



## **Tame Valley Academy**

Maths is a vital part of everyday life. It is an important creative discipline that helps us to understand and change the world. It teaches our children how to make sense of the world around them and develops their ability to understand and solve problems, Numbers are one way that we communicate between ourselves about our world and therefore: we need to understand what numbers represent and how they are used in order to better understand our world.

At Tame Valley Academy, we intend to give every child the capability, confidence and resilience to reach their full potential by ensuring that they have the tools to calculate fluently, reason logically, problem solve and think in abstract ways. For this reason, we follow the White Rose Maths structure and make additions and support this using NECTM and NRICH. Our maths lessons are taught daily and follow a mastery approach which is split into arithmetic, fluency and knowledge (AFK) where children acquire the deepened understanding of skills and concepts through concrete, pictorial and abstract concepts. Children then apply these maths skill to Reasoning and Problem Solving (RPS) part of the lesson where children reasoning in the real world. We believe this is all important for our children's mathematical development.

Our whole curriculum is shaped by our school vision which aims to enable all children, regardless of background, ability or SEND, to flourish and become the very best version of themselves they can possibly be. We teach the National Curriculum, supported by a clear skills and knowledge progression. This ensures that skills and knowledge are built on year by year and sequenced appropriately to maximise learning for all children.

Our aim is to support children to:

- become capable, confident and independent mathematicians.
- develop a deep conceptual understanding of Maths and its interrelated content so that children can apply their learning in different situations.
- articulate, discuss and explain their thinking using appropriate mathematical vocabulary.
- see mistakes as a learning opportunity.
- develop into resilient and inquisitive learners.

## EYFS (Nursery & Reception)

### Addition

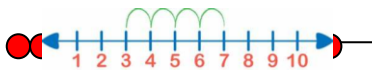
Children are encouraged to gain a sense of the number system through the use of counting concrete objects.



They combine objects in practical ways and count all.

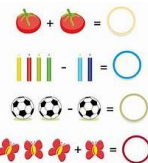


They understand addition as counting on and will count on in ones and twos using objects, cubes, bead string and number line.



They use concrete and pictorial representation to record their calculations.

They begin to use + and =



They are encouraged to develop a mental picture of the number system in their heads to use for calculations.

Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

### Subtraction

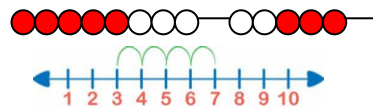
Children are encouraged to gain a sense of the number system through the use of counting concrete objects.



They understand subtraction as counting out.



They begin to count back in ones and twos using objects, cubes, bead string and number line.



They use concrete and pictorial representation to record their calculations.

They begin to use - and =

They are encouraged to develop a mental picture of the number system in their heads to use for calculations.

### Multiplication

Children use concrete objects to make and count equal groups of objects.

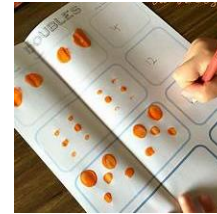


They will count on in twos using a bead string and number line.

They understand doubling as repeated addition.

$$2 + 2 = 4$$

They use concrete and pictorial representation to record their calculations.



Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

### Division

Children use concrete objects to count and share equally into 2 groups.

6 cakes shared between 2 people each person gets 3 cakes.  $6 \div 2 = 3$



They count a set of objects and halve them by making two equal groups.

They understand sharing and halving as dividing by 2.

They will begin to use objects to make groups of 2 from a given amount.

They use concrete and pictorial representation to record their calculations.

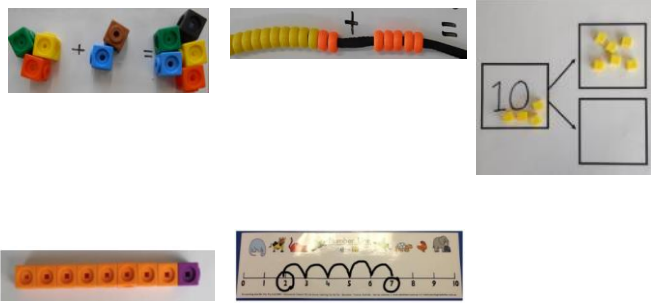
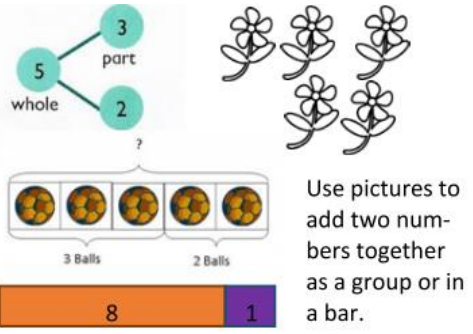
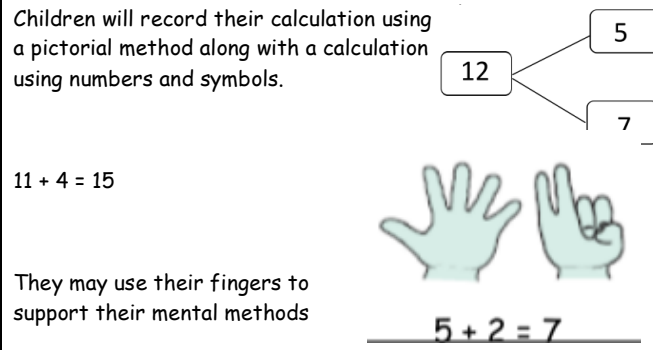
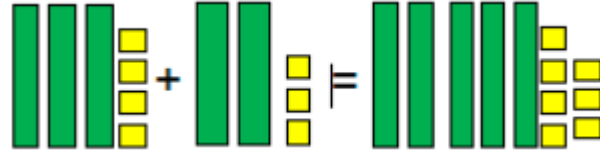
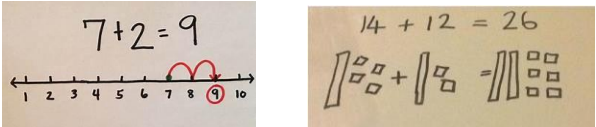


Higher attaining children may be able to represent their calculations using symbols and

Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

numbers within a written calculation.

### ADDITION - KS1 (Years 1&2)

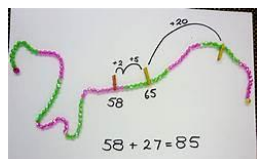
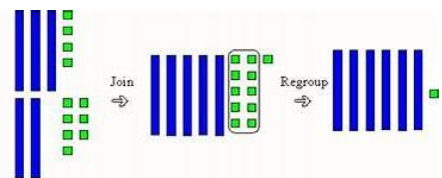
	Concrete	Pictorial	Abstract
Stage 1	<p>Use part whole model, cubes and bead strings to add two numbers together as a group or in a bar.</p> 	<p>Use jottings to represent numbers.</p>  <p>Use pictures to add two numbers together as a group or in a bar.</p>	<p>Children will record their calculation using a pictorial method along with a calculation using numbers and symbols.</p> 
Stage 2	<p><b>Grouping objects to add</b></p> <p>Children will use dienes cubes to add larger numbers where regrouping is not required.</p> <p>They will also use a bead string to add larger numbers by counting in tens and ones</p> 	<p><b>Number line</b></p> <p>Start at the larger number on the number line and count on in ones or in one jump to find the answer. Children will show their representations from the concrete method using pictures.</p> 	<p>Children will record their calculation using a pictorial method along with a calculation using numbers and symbols.</p> <p>Children will begin to add multiples of tens.</p> <p> <math>27 + 10 = 37</math>  <math>27 + 20 = 47</math>  <math>27 + \square = 57</math> </p>

Numbers will get progressively larger throughout the keystage. Children will be able to add tens and ones using an empty number

line.

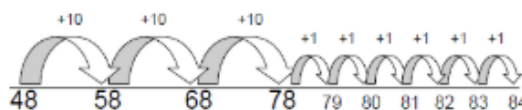
**Partitioning**

Children will add larger numbers where they will need to join, regroup and count.



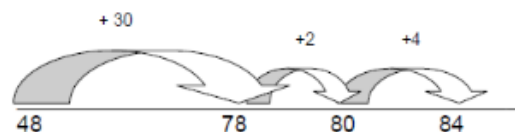
Children will also use bead strings to add numbers together using groups of tens and ones to count on.

**Number line**



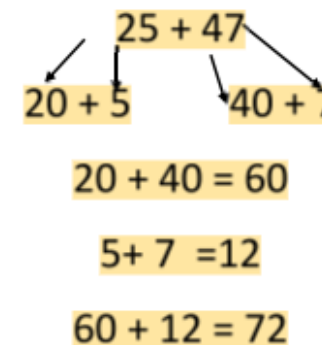
Use an empty number line to count in tens and then ones.

When confident:



**Partitioning**

Children will begin to use the partitioning method. Tens and ones will be added to form partial sums and then these partial sums will be added together to find the total.



Stage  
3

**ADDITION - Lower KS2 (Years 3 & 4)**

**Concrete**

Use dienes cubes to consolidate learning from KS1. Ensure children are confident at using these to join, regroup and count. This will support them moving onto the next stage of column addition.

**Pictorial**

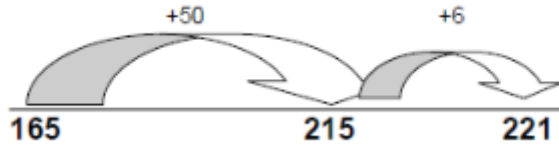
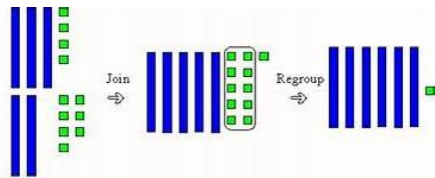
**Number line**  
Consolidate their learning from KS1 by using an empty number line to count larger numbers.

**Abstract**

**Partitioning**  
Children will consolidate using the partitioning method. The layout will begin to form a written method to support further progress onto the column method. Hundreds, Tens and ones will be added to form partial sums and then these partial sums will be added together to find the total.

Stage

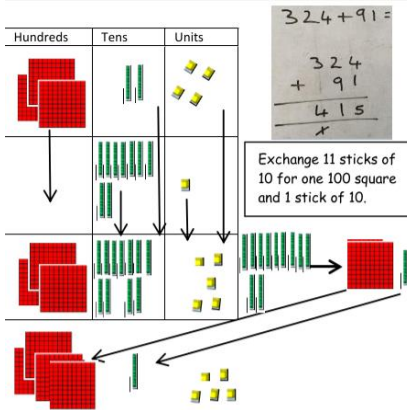
1



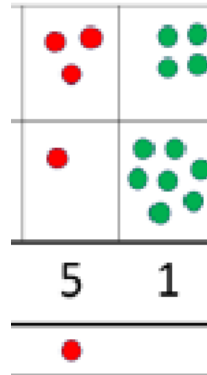
$$\begin{array}{r}
 200 + 60 + 3 \\
 + 100 + 10 + 9 \\
 \hline
 300 + 70 + 12 \\
 \hline
 300 + 80 + 2
 \end{array}$$

Stage 2

Introduce children to place value counters and dienes cubes. Use the column method layout to support their learning onto the abstract method.



Children can draw a representation of the grid to further support their understanding, carrying the ten underneath the line.



**Expanded column method - Formal method**

Children to use the Expanded Column Method. Start by partitioning the numbers before the formal column to show the exchange. Once confident, they can move onto the column method in stage 3.

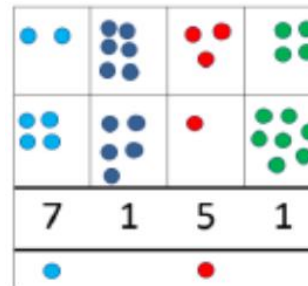
$$\begin{array}{r}
 176 \\
 + 147 \\
 + 13 \\
 + 110 \\
 \hline
 200 \\
 \hline
 323
 \end{array}
 \begin{array}{l}
 (7 + 6) \\
 (70 + 40) \\
 (100 + 100)
 \end{array}
 \begin{array}{r}
 147 \\
 + 176 \\
 \hline
 323
 \end{array}$$

Stage 3

Children will add larger numbers where they will need to exchange place value counters or dienes cubes.



Children can draw a representation of the grid using larger numbers.



**Column method - Formal method**

Column Method for addition to be used.

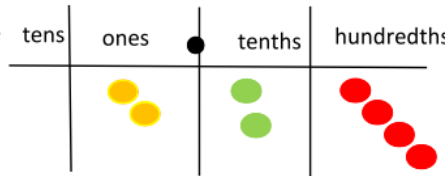
$$\begin{array}{r}
 4478 \\
 + 3762 \\
 \hline
 8240 \\
 \hline
 1111
 \end{array}$$

## ADDITION - Upper KS2 (Years 5 & 6)

Stage 1

### Concrete

Introduce decimal place value counters and model regrouping for addition.



### Pictorial

Children will draw their representations showing where they have regrouped.

$2.37 + 81.79$

$40.265 + 3.000 = 43.265$

TTh	Th	H	T	O
4	0	2	6	5
+				
	3	5	2	2
-----				
	7	7	8	7

### Abstract

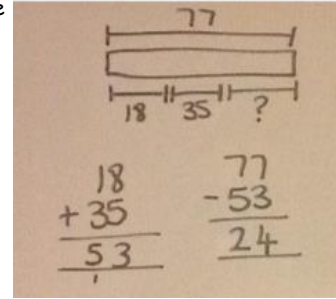
#### Column method

Children will continue to develop their understanding of column method addition. Calculations will become larger and include decimal places.

$$\begin{array}{r}
 379.173 \\
 + 203.116 \\
 \hline
 582.289
 \end{array}$$

Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.

Children will begin to use the bar model when problem solving. Jottings and calculations should be recorded to show their processes.



**Column method**

Children to further develop their confidence using the column method. Larger numbers, decimal places and inserting zero for place holders when decimals are different.

6 digit + 6 digit

$$\begin{array}{r} 447813 \\ + 376245 \\ \hline 824058 \\ \hline \end{array}$$

Numbers with 3 decimal place

$$\begin{array}{r} 379.173 \\ + 203.116 \\ \hline 582.289 \\ \hline \end{array}$$

Numbers with a different number of decimal places

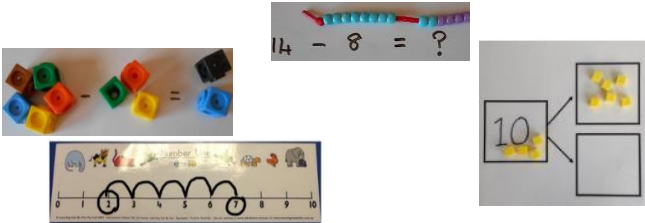
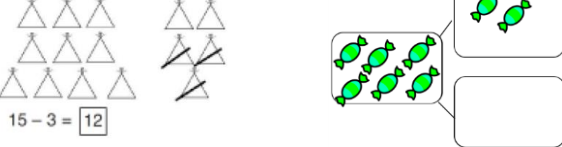
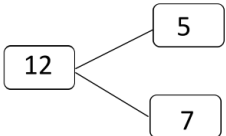

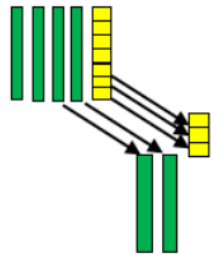
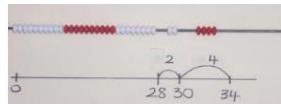
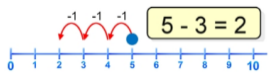

$$45.25 + 85 + 3.247$$

$$\begin{array}{r} 45.250 \\ + 85.000 \\ + 3.247 \\ \hline 56.997 \\ \hline \end{array}$$

Insert zeros for place holders.

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ + 1.300 \\ \hline 93.511 \\ \hline \end{array}$$

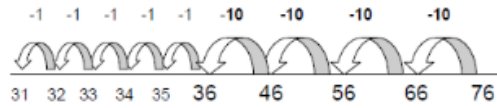
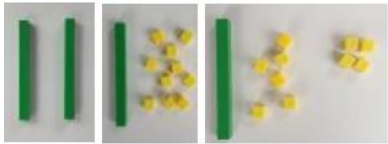
# SUBTRACTION - KS1 (Years 1&2)

	Concrete	Pictorial	Abstract
Stage 1	<p><b>Taking objects away</b></p> <p>Use part whole model, cubes and bead strings to subtract two numbers together by moving objects away from the group.</p> 	<p>Use jottings to represent numbers. Children will learn to cross out drawn objects to show what has been taken away.</p> 	<p>Children will record their calculation using a pictorial method along with a calculation using numbers and symbols.</p> <div style="text-align: right;">  </div> <p><math>11 - 4 = 7</math></p> <p>They may use their fingers to support their mental methods</p> 
Stage 2	<p>Children will use dienes cubes to subtract larger numbers where exchanging is not required. Children will lay out the first number using the dienes cubes and then move the second number away to show the subtraction.</p>  <p>They will also use a bead string to add larger numbers by counting in tens and ones.</p> 	<p><b>Number line</b></p> <p>Children will begin to draw their own number lines. Start at the larger number on the number line and count back in ones or in one jump to find the answer.</p>  <p>Numbers will get progressively larger throughout the keystage. Children will be able to subtract tens and ones using an empty number line.</p>  <p>Children will show their representations from the concrete method using pictures.</p> <p style="text-align: center;"><math>43 - 21 = 22</math></p>	<p>Children will record their calculation using a pictorial method along with a calculation using numbers and symbols.</p> <p><math>25 - 12 = 13</math></p> <p>Children will begin to subtract multiples of tens.</p> <p><math>25 - 10 = 15</math></p> <p><math>25 - 10 = 15</math></p>
Stage 3	<p>Children will begin to use place value counters and dienes cubes to show how to exchange between units of number. They will be</p>	<p><b>Empty number line</b> - Use an empty number line to count back in tens and then ones.</p>	<p><b>Partitioning method</b></p> <p>Children will begin to use the partitioning method. Tens and ones will be subtracted to form partial sums and then these partial sums will be added together to find the total.</p>



3

able to change 1 ten and exchange it for 10 ones.



When confident:

$$\begin{array}{r}
 \phantom{4} - 5 \\
 \hline
 31
 \end{array}$$

$$\begin{array}{r}
 \phantom{4} - 40 \\
 \hline
 47 - 24 = 23
 \end{array}$$

$$\begin{array}{r}
 40 + 7 \\
 - 20 + 4 \\
 \hline
 20 + 3
 \end{array}$$

$47 - 23 = 24$

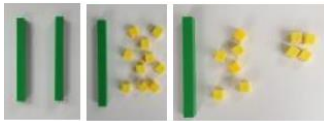
$47 - 20 = 27$

$27 - 3 = 24$

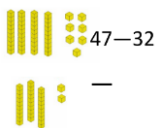
### SUBTRACTION - Lower KS2 (Years 3 & 4)

#### Concrete

Children consolidate and use place value counters and dienes cubes to show how to exchange between units of number. They will be able to change 1 ten and exchange it for 10 ones.



They will be able to begin to lay this out like the column method and removing counters or cubes away to represent taking away.

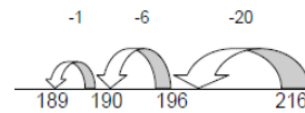


H	T	O
4	7	
3	2	

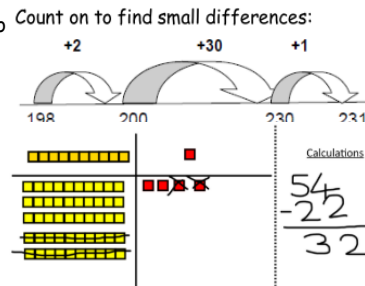
#### Pictorial

Consolidate their learning from KS1 by using an empty number line to calculate larger numbers.

Develop the use of empty number line with calculations that bridge 100:



Children will also be able to draw representations of dienes cubes and place value counters by crossing out the number being taken away.



#### Abstract

$$\begin{array}{r}
 90 \ 8 \\
 - 30 \ 5 \\
 \hline
 60 \ 3
 \end{array}$$

$$\begin{array}{r}
 47 - 24 = 23 \\
 - 40 + 7 \\
 \hline
 20 + 3
 \end{array}$$

Children to further secure their knowledge using the **partitioning method** but will start to lay their work out using the column method approach. Tens and ones will be subtracted to form partial sums and then these partial sums will be added together to find the total.

S  
t  
a  
g  
e

1

S  
t  
a  
g  
e

2

Children begin to set out HTU - HTU using dienes cubes and place value counters (that cross the tens boundary) in columns and record as column subtraction with decomposition. Teach children how to exchange units of numbers.

Subtract the units

Exchange 1 square of 100 for 10 sticks of 10.

Subtract the tens

$$\begin{array}{r} 236 - 73 = 163 \\ \underline{- 73} \\ 163 \end{array}$$

Children may draw dienes cubes or place value counters and cross off showing their understanding of taking away. They will need to represent any exchanging that takes place.

$$\begin{array}{r} 45 \\ - 29 \\ \hline 16 \end{array}$$

45  
-29  
---  
16

Tens | Ones

10 + 6 = 16

**Partitioning method - with exchanging**

Children will use the partitioning method to show exchanging.

$$\begin{array}{r} 200 + 50 + 13 \\ - 100 + 10 + 9 \\ \hline 100 + 40 + 4 \end{array}$$

Once confident, children can start to use the column method.

$$\begin{array}{r} 51 \\ - 23 \\ \hline 28 \\ - 119 \\ \hline 144 \end{array}$$

S  
t  
a  
g  
e

3

Children continue to develop their confidence in using dienes cubes and place value counters to show decomposition using the column method.



Children draw representations from concrete activities using dienes cubes and place value counters.

$$\begin{array}{r} 6232 \\ - 4814 \\ \hline 1418 \end{array}$$

**Column Method**

Children continue to use column method to subtract larger numbers.

$$\begin{array}{r} 5131 \\ - 2684 \\ \hline 2447 \\ - 2684 \\ \hline 3783 \end{array}$$

**SUBTRACTION - Upper KS2 (Years 5 & 6)**

Concrete

Pictorial

Abstract

Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.

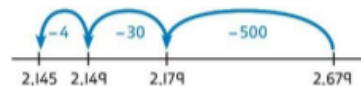
Children can draw using place value counters showing how exchanging takes place between the units of numbers.

$$15,735 - 2,582 = 13,153$$

Now subtract the 10s. Exchange 1 hundred for 10 tens.

Subtract the 100s, 1,000s and 10,000s.

Children also show subtraction on an empty number line using larger numbers.



### Column Method

Children will continue to develop their understanding of column method subtraction. Calculations will become larger.

#### 5 digit - 5 digit

$$\begin{array}{r} 5 \ 13 \ 1 \\ - 2 \ 6 \ 8 \ 5 \ 4 \\ \hline 3 \ 7 \ 8 \ 4 \ 3 \end{array}$$

Introduce decimal place value counters and model exchange for subtracting between units of numbers.

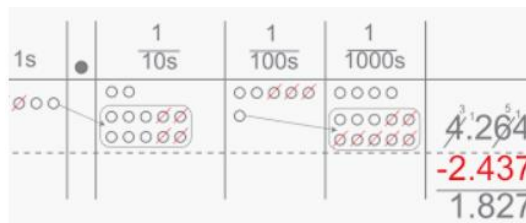
$$5.74 - 2.25 = ?$$

Exchange 1 tenth for 10 hundredths.

Now subtract the 5 hundredths.

Now subtract the 2 tenths, then the 2 ones.

Children will draw their representations showing where they have exchanged.



Children will continue to develop their understanding of column method subtraction. Calculations will become larger, include decimal places and require 0 to be added as a placeholder.

#### 6 digit - 6 digit

$$\begin{array}{r} 5 \ 13 \ 1 \\ - 2 \ 6 \ 8 \ 5 \ 1 \ 4 \\ \hline 3 \ 7 \ 8 \ 4 \ 2 \ 3 \end{array}$$

#### Numbers with 3 decimal place


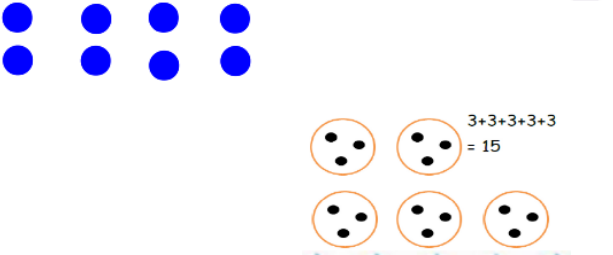
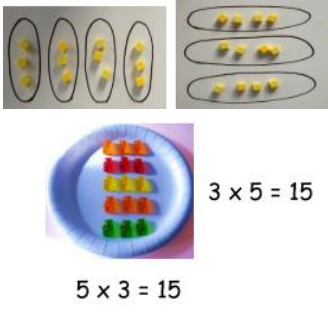
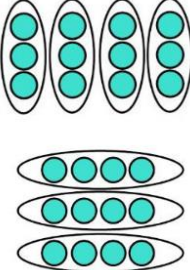

$$\begin{array}{r} 3 \ 1 \\ 7 \ 3 \ .7 \ 9 \ 8 \\ - 2 \ 1 \ 6 \ .2 \ 7 \ 3 \\ \hline 5 \ 2 \ 7 \ .5 \ 2 \ 5 \end{array}$$

#### Numbers with a different number of decimal places

$$69.2 - 27.54$$

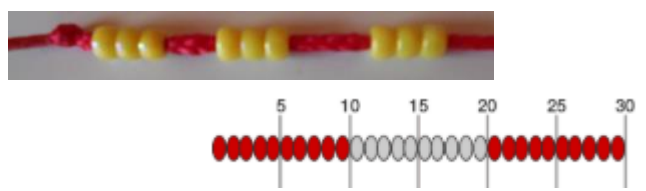
$$\begin{array}{r} 8 \ 1 \ 1 \\ 6 \ 9 \ .2 \ 0 \\ - 2 \ 7 \ .5 \ 4 \\ \hline 4 \ 1 \ .6 \ 6 \end{array}$$

# MULTIPLICATION - KS1 (Years 1&2)

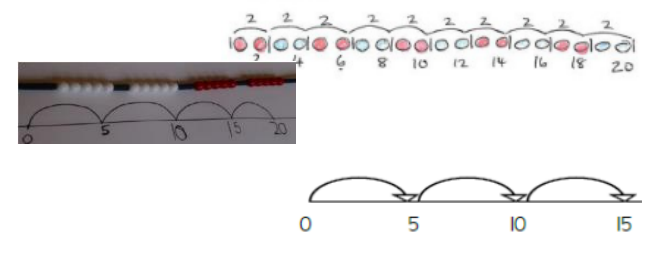
	Concrete	Pictorial	Abstract
Stages 1	<p><b>Repeated addition - Groups of multiple objects</b></p> <p>Children will count groups of the same number of objects and add them together. The children learn about grouping in practical contexts and through pictorial representations.</p> 	<p>Children draw representations to show counting in multiples and groups.</p> <p>Double 4 is 8</p> 	<p>Children show multiplication as repeated addition. Children may provide pictorial representations to support.</p> <p><math>3 \times 9</math></p> <p><math>3 + 3 + 3 = 9</math></p>
Stages 2	<p><b>Arrays</b></p> <p>Children will be able to represent a multiplication calculation using an array and write the multiplication symbol within a number sentence. Children will also understand that multiplication can be carried out in any order (commutative).</p>  <p><math>3 \times 5 = 15</math></p> <p><math>5 \times 3 = 15</math></p>	<p>Children draw representations to show arrays.</p> 	<p>Children use arrays to show how to solve multiplication calculations. Children are able to show that multiplication can be done in any order (commutative).</p> <p><math>3 \times 5 = 15</math></p> <p><math>5 \times 3 = 15</math></p> <p>Introduce x sign and record as number sentence</p> <p><math>7 \times 10 = 70</math></p> <p><math>4 \times 5 = 20</math></p> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p><math>5 + 5 + 5 = 15</math></p> <p><math>3 + 3 + 3 + 3 + 3 = 15</math></p> <p><math>5 \times 3 = 15</math></p> <p><math>3 \times 5 = 15</math></p>
Stage 3	<p><b>Number line</b></p>	<p>Children will be able to use an empty number line to show multiplication as repeated addition. The use of beadsting</p>	<p>Children show multiplication as repeated addition.</p>

a  
g  
e  
3

Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this. Count the groups as children are skip counting, children may use their fingers as they are skip counting.



concrete resources may be used to support conceptual understanding.



$5 + 5 + 5 = 15$

Introduce x sign and record as number sentence

$7 \times 10 = 70$

$4 \times 5 = 20$

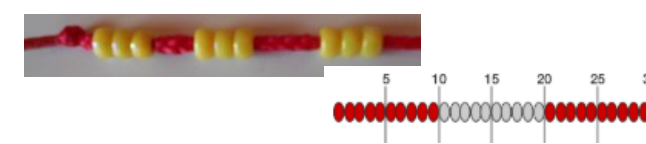
### MULTIPLICATION - Lower KS2 (Years 3 & 4)

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#### Concrete

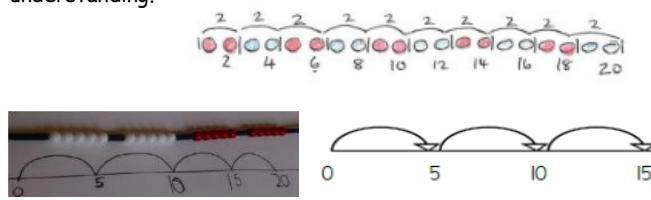
##### Number line - Consolidation

Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this. Count the groups as children are skip counting, children may use their fingers as they are skip counting.



#### Pictorial

Children will be able to use an empty number line to show multiplication as repeated addition. The use of beadsting concrete resources may be used to support conceptual understanding.



#### Abstract

Children show multiplication as repeated addition.

$5 + 5 + 5 = 15$

Introduce x sign and record as number sentence

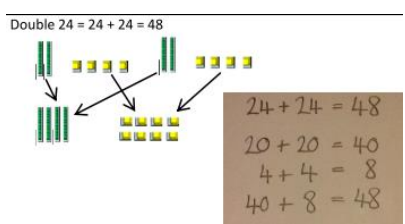
$7 \times 10 = 70$

$4 \times 5 = 20$

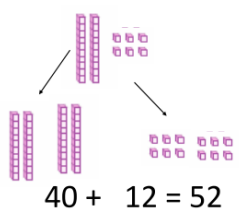
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##### Partitioning

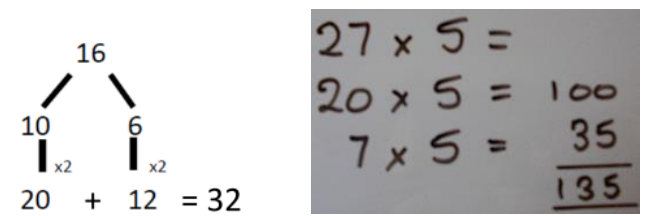
Children will learn to multiply ones and tens separately before recombining the numbers back together. They can use Dienes cube of place value counters to achieve this.



Children can draw representations of the partitioning process to support their conceptual understanding.



Partition a number and then multiply each part before recombining it back together.

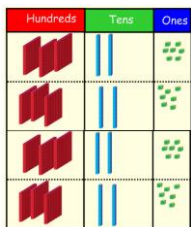


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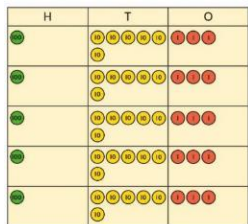
**Grid Method**

Show the links with arrays to first introduce the grid method.

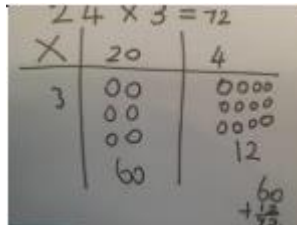


Move onto Dienes cubes to move towards a more compact method.

Move on to place value counters to show how we are finding groups of a number. We are multiplying by 5 so we need 5 rows of that number.



Pictorial representations can be made using their concrete manipulatives as visuals. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown.



x	T	U
10	40	4
3	12	12
		16

$$13 \times 4 = (10 \times 4) + (3 \times 4)$$

$$= 40 + 12$$

$$= 52$$

Children should be able to draw the grid method for each multiplication. The grid method will be used to show how this relates to a formal written method.

**Grid method**

X	30	6
4	120	24

Grid method may then lead to the expanded method.

$$\begin{array}{r} 36 \\ \times 4 \\ \hline 24 \text{ (6 x 4)} \\ 120 \text{ (30 x 4)} \\ \hline 144 \end{array}$$

3

**MULTIPLICATION - Upper KS2 (Years 5 & 6)**

S  
t  
a  
g  
e

**Concrete**

Concrete materials may be needed to support children's conceptual understanding. Dienes cubes and place value counters will support.

Use place value equipment to multiply by 10, 100 and 1,000 by unitising.

When multiplying by 10,100,1000 initial concrete resources will be used to support

$4 \times 1 = 4 \text{ ones} = 4$	
$4 \times 10 = 4 \text{ tens} = 40$	
$4 \times 100 = 4 \text{ hundreds} = 400$	

**Pictorial**

Use place value equipment to compare methods.

**Abstract**

The **grid method** may be used to show how this relates to a formal written method.

Grid method will lead onto **expanded method** and then onto the **compact short multiplication**.

**Grid method**

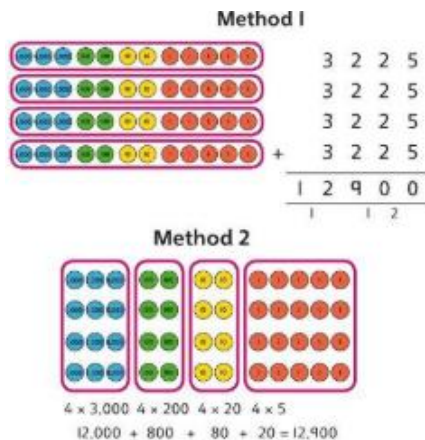
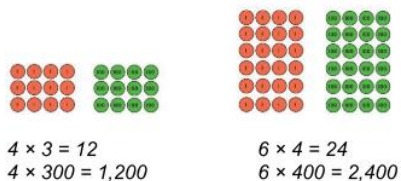
X	30	6
4	120	24

Leading to expanded method

$$\begin{array}{r} 36 \\ \times 4 \\ \hline 24 \text{ (6 x 4)} \\ 120 \text{ (30 x 4)} \\ \hline 144 \end{array} \quad \longrightarrow \quad \begin{array}{r} 36 \\ \times 4 \\ \hline 144 \\ 2 \end{array}$$

1

understanding.

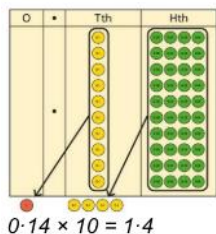


Use known facts and unitising to multiply.

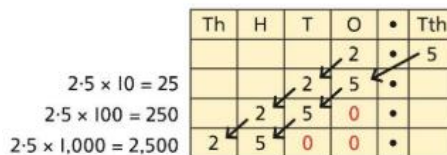
$5 \times 4 = 20$   
 $5 \times 40 = 200$   
 $5 \times 400 = 2,000$   
 $5 \times 4,000 = 20,000$   
 $5,000 \times 4 = 20,000$

Stage 2

When multiplying decimals by 10,100,1000 initial concrete resources will be used to support understanding to show how exchanging can take place.



This pictorial grid method will support children's understanding of multiplying by 10, 100, 1000.



**Long multiplication**

Children may wish to use 2 separate calculations to support their understanding. Reinforce language of place value when multiplying by multiples of 10. Extend to 3 or 4-digit numbers

$$\begin{array}{r} 23 \\ \times 13 \\ \hline + 69 \quad (3 \times 23) \\ \hline 230 \quad (10 \times 23) \\ \hline 299 \end{array}$$

multiplied by a 2-digit number.

Stage 3

Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.

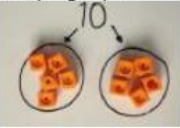



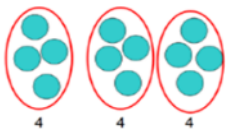


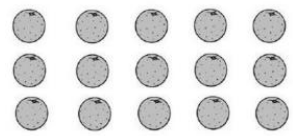
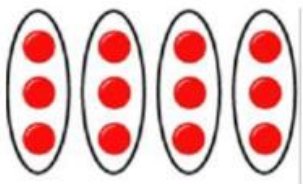
Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.

Use column multiplication, ensuring understanding of place value at each stage.

$$\begin{array}{r} 1.43 \\ \times \quad 6 \\ \hline 8.58 \end{array}$$

$$\begin{array}{r} 1\ 2\ 7\ 4 \\ \times \quad 3\ 2 \\ \hline 2\ 5\ 4\ 8 \quad 1,274 \times 2 \\ 3\ 8\ 2\ 2\ 0 \quad 1,274 \times 30 \\ \hline 4\ 0\ 7\ 6\ 8 \quad 1,274 \times 32 \\ \hline 1,274 \times 32 = 40,768 \end{array}$$

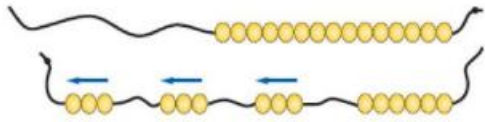
## DIVISION - KS1 (Years 1&2)

	Concrete	Pictorial	Abstract
S t a g e  1	<p><b>Sharing and Grouping</b></p> <p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p> <p style="text-align: center;">Share 10 into 2 equal groups</p>  <p style="text-align: center;">How many 2s in 10?</p> 	<p>Use pictures to share objects. Use circles rather than dots to aid counting.</p> <p style="text-align: center;">Share 10 into 2 equal groups</p>  <p style="text-align: center;">How many 2s in 10?</p>  <p style="text-align: center;">Develop division as repeated subtraction on a number line.</p>  <p style="text-align: center; color: red;">12 shared between 3 is 4</p>	<p>Children will be able to represent a division calculation using a pictorial method and write the division within a number sentence.</p> <p style="text-align: center;"><math>10 \div 2 = 5</math></p> <p style="text-align: center;">Share 10 into 2 equal groups</p> 
S t a g e  2	<p><b>Arrays</b></p> <p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p>  <p>Eg:</p> <p style="margin-left: 20px;"><math>15 \div 3 = 5</math>     <math>5 \times 3 = 15</math></p> <p style="margin-left: 20px;"><math>15 \div 5 = 3</math>     <math>3 \times 5 = 15</math></p>	<p>Draw arrays to show how pictures are divided.</p> 	<p>Children will be able to represent a division calculation using an array and write the division within a number sentence</p> <p style="text-align: center;"><math>12 \div 3 = 4</math></p> 
S t	<p><b>Repeated addition and subtraction</b></p>	<p>Children will understand the operation of division as grouping</p>	<p>Children will be able to represent a division calculation using a</p>

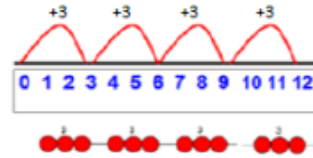


a Children will understand the operation and repeated addition or subtraction using bead strings and number lines. This will support the pictorial element.

$$15 \div 3 = 5$$

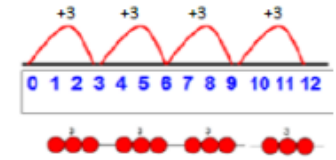


using repeated addition or subtraction on a prepared number line.



$$12 \div 3 = 4$$

numberline and write the division within a number sentence.



$$12 \div 3 = 4$$

### DIVISION - Lower KS2 (Years 3 & 4)

#### Concrete

#### Pictorial

#### Abstract

**Division with no remainders through sharing.**

Use concrete materials to share into groups.

$$60 \div 3 = 20$$

CONCRETE / PICTORIAL

(Base 10 equipment)

sharing



grouping



$$6 \text{ tens} \div 3 = 2 \text{ tens} = 20$$

$$96 \div 3 = 32$$

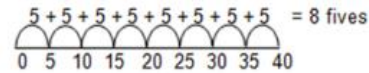


Consolidate learning from KS1 using diagrams of sharing and repeated subtraction and addition on a number line to make jumps

**Example without remainder:**

$$40 \div 5$$

Ask "How many 5s in 40?"



Concrete methods could be represented pictorially within books to show understanding.

How many groups of 6 in 24?

$$24 \div 6 = 4$$

Abstract methods may be supported with pictorial methods within the children's books.

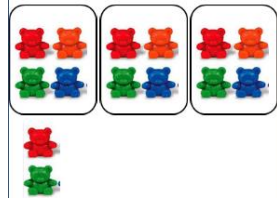
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**Division with remainder through sharing**

$14 \div 3 =$

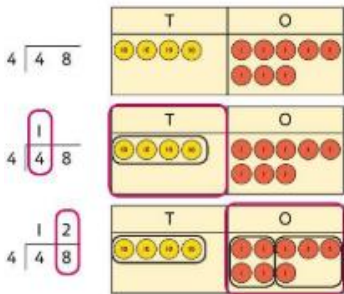
Divide objects between groups and see how much is left over.



**Division no remainders - introduction to bus stop method** Use place value equipment on a place

value grid alongside short division.

The model uses grouping.

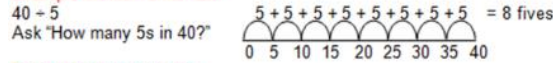


Students can continue to use drawn diagrams with circles to help them divide numbers into equal groups. Remainders will be seen by not fitting into a whole group.

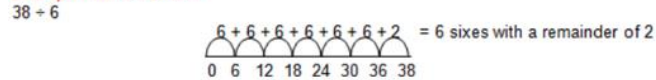
Draw dots and group them to divide an amount and clearly show a remainder.



**Example without remainder:**



**Example with remainder:**



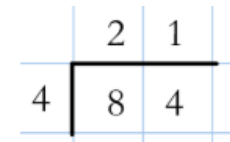
Children will begin to move onto division with remainders. A number sentence will support any abstract written calculation by using pictorial method to support.

$$29 \div 8 = 3 \text{ REMAINDER } 5$$

↑
↑
↑
↑
  
 dividend    divisor    quotient                    remainder

**Short division**

Children will begin to use the formal written method of division without remainders. This will only come after a clear concept is understood using manipulatives.



Dividing by 2,3,4, and 5

### Division with remainders - Bus stop

4  $\overline{) 92}$

2  
4  $\overline{) 92}$

2  
4  $\overline{) 92}$

2 3  
4  $\overline{) 92}$

First, lay out the problem.

How many groups of 4 go into 9 tens?

2 groups of 4 tens with 1 ten left over.

Exchange the 1 ten left over for 10 ones.

We now have 12 ones.

How many groups of 4 go into 12 ones?

3 groups of 4 ones.

Pictorial representations can be used to support any concrete manipulatives.

How many groups of 6 are in 100?

6  $\overline{) 132}$

0  
6  $\overline{) 132}$

How many groups of 6 are in 13 tens?

6  $\overline{) 132}$

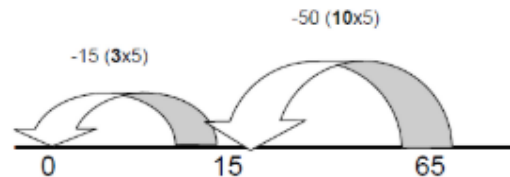
0 2  
6  $\overline{) 132}$

How many groups of 6 are in 12 ones?

6  $\overline{) 132}$

Continue to use blank number lines as appropriate, using multiples of the divisor.

$65 \div 5 = 13$



### Chunking

Chunking is repeated subtraction of the divisor and multiples of the divisor.

$73 \div 5$

$$\begin{array}{r}
 5 \overline{) 73} \\
 - 50 \\
 \hline
 23 \\
 - 20 \\
 \hline
 3
 \end{array}$$

(10 x 5) → 10 + 4 = 14  
(4 x 5)

How many 5s have been subtracted?  
14 sets of 5, with 3 left over.

**Answer:  $73 \div 5 = 14 \text{ r}3$**

### Bus Stop Method for division

Begin with divisions that divide equally with no remainder.

$$\begin{array}{r}
 218 \\
 3 \overline{) 654} \\
 \hline
 654
 \end{array}$$

Move onto divisions with a remainder.

$$\begin{array}{r}
 86 \text{ r} 2 \\
 3 \overline{) 258} \\
 \hline
 258
 \end{array}$$

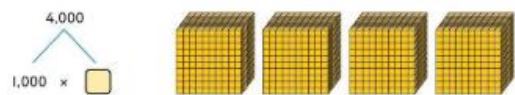
## DIVISION - Upper KS2 (Years 5 & 6)

### Concrete

#### Dividing whole numbers by 10, 100 and 1,000

Use place value equipment to support unitising for division.

$$4,000 \div 1,000$$



4,000 is 4 thousands.

$$4 \times 1,000 = 4,000$$

$$\text{So, } 4,000 \div 1,000 = 4$$

Concrete and pictorial representations may still be required to support the formal method of division (Bus Stop) - Go back to LKS2 to consolidate learning.

### Pictorial

Understand how and why the digits change on a place value grid when dividing by 10, 100 or 1,000.

Th	H	T	O
3	2	0	0

$$3,200 \div 100 = ?$$

3,200 is 3 thousands and 2 hundreds.

$$200 \div 100 = 2$$

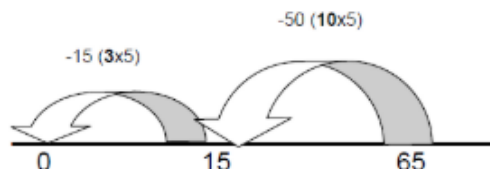
$$3,000 \div 100 = 30$$

$$3,200 \div 100 = 32$$

So, the digits will move two places to the right.

Continue to use blank number lines as appropriate, using multiples of the divisor.

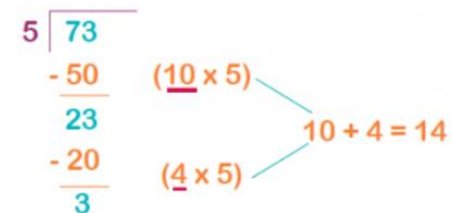
$$65 \div 5 = 13$$



### Abstract

#### Chunking

$$73 \div 5$$



How many 5s have been subtracted?  
14 sets of 5, with 3 left over.

$$\text{Answer: } 73 \div 5 = 14 \text{ r}3$$

Chunking is repeated subtraction of the divisor and multiples of the divisor.

#### Bus Stop Method for division

Begin with divisions that divide equally with no remainder.

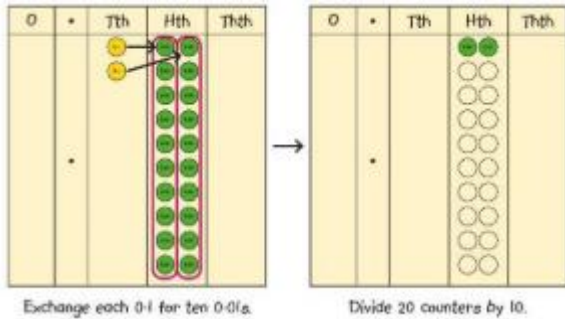
$$\begin{array}{r} 218 \\ 3 \overline{) 654} \\ \underline{-60} \phantom{0} \\ 54 \phantom{0} \\ \underline{-51} \phantom{0} \\ 30 \phantom{0} \\ \underline{-30} \\ 0 \end{array}$$

Move onto divisions with a remainder.

$$\begin{array}{r} 86 \text{ r} 2 \\ 5 \overline{) 432} \\ \underline{-40} \phantom{0} \\ 32 \phantom{0} \\ \underline{-30} \\ 2 \end{array}$$

**Dividing decimals by 10, 100 and 1,000**

Use place value counters to represent dividing by 10, 100, 1000. Represent division using exchange on a place value grid.

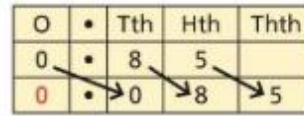


0.2 is 2 tenths.

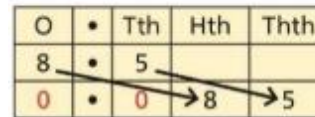
2 tenths is equivalent to 20 hundredths.

20 hundredths divided by 10 is 2 hundredths.

Represent division to show the relationship with multiplication. Understand the effect of dividing by 10, 100 and 1,000 on the digits on a place value grid.

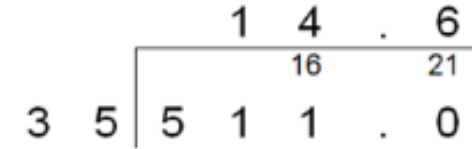


$0.85 \div 10 = 0.085$



$8.5 \div 100 = 0.085$

Finally move into decimal places to divide the total accurately using a formal method for division (Bus stop)



**Long Division - Abstract Method**

Calculations will start with tens and ones and move onto more advanced division calculations.

**1. Divide.**

$$\begin{array}{r} \text{t o} \\ 2 \overline{)58} \end{array}$$

Two goes into 5 two times, or 5 tens  $\div 2 = 2$  whole tens -- but there is a remainder!

**2. Multiply & subtract.**

$$\begin{array}{r} \text{t o} \\ 2 \overline{)58} \\ -4 \phantom{0} \\ \hline 1 \phantom{0} \end{array}$$

To find it, multiply  $2 \times 2 = 4$ , write that 4 under the five, and subtract to find the remainder of 1 ten.

**3. Drop down the next digit.**

$$\begin{array}{r} \text{t o} \\ 2 \overline{)58} \\ -4 \downarrow \\ \hline 18 \end{array}$$

Next, drop down the 8 of the ones next to the leftover 1 ten. You combine the remainder ten with 8 ones, and get 18.