 42 etc)  
Recognise that multiples of 10 end in 0, 5 end in 5 and 0, 2 end in 0,2,4,6,8.  
Work out the four times table by doubling the two times table.

Use of arrays and beaded string.



### Concrete

$$\begin{array}{r} 12 \\ \div 2 \\ \hline 6 \end{array} \quad \begin{array}{l} 2 \times 6 = 12 \\ 6 \times 2 = 12 \\ 12 \div 2 = 6 \\ 12 \div 6 = 2 \end{array}$$



X and division facts.

Use knowledge of 2, 5 & 10 times tables to work out multiples of 7.  
 $7 \times 2 = (5+2) \times 2 = (5 \times 2) + (2 \times 2) = 10 + 4 = 14$

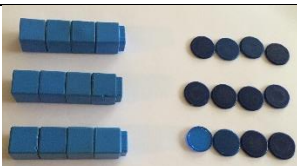
Break number into factors.

### Progression into written statements

Each child has picked 4 flowers. How many flowers will 3 children have altogether? The fixed number is 4  
It is being multiplied by 3.  $4 \times 3 = 12$  (3 children will have 12 flowers altogether)



### Progression into worded problems



There are 4 sweets in a pack. There are 3 packs. How many sweets are there altogether?

### Multiplication Year 3

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects.

**Key vocab:** : double, times, multiply, multiplied by, multiple of, lots of, groups of, times as (big, long, wide...) product, lots of, groups of, repeated addition, array, row, column.

#### Mental Maths

**Rapid recall of 3, 4 and 8 times tables**  
**Multiply any single digit by 1, 10, 100 and 0**  
**Multiply a two digit number by 2,3,4, or 5 without crossing the tens boundary.**  
 Reflect on year 2 understanding of 2, 5 and 10 times tables.

Division facts:  
 $3 \times 4 = 12$ ,  $12 \div 4 = 3$ ,  $12 \div 3 = 4$ ,

Use doubling to connect 2, 4 and 8 times tables.  
 Develop efficient mental methods using commutativity and associativity.

Derive related multiplication and division facts.

**The commutative law:**  $4 \times 12 = 12 \times 4$

Partitioning: multiply the tens first and then multiply the units.

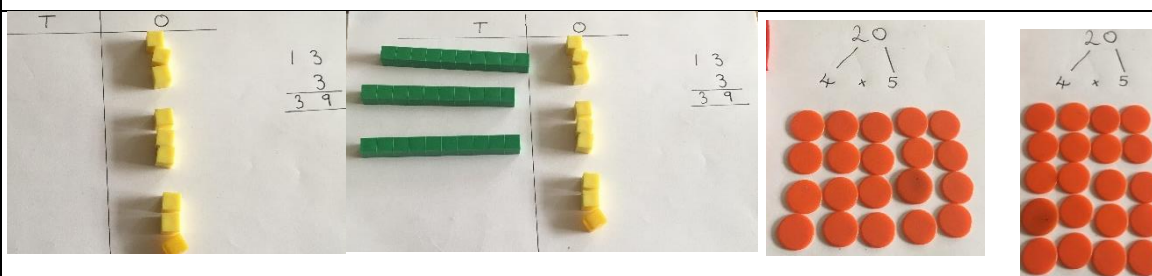
Arrays

Deriving related facts:

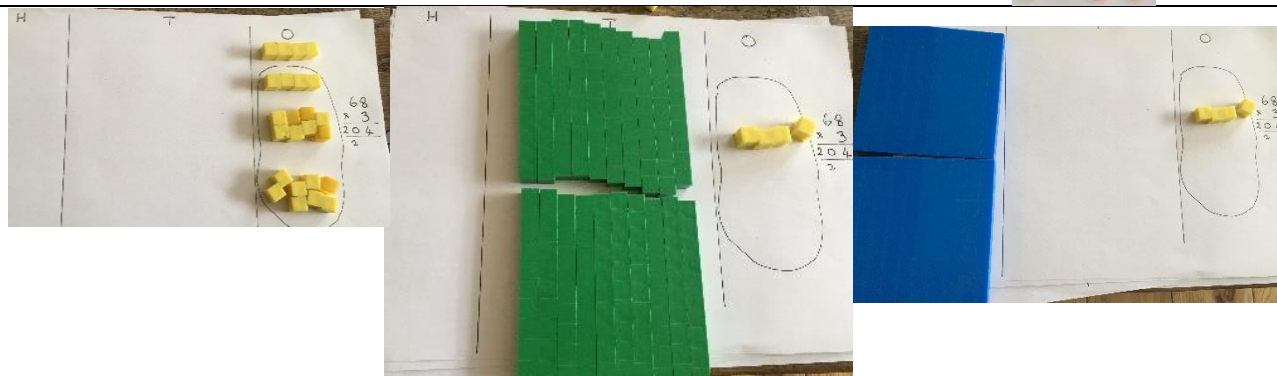
$$3 \times 2 = 6, 6 \div 3 = 2, 6 \div 2 = 3$$

$$30 \times 2 = 60, 60 \div 3 = 20, 60 \div 2 = 30$$

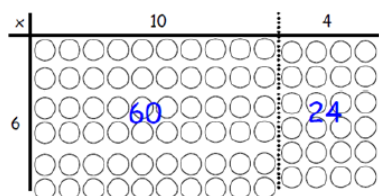
#### Concrete representations No regrouping



#### Column multiplication with regrouping



#### Progression into written methods



Make the link to expanded method  
 Finally, short multiplication method.

Estimate before calculating to develop number fluency.

Ensure written methods build on or relate to mental methods.

$\times$	30	5
7	210	35

$$210 + 35 = 245$$

Introduce grid method using arrays.

Move on to grid just using partitioning te

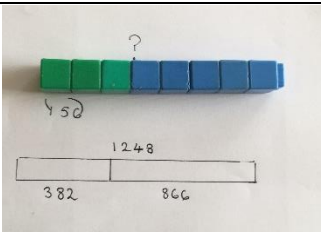
$$\begin{array}{r} 24 \\ \times 6 \\ \hline 120 \\ 24 \\ \hline 144 \end{array}$$

24 x 6 becomes

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

Answer: 144

**Progression into worded problems**



Mr Miaow had 8 bags of cat treats. Each bag contained 156 cat treats. He fed 382 cat treats to his cats. How many cat treats had he left?

**Links to other strands**

**Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects.**

The comparison of measures includes simple scaling by integers, e.g. a given measurement or quantity is twice as long or five times as high.

Pupils now use multiples of 2, 3, 4, 5, 8, 10, 50 and 100.

Pupils understand and use simple scales in pictograms and bar charts with increasing accuracy.

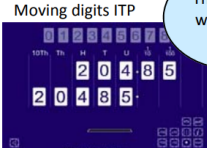
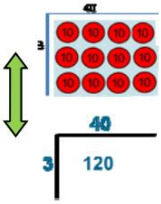


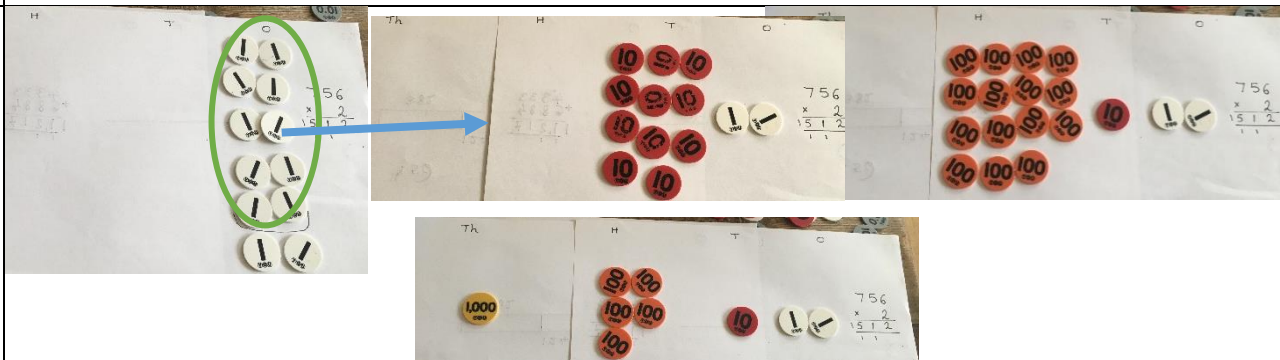
## Multiplication Year 4

Recall multiplication and division facts for multiplication tables up to  $12 \times 12$ . Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. Recognise and use factor pairs and commutativity in mental calculations. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

**Key vocab:** : double, times, multiply, multiplied by, multiple of, lots of, groups of, times as (big, long, wide...) product, lots of, groups of, repeated addition, array, row, column, factor, inverse.

<b>Mental Maths</b>	<p><b>Recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></b></p> <p><b>Use place value, known and derived facts to multiply and divide mentally, including:</b></p> <p><b>Multiplying by 0 and 1;</b></p> <p><b>Dividing by 1;</b></p> <p><b>Multiplying three numbers together.</b></p> <p><b>Recognise and use factor pairs and commutativity in mental calculations.</b></p> <p>Practise mental methods and extend this to three-digit numbers to derive facts, (for example <math>600 \div 3 = 200</math> can be derived from <math>2 \times 3 = 6</math>)</p>	<p><b>The associative law:</b>  <math>(2 \times 3) \times 4 = 2 \times (3 \times 4)</math></p> <p><b>The distributive law:</b>  <math>39 \times 7 = 30 \times 7 + 9 \times 7</math></p> <p><b>Using facts and rules:</b>  <math>2 \times 6 \times 5 = 10 \times 6 = 60</math></p>
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<b>Concrete/ Pictorial representations</b>	<p>Use arrays made with place value counters to demonstrate the link between multiplication and division.</p> <div style="display: flex; align-items: center; justify-content: space-around;">  <div style="text-align: center;"> <p>245 X 6 ----- 1470</p> <p>2 3</p> </div>  </div> <p style="text-align: center;">This digit is worth 200      This digit is worth 30</p> <p style="text-align: center;">I can use place value counters to</p>
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<b>Concrete/ Pictorial representations</b>	
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**Progression into written methods**

To multiply a 2 digit number by a 1 digit number

To multiply a 3 digit number by a 1 digit number

To multiply a 2 digit by a 2 digit number

**56 x 27 = 1512**

x	20	7	
50	1000	350	1350
6	120	42	162
			1512

→

56

x 27

-----

1120

392

1512

56 x 20

56 x 7

50

4

4

→

54

x 4

-----

216

→

54

x 4

-----

216

0.2 x 3 =

0.2 + 0.2 + 0.2 = 0.6

3 x 2 tenths = 6 tenths = 0.6

0.2

x 3

-----

0.6

Ones	Tenths
	••
	••
	••
0	6

3 x 0.2

<b>Links to other strands</b>	<p>Convert between different units of measure (e.g. km to m)</p> <p>Relate area to arrays and multiplication</p> <p>Pupils understand and use a greater range of scales in their representations (statistics)</p>
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## Multiplication Year 5

**Key Vocab:** times, multiply, multiplied by, product, multiple, inverse and x sign, double, times, multiply, multiplied by, multiple of, lots of, groups of, times as (big, long, wide...) product, lots of, groups of, array, row, column, factor.

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19. 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. Multiply numbers mentally drawing upon known facts. Multiply whole numbers and those involving decimals by 10, 100 and 1000

### Mental Maths

Multiply numbers mentally drawing upon known facts Multiply whole numbers and those involving decimals by 10, 100 and 1000  
Use square numbers and cube numbers, and the notation for squared(2 ) and cubed (3 )  
To use understanding of factors to solve times table facts.

Use factors for finding products mentally ( $16 \times 12 = 16 \times 3 \times 2 \times 2 = 48 \times 2 \times 2 = 96 \times 2 = 192$ )

To double using known facts (double 79 = double 70 + double 9 =  $140 + 18 = 158$ )

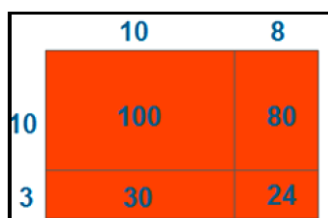
Double a number ending in 5 and halve the other number

24 x 15 = ?

I did:  $24 \times 5 = 120$  (half of  $24 \times 10$ ), then multiplied 120 by 3 to get 360

I did:  $(24 \times 10) + (24 \times 5)$ .

### Pictorial representations



	3000	500	60	7	
20	60000	10000	1200	140	71340
4	12000	2000	240	28	14268
					Total 85608

3567  
x24  
-----  
14268  
71340  
-----  
85608

What is the same and what is different about these two methods?

### Progression into written methods Up to 4 digits by 1. Use of expanded method.

$2741 \times 6 = 16446$   
(estimate  $3000 \times 6 = 18000$ )

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

	H	T	U	
2 4 7				
x 3 2				
	1 4	2 x 7		
	8 0	2 x 40		
	4 0 0	2 x 200		
	2 1 0	30 x 7		
	1 2 0 0	30 x 40		
	6 0 0 0	30 x 200		
	7 9 0 4			
	1			

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

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

### Links to other strands

Identify multiples & factors, including finding all factor pairs of a number, & common factors of two numbers.

Know and use the vocabulary of prime numbers, prime factors and composite (non-prime). Establish whether a number up to 100 is prime and recall prime numbers up to 19.

Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes, and including understanding the meaning of the equals sign. Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Convert between different units of metric measure; problems including money.

Other links: *ratio*.

## Multiplication Year 6

**Key vocab:** times, multiply, multiplied by, product, multiple, inverse and x sign, double, multiple of, lots of, groups of, times as (big, long, wide...) product, lots of, groups of, repeated addition, array, row, column.

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. Perform mental calculations, including with mixed operations and large numbers Identify common factors, common multiples and prime numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations. Solve problems involving addition, subtraction, multiplication and division. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

### Mental Maths

**Perform mental calculations, including with mixed operations and large numbers** (*increasingly large numbers and more complex calculations*).

**Use estimation to check answers to calculations.**

**Multiply numbers by 10, 100 and 1000 giving answers up to three decimal places.**

**Use mental strategies to solve problems e.g.**

X4 by doubling and doubling again.

X5 by x10 and halving.

X20 by x10 and doubling.

X9 by multiplying by 10 and adjusting.

X6 by multiplying by 3 and doubling.

What is the best approximation for  $4.4 \times 18.6$ ?

Children should know the square numbers up to  $12 \times 12$  and derive the corresponding squares of multiples of 10 e.g.  $80 \times 80 = 6400$

### Pictorial representations

×	5	0.6	0.05		
9	45	5.4	0.45		50.85

×	20	9		
200	4000	1800		5800
80	1600	720		2320
6	120	54		174
				8294
				1

Use place value counters for concrete representations of multiplication.

### Written methods

Link back to expanded where necessary.

$$\begin{array}{r} 4.7 \\ \times 8 \\ \hline 37.6 \\ \hline 6 \end{array}$$

£	6.23
×	27
43.61	
124.60	
£ 168.21	

286	
×	29
4000	$200 \times 20 = 4000$
1600	$80 \times 20 = 1600$
120	$6 \times 20 = 120$
1800	$200 \times 9 = 1800$
720	$80 \times 9 = 720$
54	$6 \times 9 = 54$
8294	
1	

$$\begin{array}{r} 286 \\ \times 29 \\ \hline 5720 \\ 2574 \\ \hline 8294 \\ \hline 1 \end{array}$$

### Links to other strands

Explore the order of operations using brackets; e.g.  $2 + 1 \times 3 = 5$  and  $(2 + 1) \times 3 = 9$ .

Fractions, decimals and percentages including equivalences in different contexts.

Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.

Solve problems involving the calculation of percentages (e.g. of measures, such as 15% of 360) and the use of percentages for comparison.

Solve problems involving similar shapes where the scale factor is known or can be found.

Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

**Algebra** including formulae, linear number sequences, combinations of variables.

**Measurement** including solving problems with conversion of units, decimal notation, area and volume.

**Statistics** including pie charts, line charts and calculating the mean.

## Division EYFS

**Key vocab:** share, share equally, one each, two each, three each, group in pairs, threes...., equal groups of,

Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing

### Mental Maths

To count forwards and backwards in 1s and 2s

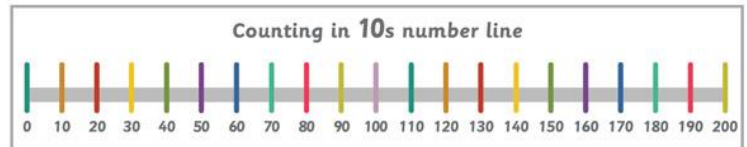
To count forwards and backwards in 10s

To count forwards and backwards in 1s from any given number

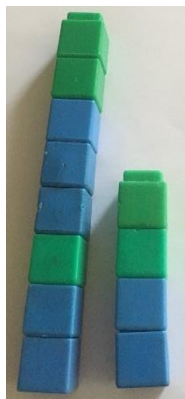
To count in pairs (children, shoes, animals)

Put half of the: sheep in the field, cars in the garage, dinosaurs in the box

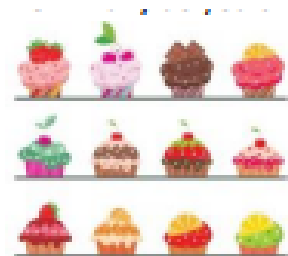
To quickly derive: Doubles of numbers 1-10 Halves of even numbers to 20



### Concrete/ Pictorial representations



Halving objects  
Sharing objects  
Counting objects in arrays





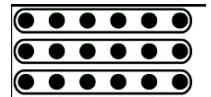
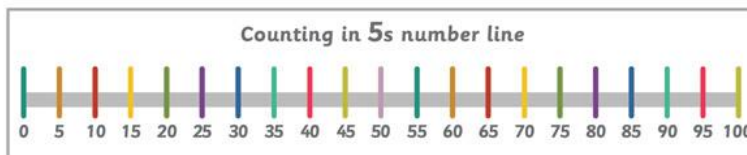
## Division Year 1

**Key vocab:** share, share equally, one each, two each, three each, group in pairs, threes..., equal groups of,  $\div$ , divide, divided by, divided into, left, left over., halve.

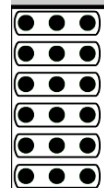
Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

### Mental Maths

To count forwards and backwards in 2s, 5s and 10s from any given number To have rapid recall of numbers up to 20 divided by 2.  
To have rapid recall of numbers up to 100 divided by 10.  
To derive the corresponding division facts when given multiplication fact (number families).  
To quickly derive: doubles of numbers.

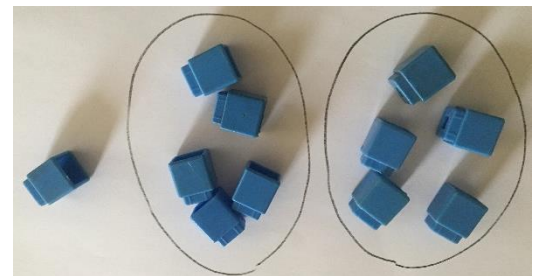
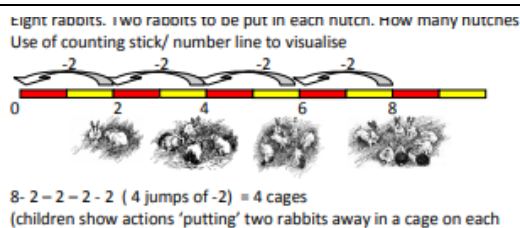


$$18 \div 3 = 6$$

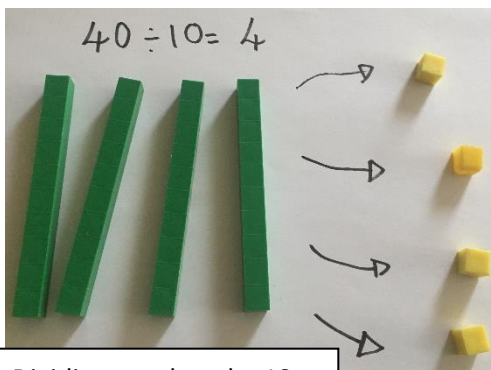


$$18 \div 6 = 3$$

### Concrete/ Pictorial representations



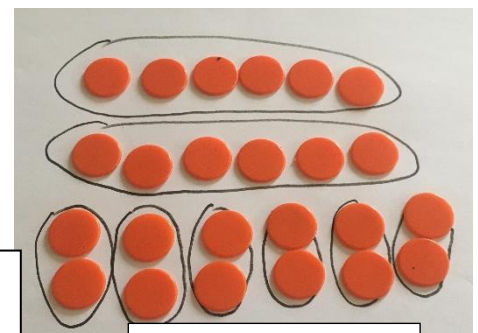
Sharing with odd numbers.



Dividing numbers by 10



If you have 18 cubes, how many towers can you make?



12 divided by 6=2  
12 divided by 2=6

### Progression into worded problems.



Arranging counters into the bar model.

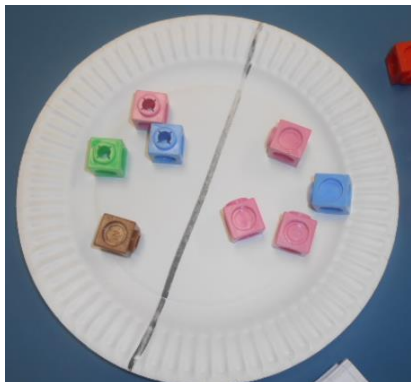


## Division Year 2

**Key vocab:** share, share equally, one each, two each, three each, group in pairs, threes...., equal groups of,  $\div$ , divide, divided by, divided into, left, left over, halve.

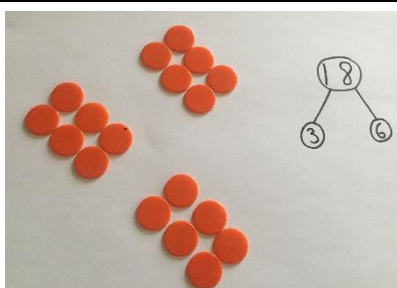
Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals ( $=$ ) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

### Mental Maths

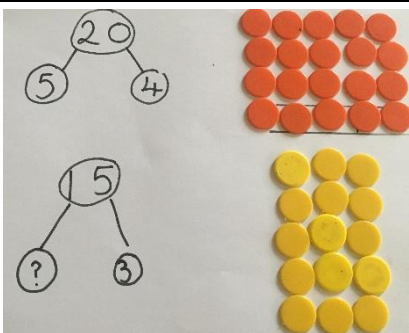


To count around the clock face using the five times table.  
 To know multiplication facts and corresponding division facts. ( )  
 To halve two digit numbers  
 Respond rapidly to oral questions phrased in a variety of ways  
 Use known facts to derive quickly: doubles of numbers 1-20  
 doubles of 5, 10, 15 to 100 halves of even numbers to 20 halves  
 of multiples of 10 up to 200  
 To know that to find a quarter you must halve and halve again  
 To divide a two digit multiple of ten by 1, 10 or zero  
 To halve any multiple of ten to 100

### Concrete representations



Factors/missing factors.

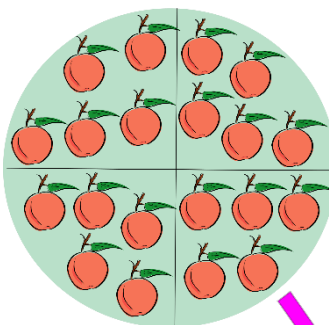
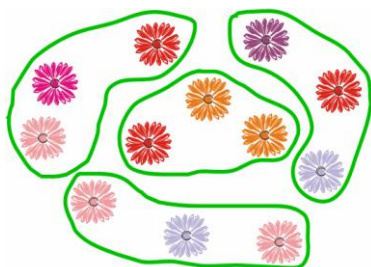


Number families,

$$\begin{array}{r} 15 \\ \div 3 \quad \times 5 \\ \hline 3 \times 5 = 15 \\ 5 \times 3 = 15 \\ 15 \div 3 = 5 \\ 15 \div 5 = 3 \end{array}$$

### Pictorial representations

Divide 12 flowers into groups of three.



Divide 20 apples into groups of four.

### Progression into worded problems.

I have £10. Tickets cost £3. How many tickets can I buy? **ROUND DOWN:** I can buy 3 tickets (£1 left over) There are 10 people. A taxi holds 4 people. How many taxis do we need for the journey? **ROUND UP:** We will need three taxis.

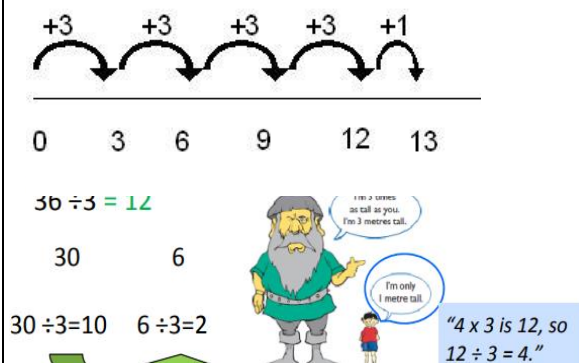


## Division Year 3

**Key vocab:** share, share equally, one each, two each, three each, group in pairs, threes...., equal groups of,  $\div$ , divide, divided by, divided into, left, left over, remainder, halve.

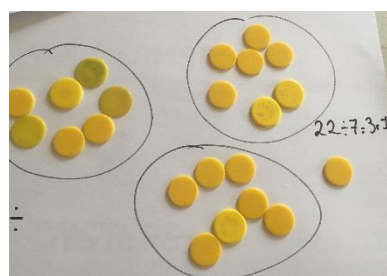
Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects.

### Mental Maths

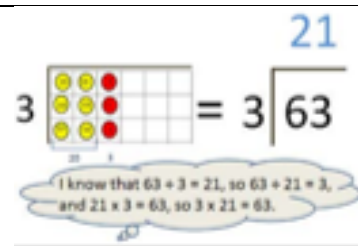


**To count forwards and backwards in 3s, 4s and 8s**  
**To have rapid recall of all division facts when given a multiplication fact.**  
**To use repeated subtraction on the counting stick**  
**To divide any number by one or zero.**  
**To divide any two digit even number by 2.**  
**Doubles and halves.**

### Concrete/abstract representations

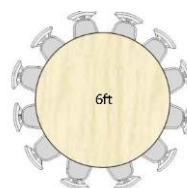
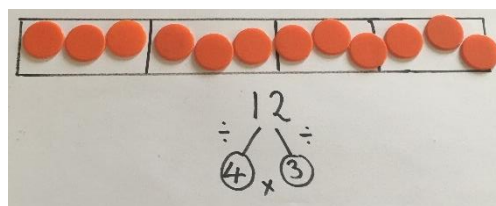


Dividing with remainders.



### Progression into worded problems.

12 children can sit at 1 table. There are 52 children. How many tables are needed so each child can sit at a table? 1. ROUND UP: We will need five tables.

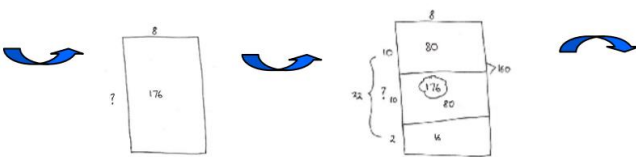


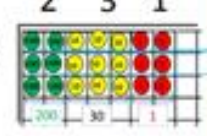
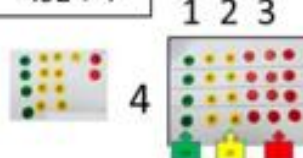
How can we share 12 sweets between four children?

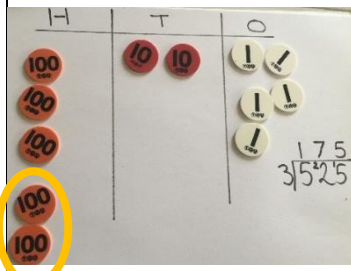
## Division Year 4

**Key vocab:** share, share equally, one each, two each, three each, group in pairs, threes...., equal groups of,  $\div$ , divide, divided by, divided into, left, left over, remainder, factor, quotient, divisible by, inverse.

Recall multiplication and division facts for multiplication tables up to  $12 \times 12$ . Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. Recognise and use factor pairs and commutativity in mental calculations. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

<b>Mental Maths</b>	<p>Pupils should be taught to recall and use multiplication and division facts up to <math>12 \times 12</math>. Use place value, known and derived facts, to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1. Recognise and use factor pairs and commutativity in mental calculations. Using blank arrays...</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>I know that  <math>6 \div 3 = 2</math>, so  <math>600 \div 3 = 200</math></p> </div> </div> <p style="text-align: center; margin-top: 10px;"><i>Pupils practise mental methods and extend this to three-digit numbers to derive facts.</i></p>
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<b>Concrete/Pictorial representations</b>	<div style="display: flex; align-items: center; justify-content: space-around;"> <div style="text-align: center;"> <p>2 3 1</p>  <p>airs: child</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>By working through larger number calculations with manipulatives, children gain experience of exchange (re-partitioning) within division algorithms.</p> </div> <div style="text-align: center;"> <p>492 <math>\div</math> 4</p>  </div> </div>
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<b>Progression into written methods</b>	<div style="display: flex; justify-content: space-around; align-items: flex-end;">     </div>
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<b>Formal written method</b>	<div style="font-size: 2em; margin-bottom: 10px;"> <math display="block">\begin{array}{r} 197 \\ 3 \overline{) 591} \end{array}</math> </div> <p><math>591 \div 3 = 197</math></p>
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<b>Links to other strands</b>	<p>Convert between different units of measure (e.g. km to m; hour to minute). Estimate, compare and calculate different measures, including money in pounds and pence.</p>
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## Division Year 5

**Key vocab:** share, share equally, one each, two each, three each, group in pairs, threes..., equal groups of,  $\div$ , divide, divided by, divided into, left, left over, remainder, factor, quotient, divisible by, inverse

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. Know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19. Multiply and divide numbers mentally drawing upon known facts. 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. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3). Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

### Mental Maths

Pupils should be taught to:

Divide whole numbers and those involving decimals by 10, 100 and 1000.

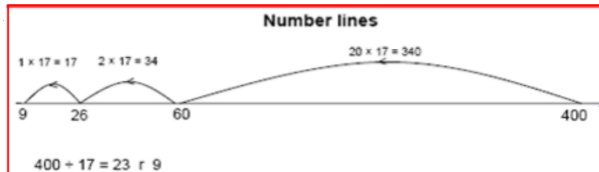
Divide numbers mentally drawing upon known facts.

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.

If  $42 \div 6 = 7$ .

$\div 10$        $\div 10$

Then  $4.2 \div 6 = 0.7$

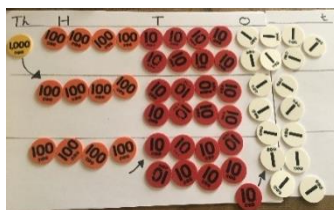
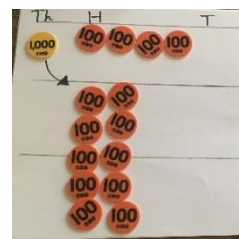


Factorising

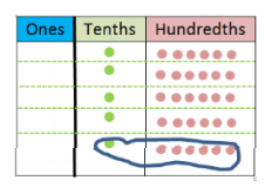
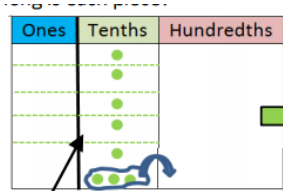
$$480 \div 15 \\ = 480 \div 5 \div 3$$

"I know that the answer to  $138 \div 6$  will be close to 20, because  $2 \times 6 = 12$ , so  $20 \times 6 = 120$ ."

### Concrete/Pictorial representations



1457 divided by 3 using place value counters



$$\begin{array}{r} 0.16 \\ 5 \overline{)0.80} \end{array}$$

### Progression into written methods

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.

$$\begin{array}{r} 0663 \text{ r } 5 \\ 8 \overline{)53509} \end{array}$$

$$\begin{array}{r} 0855.4 \text{ } \leftarrow \text{Decimal remainder.} \\ 5 \overline{)42770} \end{array}$$

$$\begin{array}{r} 0855 \frac{2}{5} \leftarrow \text{Fraction remainder.} \\ 5 \overline{)4277} \end{array}$$



## Division Year 6

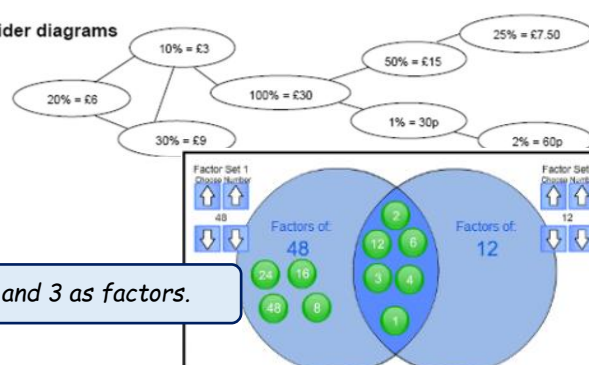
**Key Vocab:** share, share equally, one each, two each, three each, group in pairs, threes..., equal groups of,  $\div$ , divide, divided by, divided into, left, left over, remainder, factor, quotient, divisible by, inverse.

Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. Perform mental calculations, including with mixed operations and large numbers. Identify common factors, common multiples and prime numbers Use their knowledge of the order of operations to carry out calculations involving the four operations.

### Mental Maths

Pupils should be taught to:  
Perform mental calculations, including with mixed operations and large numbers.  
Use their knowledge of the order of operations to carry out calculations involving the four operations.  
Identify common factors, common multiples and prime numbers.

Spider diagrams



*I know that 366 will divide by 6 because it has 2 and 3 as factors.*

### Written methods and Remainders

Divide numbers up to 4 digits by a two-digit number using the formal written methods of long and short division and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.

**Divide:**  $3 \overline{)75}$  3 goes into 7 2 times... with some extra!

**Multiply:**  $3 \overline{)75}$   $2 \times 3 = 6$

**Subtract:**  $3 \overline{)75}$   $-6$  1

**Bring Down:**  $3 \overline{)75}$   $-6$  15

**Repeat:**  $3 \overline{)75}$   $-6$  15  $5 \times 3 = 15$   $15 \div 3 = 5$

To divide by 2 digit numbers, the children will use the method of long division. The example to the left clearly shows the method in the 'Burger' steps, whereas the example to the right shows what a completed method would look like. Any remainders would need to be expressed in a way that matched the context of the problem.

$$\begin{array}{r} 291 \\ 45 \overline{)13095} \\ \underline{90} \\ 409 \\ \underline{405} \\ 45 \\ \underline{45} \end{array}$$

$6100 \div 8 =$

$6100 \div 8 = 762 \text{ r } 4$

$262 \frac{1}{2}$

$262.5$

$263$

Does McDonald's serve cheese Burgers?

