Raglan Primary School
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# Mathematics Calculation Policy

This policy supports the White Rose Maths scheme used throughout the school. Progression within each area of calculation is in line with the 2014 National Curriculum Programme of Study.

| | Name | Date | Signature |
|---|---|---|---|
| Written By | Martin Hunter | November 2022 | |
| Reviewed | Liam Farmer | November 2023 | |
| Reviewed | Liam Farmer | November 2024 | |
| Reviewed | Liam Farmer | October 2026 | |
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## Version Control

| Date | Change |
|---|---|
| Sept 2023 | p.3 added paragraph about learning in KS2 |
| Nov 2025 | p.3 amended to include the use of graduated release model during class teaching and remove the split input model for KS2 |
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**Intent Statement**

The Maths curriculum at Raglan Primary School has been designed to be accessible to all and to ensure the maximum development of every child's ability and academic achievement, in line with the national outcomes. We deliver lessons that are creative and engaging, using a range of stimuli such as books, Number Blocks and real-life problems, to hook the children and allow them to make links between their learning and everyday situations. Our curriculum aims to help children develop a love for Maths through growing confidence in their ability and enjoyment of what they are learning. We want children to make connections, develop their fluency, reason mathematically and solve problems with increasing sophistication. We understand that the way pupils speak and write about mathematics transforms their learning, so we plan in carefully sequenced and structured vocabulary to ensure that the children not only know what the answer is, but can confidently articulate their reasoning behind their understanding. Our intention is for our pupils to be able to apply their mathematical knowledge, understanding and skills in other subject areas to maximise their enjoyment and curiosity about the subject.

**Implementation**

Maths is a core aspect of our curriculum and is taught daily in every year group. We are aware of the importance of the children being fluent in the fundamentals of Mathematics as well as developing their problem solving and reasoning skills. At Raglan, we ensure learning is cumulative and progressive by following 'White Rose- small steps of learning'. This ensures our children are confident and secure in their understanding of each small concept, which enables all children to embed the learning and make progress. Our staff use a carefully adapted 'whole school overview' to ensure there is progression in knowledge and skills throughout the school. Using this, lessons are planned carefully to ensure links between Maths concepts are made when appropriate. Learning is taught through the Concrete, Pictorial and Abstract (CPA) ways of learning and mathematical vocabulary is taught explicitly and the children have regular opportunities to talk about maths and explain their thinking. We have adapted a mastery approach to the way that we deliver our Mathematics curriculum. One way we achieve this is through our split-input approach. During each lesson, children will receive teaching that is pitched and modelled appropriately, which focuses on their level of understanding. Our split-input starter activities support the children to:

- Recap skills that will support them in their new learning in the lesson
- Develop core skills such as number bonds, partitioning, rounding and times tables
- Reinforce and recap 'sticky knowledge' that has been previously taught in other topics of learning
- Independently solve open ended problems/ challenges

During our daily Mathematics lessons, the children will work alongside the teachers and support staff to recap prior knowledge and are taught new learning, while receiving in lesson marking/ verbal feedback to ensure all children make progress and master each concept. Teachers use 'flexible grouping' to seat

the children in order of understanding, to ensure the learning in each lesson is pitched appropriately. This means that extra support can be given to children that struggled the previous day and challenging questions given to children that are excelling. Marking, targeted questioning and children's own self-assessment are used to ensure children are grouped appropriately. Children have a variety of strategies to support them during a lesson. An example of this is when they get stuck, they can use manipulatives to support them, look at the Maths modelling on the working wall, talk to a buddy on their table or re-read the question and use an alternative method. If a pupil has demonstrated that they have not mastered a concept, they will receive additional support to secure their understanding either later that day (same day intervention); during early morning work the next day or whole lessons may need to be re-taught. This ensures staff intervene quickly to tackle any key misconceptions, so that children keep up and don't have to catch- up.

At Raglan, we encourage our children to become confident problems solvers. We offer a range of opportunities to apply their mathematical knowledge, to show their ability to be systematic, logical, to find all possibilities and to find the rules and patterns that support their conjectures. It is also important that the children at Raglan are able to reason mathematically. We provide regular opportunities for the children to apply and explain their mathematical understanding and model this, in turn, so they can demonstrate real rigor and depth of knowledge. Teachers will challenge children who grasp concepts quickly by providing sophisticated problems, rather than accelerating them through new content from other year groups.

Strong roots in Maths start early in our EYFS and Year 1 classrooms. In Reception and Year 1, the children learn through continuous provision. The children have access to a range of visuals and manipulatives to support them in consolidating learning, practising core skills, deepening their understanding through problem solving and reasoning challenges, as well as their love for Maths. The children have regular small, adult-led focus groups, in which adults model and support the children to develop their oral fluency, automaticity and understanding. Children receive immediate, individual feedback to support them to secure their understanding and skills in each small concept of learning. Within Year 1, the children have a daily 'Maths Meeting' to recap learning and go over any misconceptions. The Maths provision area is used to further consolidate learning through adult directed enhancements and questioning as well as using the wider provision to develop and apply their understanding through meaningful experiences. In Reception, the children have one adult-led focus group a week. In the Autumn term of Year 1, the children will begin with two adult-led focus groups a week. During the Spring term this will increase so that in the Summer term of Year 1, the children learn through a combination of whole-class/graduated release model and split input teaching, ready for the transition to Year 2. Throughout KS2, teachers continue to use the graduated release and fluid grouping strategies to build on prior learning and introduce new concepts, in-line with the national curriculum. Teachers plan using the school overview and use a range high-quality resources (such as manipulatives) to provide clear and carefully structured progression. Pupils are encouraged to explain their mathematical reasoning, engage in discussions, and solve problems collaboratively and develop a love of mathematical learning that extends beyond the primary setting.

At Raglan, we use Mathletics to support the children's love of Maths at home. Children are set learning on Mathletics to secure and master concepts taught, as well as to keep core skills on the boil. In addition to this, throughout the year we hold 'Maths Breakfasts', where children and their parents have the opportunity to come into school to practise core skills, solve mathematical problems and apply these skills to answer reasoning questions. Throughout the school, children use a range of manipulatives to support their understanding in Maths lessons, such as Numicon, dienes, bead strings, counters, 100 squares and multi-link, as well as different stimuli such as books, Number Blocks and real-life problems to ensure Maths is purposeful and enjoyable.

**Impact**

As a result of our Maths teaching at Raglan Primary School children are:

- **Enriched -** they make good progress during their time with us

- **Excited -** they can recognise and use a wide range of different representations of mathematical concepts
- **Engaged -** they are all challenged appropriately
- **Experienced -** they can use a variety of resources to support (and explain) their Maths learning
- **Equipped -** they can articulate their Maths learning and the links between mathematical concepts and how these will be used in their lives beyond the education setting

## Maths Mastery

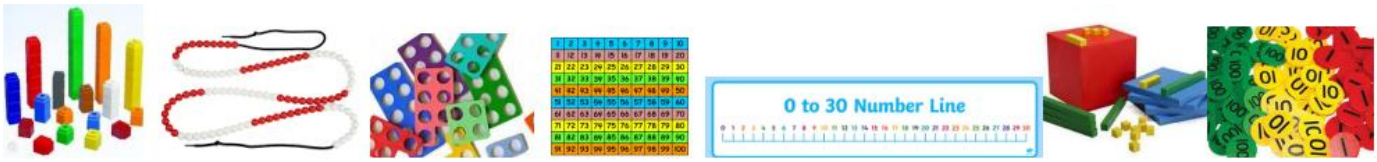
*"Pupils are taught through whole-class interactive teaching, where the focus is on all pupils working together on the same lesson content at the same time. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind. The structure and connections within mathematics are emphasised, so that pupils develop deep learning that can be sustained. Key facts such as multiplication tables and addition facts within 10 are learnt to automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts." – The Mastery Approach, NCETM 2016*

At the centre of the mastery approach is the belief that all children have the potential to succeed. They should have access to the same curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling challenging and varied problems (Problem Solving tasks). Scaffolding, pre-teaching, collaborative work, effective exposition and the implementation of other Quality First Teaching strategies should be used to assist learners who may struggle to access the content being taught. With calculation strategies, children must not simply 'rote learn' procedures but demonstrate their understanding of these procedures using concrete materials and pictorial representations.

| | |
|---|---|
| 1. Concrete representation | The pupils are introduced to an idea or skill by acting it out with real objects. This is intended to be a 'hands on' experience and lays the foundation for conceptual understanding. |
| 2. Pictorial representation | Once the pupils have understood the 'hands on' experience, they begin to relate them to representations such as diagrams or pictures of the problem. |
| 3. Abstract representation | The pupils become capable of representing problems using mathematical notation |

Manipulatives (objects), pictorial representations, words, numbers and symbols are everywhere. The mastery approach incorporates all of these to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they've learnt.

Concrete resources that may be found in classrooms will include:



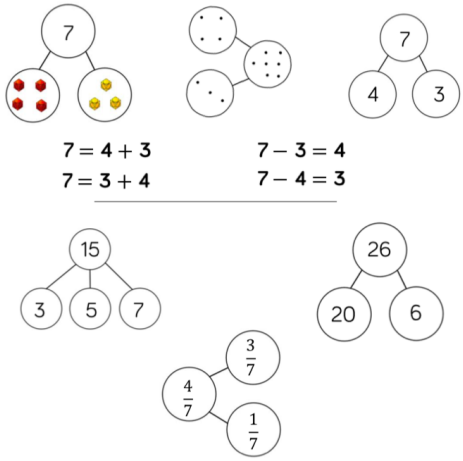
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These resources will vary depending on year group and individual needs. At home, pupils very well may not have access to these school resources; however, they are just a vehicle to support a pupil's understanding of a topic. Any objects can be used at home to replace counters, cubes etc.

**This policy outlines the different calculation strategies that should be taught, and used from Reception to Year 6 in line with the requirements of the 2014 Primary National Curriculum.**

## Overview of Models, Visual and Manipulatives to Support the Teaching of Different Mathematical Concepts

### Part-Whole Models




**Benefits**

This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.

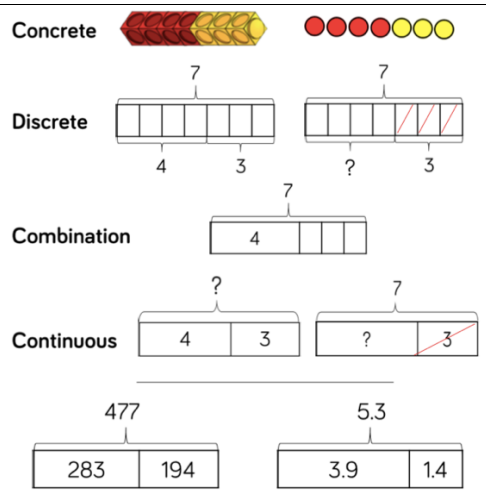
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

When the whole is complete and at least one of the parts is empty, children use partitioning (a form of subtraction) to find the missing part.

Part-whole models can be used to partition a number into two or more parts, or to help children to partition a number into tens and ones or other place value columns.

In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.

### Bar Models- Single




**Benefits**

The single bar model is another type of a part-whole model that can support children in representing calculations to help them unpick the structure.

Cubes and counters can be used in a line as a concrete representation of the bar model.

Discrete bar models are a good starting point with smaller numbers. Each box represents one whole.

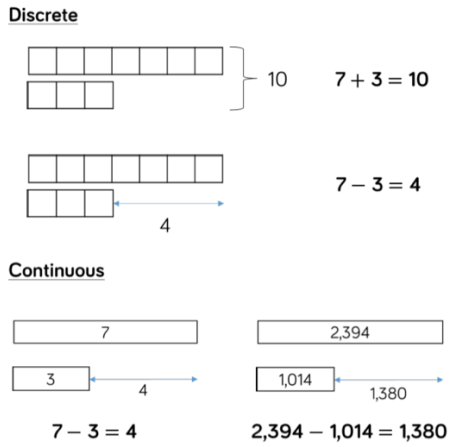
The combination bar model can support children to calculate by counting on from the larger number. It is a good stepping stone towards the continuous bar model.

Continuous bar models are useful for a range of values. Each rectangle represents a number. The question mark indicates the value to be found.

In KS2, children can use bar models to represent larger numbers, decimals and fractions.

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## Bar Models- Multiple




### Benefits

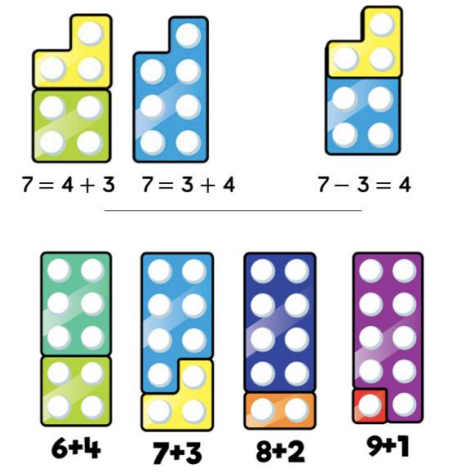
The multiple bar model is a good way to compare quantities whilst still unpicking the structure.

Two or more bars can be drawn, with a bracket labelling the whole positioned on the right hand side of the bars. Smaller numbers can be represented with a discrete bar model whilst continuous bar models are more effective for larger numbers.

Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.

When working with smaller numbers, children can use cubes and a discrete model to find the difference. This supports children to see how counting on can help when finding the difference.

## Numicon




### Benefits

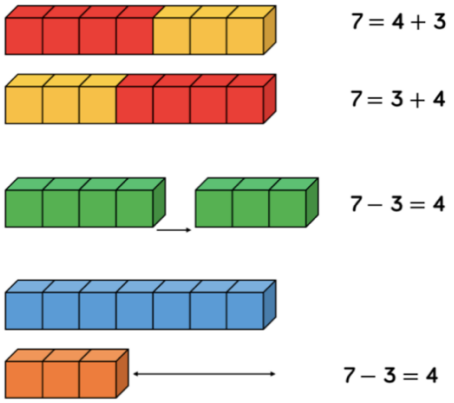
Number shapes can be useful to support children to subitise numbers as well as explore aggregation, partitioning and number bonds.

When adding numbers, children can see how the parts come together making a whole. As children use number shapes more often, they can start to subitise the total due to their familiarity with the shape of each number.

When subtracting numbers, children can start with the whole and then place one of the parts on top of the whole to see what part is missing. Again, children will start to be able to subitise the part that is missing due to their familiarity with the shapes.

Children can also work systematically to find number bonds. As they increase one number by 1, they can see that the other number decreases by 1 to find all the possible number bonds for a number.

## Cubes




### Benefits

Cubes can be useful to support children with the addition and subtraction of one-digit numbers.

When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

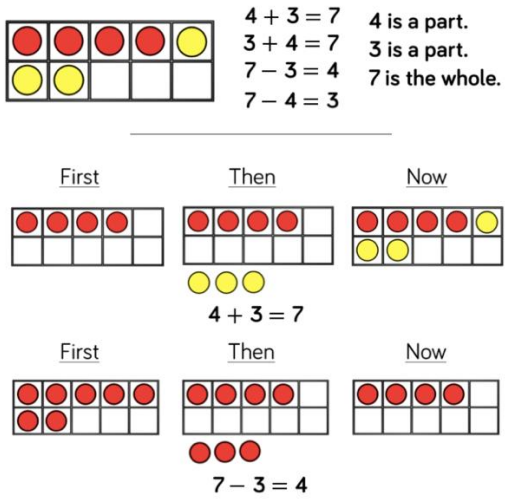
When subtracting numbers, children can start with the whole and then remove the number of cubes that they are subtracting in order to find the answer. This model of subtraction is reduction, or take away.

Cubes can also be useful to look at subtraction as difference. Here, both numbers are made and then lined up to find the difference between the numbers.

Cubes are useful when working with smaller numbers but are less efficient with larger numbers as they are difficult to subitise and children may miscount them.

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## Tens Frames- within 10



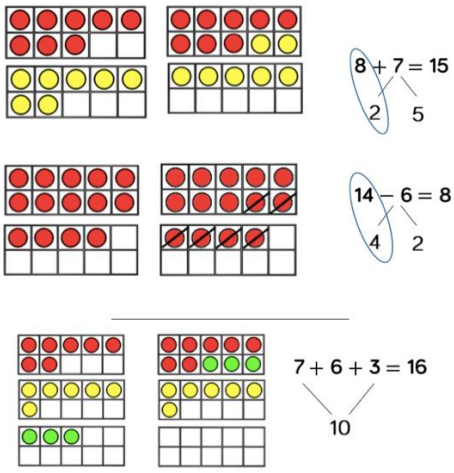

### Benefits

When adding and subtracting within 10, the ten frame can support children to understand the different structures of addition and subtraction.

Using the language of parts and wholes represented by objects on the ten frame introduces children to aggregation and partitioning.
Aggregation is a form of addition where parts are combined together to make a whole. Partitioning is a form of subtraction where the whole is split into parts. Using these structures, the ten frame can enable children to find all the number bonds for a number.

Children can also use ten frames to look at augmentation (increasing a number) and take-away (decreasing a number). This can be introduced through a first, then, now structure which shows the change in the number in the 'then' stage. This can be put into a story structure to help children understand the change e.g. First, there were 7 cars. Then, 3 cars left. Now, there are 4 cars.

## Tens Frames- within 20



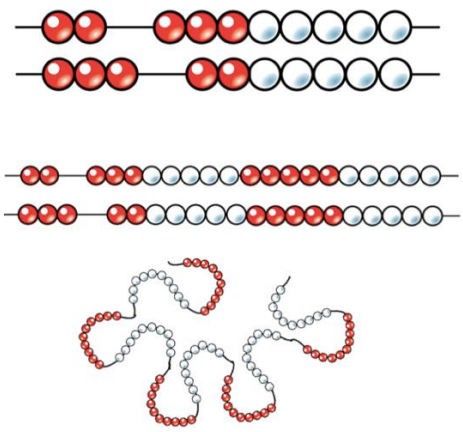

### Benefits

When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition.

When subtracting a one-digit number from a two-digit number, firstly make the larger number on 2 ten frames. Remove the smaller number, thinking carefully about how you have partitioned the number to make 10, this supports mental methods of subtraction.

When adding three single-digit numbers, children can make each number on 3 separate 10 frames before considering which order to add the numbers in. They may be able to find a number bond to 10 which makes the calculation easier. Once again, the ten frames support the link to effective mental methods of addition as well as the importance of commutativity.

## Bead Strings



### Benefits

Different sizes of bead strings can support children at different stages of addition and subtraction.

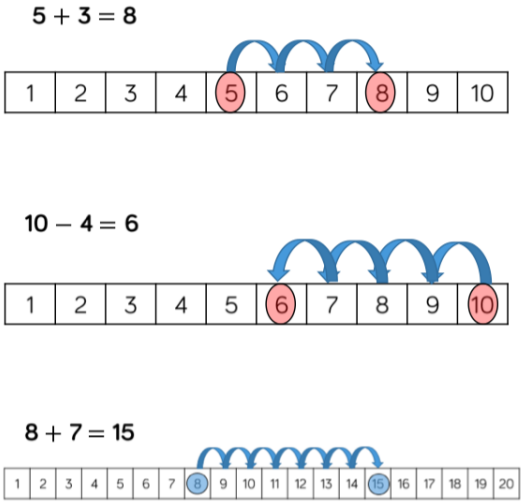
Bead strings to 10 are very effective at helping children to investigate number bonds up to 10.
They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. 2 + 8 = 10, move one bead, 3 + 7 = 10.

Bead strings to 20 work in a similar way but they also group the beads in fives. Children can apply their knowledge of number bonds to 10 and see the links to number bonds to 20.

Bead strings to 100 are grouped in tens and can support children in number bonds to 100 as well as helping when adding by making ten. Bead strings can show a link to adding to the next 10 on number lines which supports a mental method of addition.

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## Number Tracks




### Benefits

Number tracks are useful to support children in their understanding of augmentation and reduction.

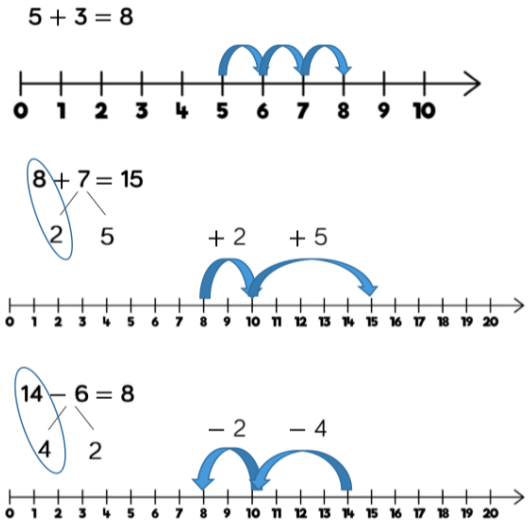
When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total.

When subtracting, children count back to find their answer. They start at the minuend and then take away the subtrahend to find the difference between the numbers.

Number tracks can work well alongside ten frames and bead strings which can also model counting on or counting back.

Playing board games can help children to become familiar with the idea of counting on using a number track before they move on to number lines.

## Number Lines- Labelled




### Benefits

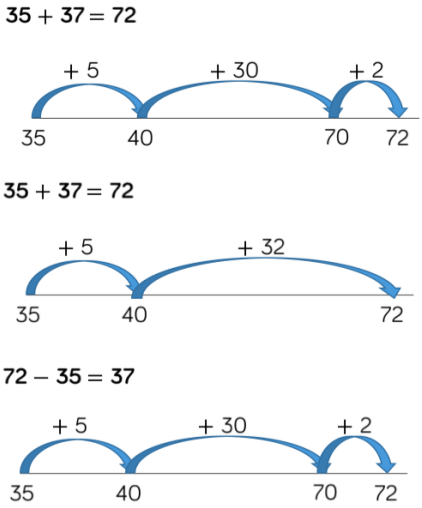
Labelled number lines support children in their understanding of addition and subtraction as augmentation and reduction.

Children can start by counting on or back in ones, up or down the number line. This skill links directly to the use of the number track.

Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part.

Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

## Number Lines- Blank




### Benefits

Blank number lines provide children with a structure to add and subtract numbers in smaller parts.

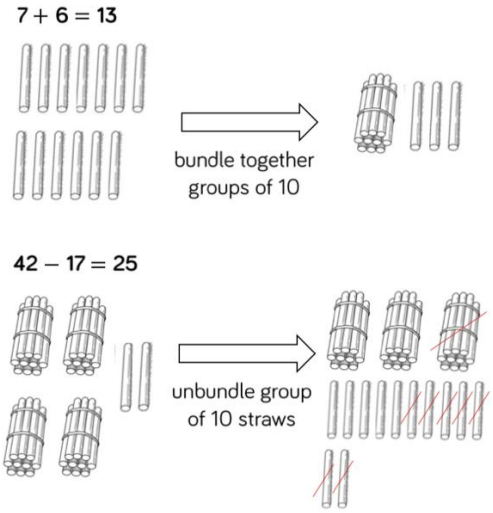
Developing from labelled number lines, children can add by jumping to the nearest 10 and then adding the rest of the number either as a whole or by adding the tens and ones separately.

Children may also count back on a number line to subtract, again by jumping to the nearest 10 and then subtracting the rest of the number.

Blank number lines can also be used effectively to help children subtract by finding the difference between numbers. This can be done by starting with the smaller number and then counting on to the larger number. They then add up the parts they have counted on to find the difference between the numbers.

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## Straws




### Benefits

Straws are an effective way to support children in their understanding of exchange when adding and subtracting 2-digit numbers.

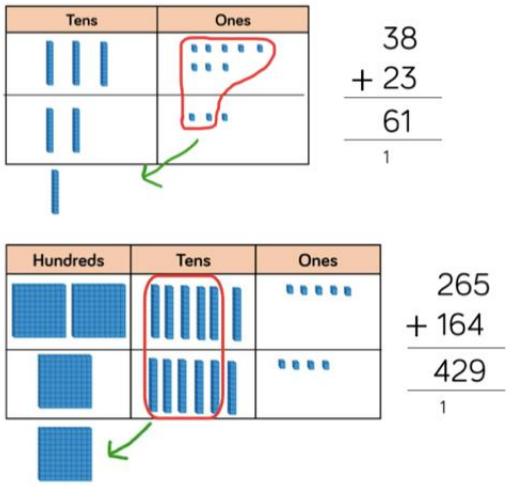
Children can be introduced to the idea of bundling groups of ten when adding smaller numbers and when representing 2-digit numbers. Use elastic bands or other ties to make bundles of ten straws.

When adding numbers, children bundle a group of 10 straws to represent the exchange from 10 ones to 1 ten. They then add the individual straws (ones) and bundles of straws (tens) to find the total.

When subtracting numbers, children unbundle a group of 10 straws to represent the exchange from 1 ten to 10 ones.

Straws provide a good stepping stone to adding and subtracting with Base 10/Dienes.

## Base 10/ Dienes- Addition



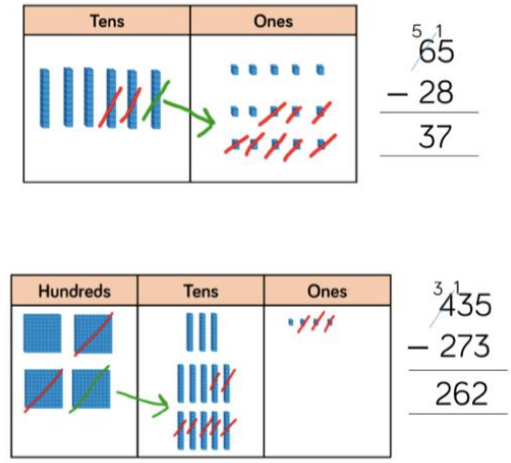

### Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

Children should first add without an exchange before moving on to addition with exchange.. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

When adding, always start with the smallest place value column. Here are some questions to support children.
How many ones are there altogether?
Can we make an exchange? (Yes or No)
How many do we exchange? (10 ones for 1 ten, show exchanged 10 in tens column by writing 1 in column)
How many ones do we have left? (Write in ones column)
Repeat for each column.

## Base 10/ Dienes- Subtraction



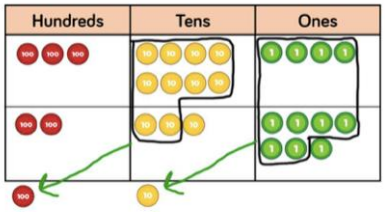

### Benefits

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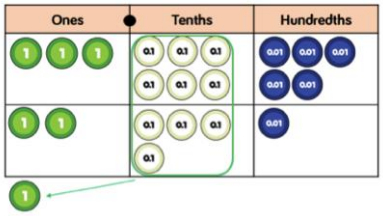
Children should first subtract without an exchange before moving on to subtraction with exchange. When building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.
This model is efficient with up to 4-digit numbers. Place value counters are more efficient with larger numbers and decimals.

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## Place Value Counters- Addition




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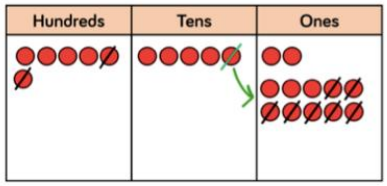

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### Benefits

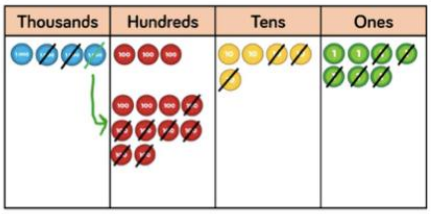
Using place value counters is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

Children should first add without an exchange before moving on to addition with exchange. Different place value counters can be used to represent larger numbers or decimals. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When adding money, children can also use coins to support their understanding. It is important that children consider how the coins link to the written calculation especially when adding decimal amounts.




$$\begin{array}{r} {}^{4}\not{6}\,{}^{1}\not{5}2 \\ -\ 207 \\ \hline 445 \end{array}$$




$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}357 \\ -\ 2735 \\ \hline 1622 \end{array}$$

### Benefits

Using place value counters is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

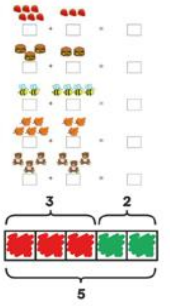
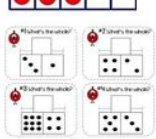
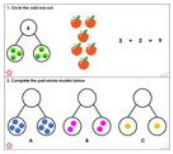
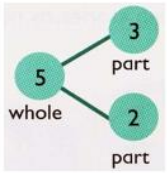
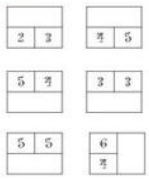
Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When building the model, children should just make the minuend using counters, they then subtract the subtrahend. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

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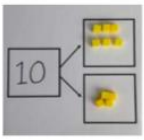
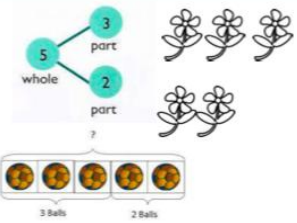
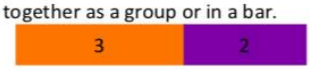
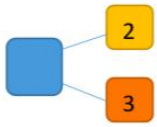
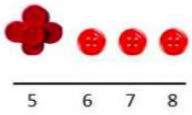
# Calculation Guidance- Addition

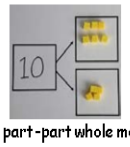
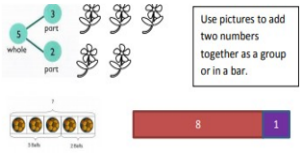
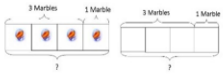
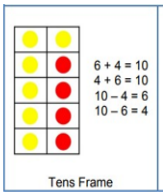
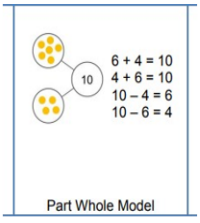
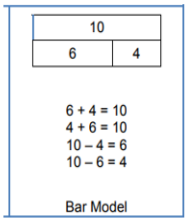
EYFS

| Objectives | Concrete | Pictorial | Abstract |
|---|---|---|---|
| - Knows that a group of things change in quantity when something is added.<br><br>- Find the total number of items in two groups by counting all of them.<br><br>- Says the number that is one more than a given number.<br><br>- Finds one more from a group of up to five objects, then ten objects.<br><br>- In practical activities and discussion, beginning to use the vocabulary involved in adding.<br><br>- Using quantities and objects, they add two single digit numbers and count on to find the answer.<br><br>- Solve problems including doubling. | <br>Use toys and general classroom resources for children to physically manipulate, group/regroup.<br><br><br>Specific maths resources such as counters, snap cubes, Numicon etc.<br><br> <br><br><br>Use visual supports such as ten frames, part part whole and addition mats, with the physical objects and resources that can be manipulated. |  <br>Two groups of pictures so children are able to count the total.<br><br><br>Bar model using visuals, pictures/icons or colours.<br><br><br>Use visual supports such as ten frames, part part whole and addition mats with pictures/icons.<br><br>  | A focus on symbols and numbers to form a calculation.<br><br>5+2=7<br><br><br><br><br><br><br>* No expectation for children to be able to record a number sentence/addition calculation. |

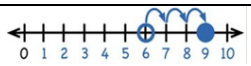
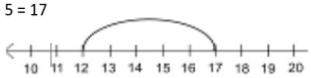
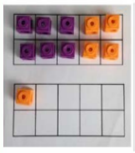
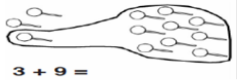
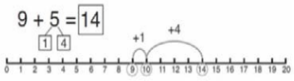
# Raglan Primary School
## Part of Mosaic Schools Learning Trust

Year 1

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Number bonds of 5, 6, 7, 8, 9 and 10 |     Use cubes to add two numbers together as a group or in a bar.  |   Use pictures to add two numbers together as a group or in a bar.   | 2 + 3 = 5<br>3 + 2 = 5<br>5 = 3 + 2<br>5 = 2 + 3   Use the part-part-whole diagram as shown above to move into the abstract. |
| Counting |  Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.   | Use a number line to count on in ones.   | 5 + 3 = 8 |

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Combining two parts to make a whole: part-whole model |  Use cubes to add two numbers together as a group or in a bar. (Some children may still need to use real objects)   Use part-part whole model |   The Bar Model will be continued from EYFS as a method to support problem solving involving addition, continuing with the concrete representations and moving onto using pictorial representations of objects. Some children will also move onto the abstract.   Pictorial (concrete) Abstract |   Use the part-part whole diagram as shown above to move into the abstract. 4 + 3 = 7 10= 6 + 4 |
| Represent and use number bonds and related subtraction facts within 20 |   (Some children may need to initially use real objects then move onto the representation, egg boxes may also be used to support this) |   |   Bar model and part-part whole to be used alongside abstract |

# Raglan Primary School
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| | | | |
|---|---|---|---|
| *Addition and subtraction of one-digit and two-digit numbers to 20 including 0.* |  | 6+3=9<br><br><br>Start at the larger number on the number line and count on in ones. | 5 + 12 = 17<br>17= 12 + 5 |
| Start at the bigger number and counting on | Start with the larger number on the bead string and then count of to the smaller number 1 by 1 to find the answer. | 12 + 5 = 17<br><br><br>Start at the larger number on the number line and count on in ones or in one jump to find the answer. | Place the larger number in your head and count on the smaller number to find your answer. |
| Regrouping to make 10 (The 'Make 10' strategy) | <br>6 + 5 = 11<br><br>Start with the bigger number and use the smaller number to make 10.<br>Use ten frames. | <br><br>Use pictures or a number line. Regroup or Partition the smaller number using the part part whole model to make 10.<br><br> | 7 + 4= 11<br>If I am at seven, how many more do I need to make 10. How many more do I add on now? |

# Raglan Primary School
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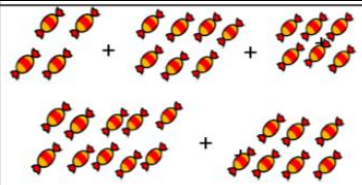
Year 2

### Adding 3 single digit numbers

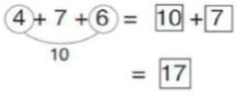
4 + 7 + 6= 17
Put 4 and 6 together to make 10. Add on 7.



Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.



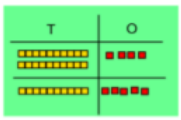
Add together three groups of objects. Draw a picture to recombine the groups to make 10.



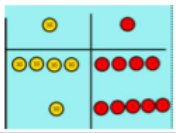

Combine the two numbers that make 10 and then add on the remainder.

### Column method without regrouping

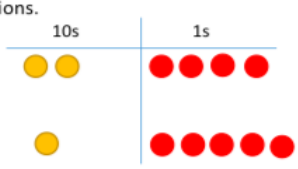
Add together the ones first, then add the tens. Use the Base 10 blocks first before moving onto place value counters.
24 + 15 =




44 + 15 =



After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.

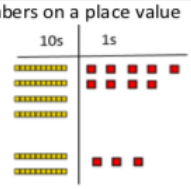



24 + 15 = 39

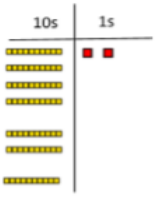
24
+ 15
39

### Column method with regrouping

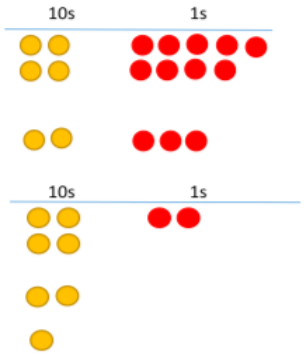
Make both numbers on a place value grid.




Add up the units and exchange 10 ones for 1 ten.

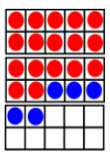



Using place value counters, children can draw the counters to help them to solve additions.




40 + 9
20 + 3
60 + 12 = 72

### Adding a 2-digit number and ones



17 + 5 = 22

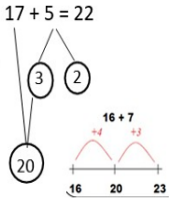
Use ten frame to make 'magic ten

Children explore the pattern.

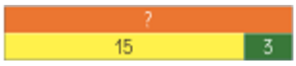
17 + 5 = 22

27 + 5 = 32

Use part part whole and number line to model.



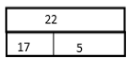

Bar Model




17 + 5 = 22

Explore related facts

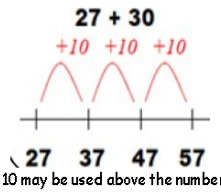
17 + 5 = 22
5 + 17 = 22
22 − 17 = 5
22 − 5 = 17




### Adding a 2-digit number and multiples of 10



25 + 10 = 35
Explore that the ones digit does not change

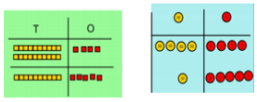
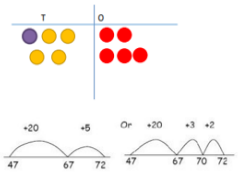
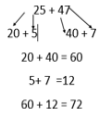



Base 10 may be used above the number line initially.
The calculation will be shown alongside the number line to see the connection

27 + 10 = 37

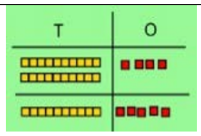
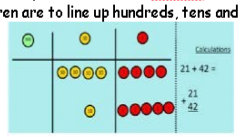
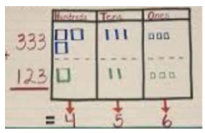
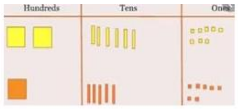
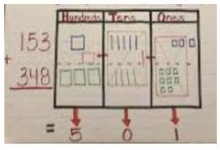
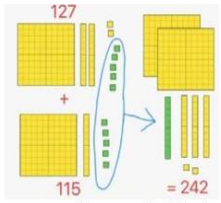
27 + 20 = 47

27 + □ = 57

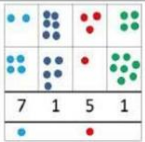
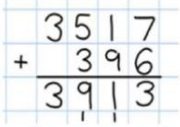
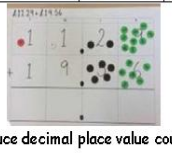
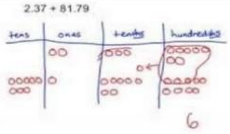
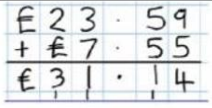
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|---|---|---|---|
| Adding two 2-digit numbers (No re-grouping) | **24 + 15=**<br>Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.<br><br>(Some children may not be ready for place value counters in Y2)<br>Numicon may also be used<br> | After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.<br><br>Use number line and bridge ten using part whole if necessary.<br>Base 10 may be used above the number line.<br><br>The calculation will be shown alongside the number line to see the connection<br><br>Model \| Calculation<br><br>The Bar Model (Singapore maths) will be used to support problem solving moving onto the generalisation that b+c=a. Children will focus on using the abstract representation with the pictorial to support where necessary. | Partitioning:<br><br>20 + 40 = 60<br>5+ 7 =12<br>60 + 12 = 72<br><br>*Recording addition in columns supports place value and prepares for formal written methods with larger numbers.*<br>Toward the end of the year, children move to more formal recording using partitioning method:<br>40 + 7<br>30 + 5<br>70 + 12 |

# Raglan Primary School
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## Year 3

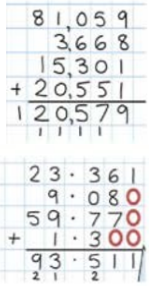
| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Add and subtract numbers with up to 3-digits, using formal written methods of columnar addition*<br><br>Column addition (no regrouping) | <br><br>Using manipulatives (dienes, numicon, counters), children are to line up hundreds, tens and ones.<br><br>Children should be secure with using PV counters before moving onto pictorial.<br><br>The calculation will be shown alongside the model used to see the connection<br><br>Model \| Calculation | <br>Children are to draw, in a PV frame, the manipulatives, that they are using.<br><br>Secure knowledge of representation with the PV columns.<br><br>The calculation will be shown alongside the model to see the connection<br><br>Model \| Calculation | 2 2 3<br>+ 1 1 4<br>3 3 7<br>Children to move onto recording more formally.<br>Some children may need to use the expanded method (see below). |
| Column addition (with regrouping) | <br> | <br><br>Children can draw a representation of the grid to further support their understanding, carrying the ten *underneath* the line. | 20 + 5<br>40 + 8<br>60 + 13 = 73<br><br>Children are to begin with the abstract: expanded form.<br>For those children, that are confident after AFL, the below method should be used. |
| | <br><br>Exchange ten ones for a ten. Model using Dienes, Numicon and place value counters. | | 536<br>+ 85<br>621<br>11 |

## Year 4

| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Using formal written methods of columnar addition where appropriate*<br><br>add numbers with up to 4 digits (with exchange) | Children continue to use dienes or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.<br><br>The calculation will be shown alongside the manipulative used to see the connection<br><br>Model \| Calculation | <br>Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding. | <br><br>Continue from previous work to carry hundreds as well as tens. |
| Add decimals with 2 decimal places, including money. | <br>Introduce decimal place value counters and model exchange for addition. | <br> | <br><br>As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here. |

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Year 5/6

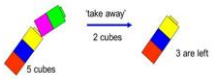
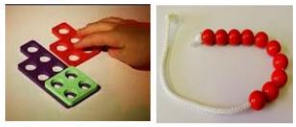
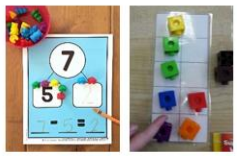
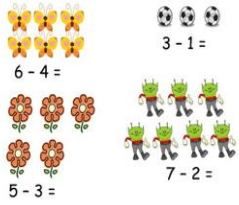
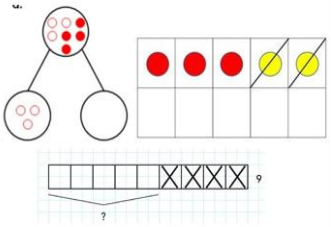
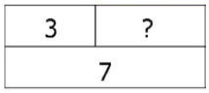
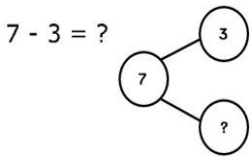
| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| add numbers with more than 4 digits. | See Year 4 | See Year 4 |  Children should have abstract supported by a pictorial or concrete if needed. |
| add several numbers of increasing complexity, including adding money, measure and decimals with different numbers of decimal points. | See Year 4 | See Year 4 |  Insert zeros for place holders. |

| | |
|---|---|
| Column method with regrouping | Consolidate understanding using numbers with more than 4 digits and extend by adding numbers with up to 3 decimal places. |

## Calculation Guidance- Subtraction

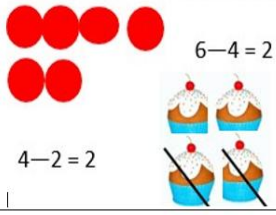
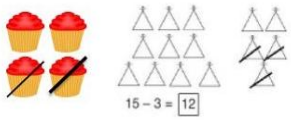
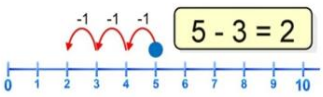
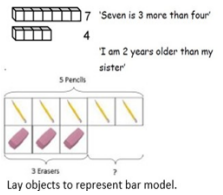
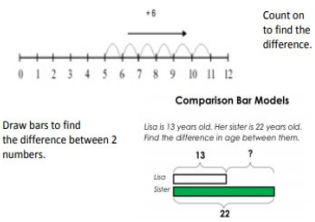
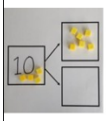
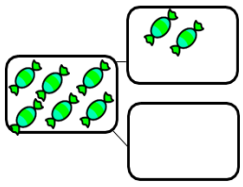
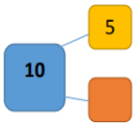
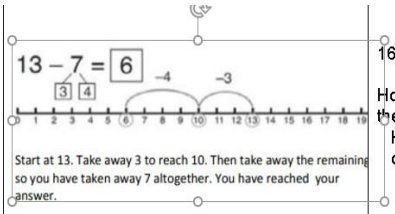
# Raglan Primary School
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EYFS

| Objectives | Concrete | Pictorial | Abstract |
|---|---|---|---|
| - Knows that a group of things change in quantity when something is taken away<br><br>- Find one less from a group of five objects, then ten objects.<br><br>- In practical activities and discussion, beginning to use the vocabulary involved in subtracting.<br><br>- Using quantities and objects, they subtract two single digit numbers and count back to find the answer. | <br>Use toys and general classroom resources for children to physically manipulate, group/regroup.<br><br><br>Use specific maths resources such as snap cubes, Numicon, bead strings etc.<br><br>Use visual supports such as ten frames, part part whole and subtraction mats, with the physical objects and resources that can be manipulated. | <br><br>A group of pictures for children to cross out or cover quantities to support subtraction.<br><br>Use visual supports such as ten frames, part part whole and bar model with pictures/icons. | A focus on symbols and numbers to form a calculation.<br><br>10 - 6 = 4<br><br><br>* No expectation for children to be able to record a number sentence/addition calculation. |

# Raglan Primary School
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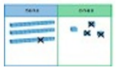
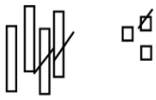
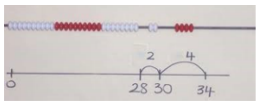
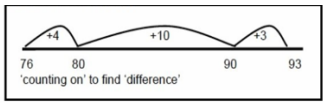
Year 1

| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Subtract one-digit and two-digit numbers to 20, including 0.*<br><br>Taking away ones | Use physical objects, counters, cubes etc to show how objects can be taken away.<br><br> | Cross out drawn objects to show what has been taken away.<br><br> | 7—4 = 3<br><br>16—9 = 7 |
| Counting back | Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.<br><br>13 – 4<br><br><br>Use counters and move them away from the group as you take ther away counting backwards as you go.<br> | <br><br>Count back on a number line or track<br>Start at the bigger number and count back the smaller number showing the jumps on the number line. | Put 13 in your head, count back 4. What number are you at? (Use your fingers to help you) |
| Find the difference | Compare objects and amounts<br><br><br>Lay objects to represent bar model. | <br> | Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister? |
| *Represent and use number bonds and related subtraction facts within 20*<br><br>Part-part whole model | <br><br>Link to addition. Use PPW model to model the inverse.<br><br>If 10 is the whole and 6 is one of the arts, what s the other part?<br><br>10—6 = 4 | <br>Use a pictorial representation of objects to show the part-part whole model | <br><br>Move to using numbers within the part whole model. |
| Make 10 | 14 – 9 =<br><br>Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9. | <br><br>Start at 13. Take away 3 to reach 10. Then take away the remaining so you have taken away 7 altogether. You have reached your answer. | 16 =<br><br>How many do we take off to reach the next 10?<br>How many do we have left to take off? |

| | | | |
|---|---|---|---|
| Taking away ones | Use physical objects, counters, cubes etc. to show how objects can be taken away.<br>4 – 2 = 2  | Cross out drawn objects to show what has been taken away.<br>4 – 2 = 2  | 4 – 2 = 2 |

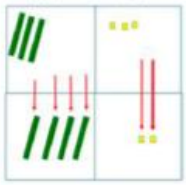
# Raglan Primary School
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Year 2

| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Subtract a two-digit number and ones, a two-digit number and tens, two two-digit numbers*<br><br>Partitioning to subtract without re-Grouping:<br>*'Friendly numbers'* | 34—13 = 21<br><br>Use Dienes to show how to partition the number when subtracting without regrouping.<br><br><br>The calculation will be shown alongside the manipulative used<br>Model \| Calculation | Children draw representations of Dienes and cross off.<br><br>43—21 = 22 | 43—21 = 22<br><br>*Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.*<br>Toward the end of the year, children move to more formal recording using partitioning method:<br>e.g. 43-21=22<br><br>40 and 3<br>-20 and 1<br>20 and 2 |
| Make ten strategy | <br>34—28<br>Use a bead bar or bead strings to model counting to next ten and the rest. | <br><br>'counting on' to find 'difference'<br>Use a number line to count on to next ten and then the rest. | 93—76 = 17 |

Column method without regrouping

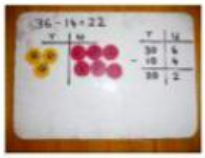
75 – 42 = 33

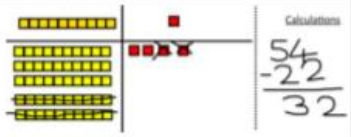


Use Base 10 to make the bigger number then take the smaller number away.

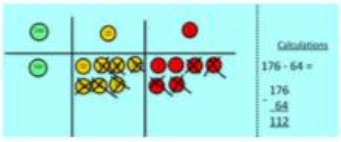
Show how you partition numbers to subtract.

Again make the larger number first.





Draw the Base 10 or place value counters alongside the written calculation to help to show working.



47 – 24 = 23

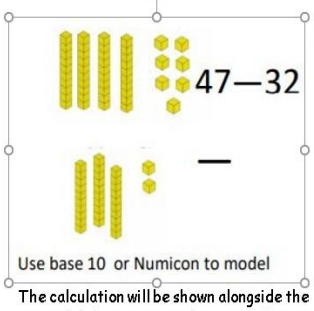
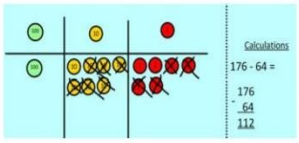
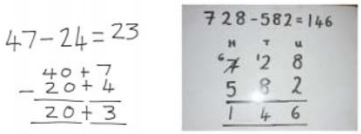
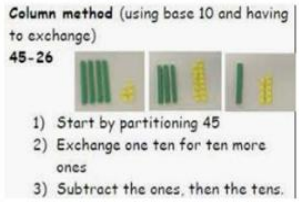
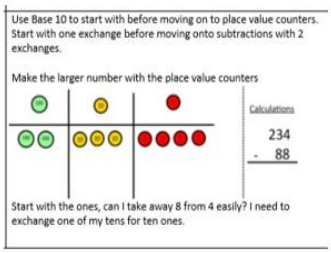
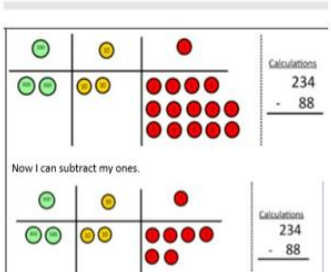
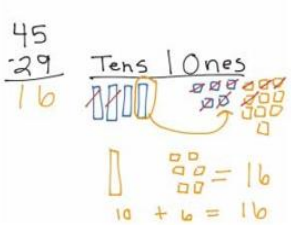
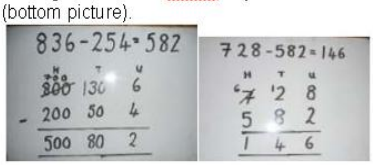
40 + 7
– 20 + 4
20 + 3

This will lead to a clear written column subtraction.

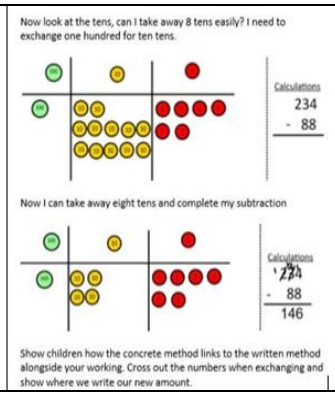


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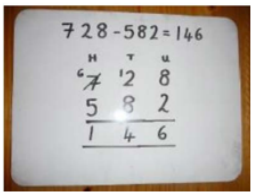
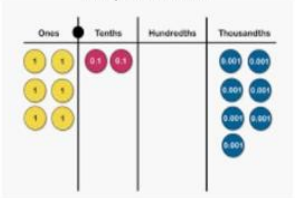
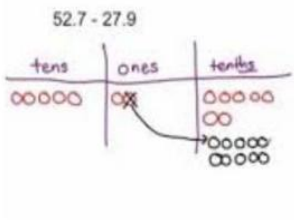
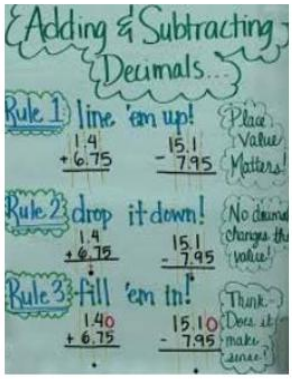
Year 3

| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| To subtract numbers with up to three-digits, using formal written methods of columnar subtraction<br><br>Column subtraction (without exchanging) | <br>The calculation will be shown alongside the model chosen to see the connection<br><br>Model \| Calculation | Children are to be secure with use of PV counters before moving onto abstract.<br><br> | Children should begin with the expanded form. Moving onto a more formal way as below.<br><br> |
| Column Subtraction (with exchanging) | Begin with base 10 or Numicon. Move to py counters, modelling the exchange of a ten into ten ones. Use the phrase 'take and make' for exchange.<br><br><br><br><br><br> | <br><br>When confident, children can find their own way to record the exchange/regrouping | Children should begin with the expanded form. Moving onto a more foraml way as below (bottom picture).<br><br> |

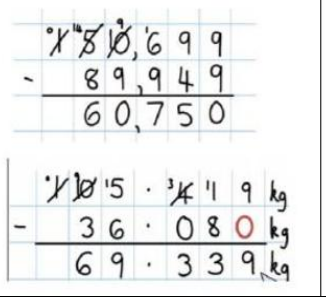
# Raglan Primary School
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## Year 4

| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Subtract numbers with up to 4 digits using the formal written methods appropriate of columnar subtraction where appropriate*<br><br>Year 4 subtraction with up to 4 digits. | Model process of exchange using Numicon, base ten and then move to PV counters.<br>Use the phrase 'take and make' for exchange- see Y3<br>The calculation will be shown alongside the model chosen to see the connection<br>**Model** \| **Calculation** | Children to draw pv counters and show their exchange—see Y3<br>The calculation will be shown alongside the model chosen to see the connection<br>**Model** \| **Calculation** | <br>This will lead to an understanding of subtracting any number including decimals. |
| Introduce decimal subtraction through context of money | Children to be encouraged to use counters to represent numbers and take counters away to subtract.<br> | <br>When confident, children can find their own way to record the exchange/regrouping |  |

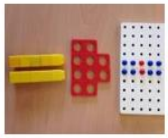
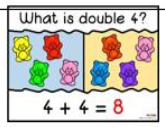
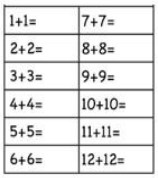
## Year 5/6

| Objective and Strategy | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Subtract with at least 4 digits, including money and measures.<br><br>Subtract with increasingly large and more complex numbers and decimal values (up to 3 decimal place). | See Year 4 | See Year 4 |  |

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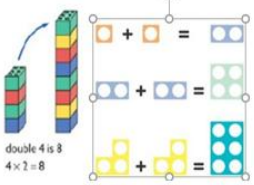
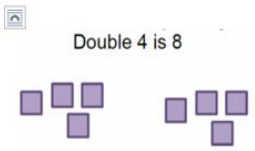
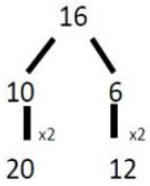
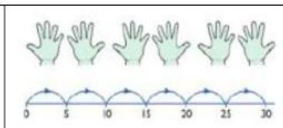
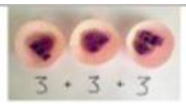
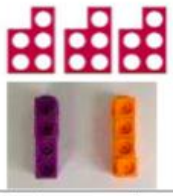
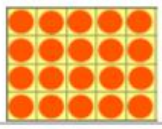
## Calculation Guidance- Multiplication

EYFS

| Objectives | Concrete | Pictorial | Abstract |
|---|---|---|---|
| - Solve problems including doubling |     Counting and other maths resources for children to make 2 equal groups.     Physical and real life examples that encourage children to see concept of doubling as adding two equal groups. |         Pictures and icons that encourage children to see concept of doubling as adding two equal groups. |   Addition calculations to model adding two equal groups. |

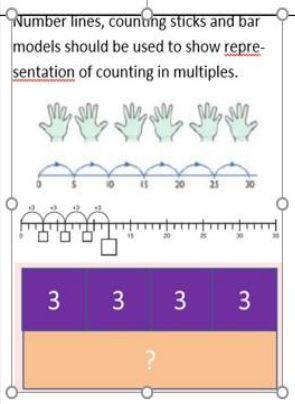
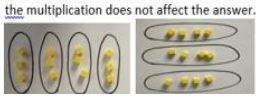
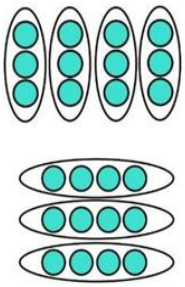
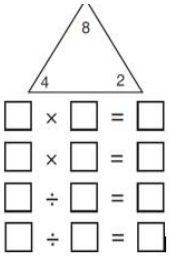
# Raglan Primary School
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Year 1

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Doubling | Use practical activities using manip-ultives including cubes and Numicon to demonstrate doubling<br> | Draw pictures to show how to double numbers<br> | Partition a number and then double each part before recombining it back together.<br> |
| Counting in multiples | <br>Count in multiples supported by concrete objects in equal groups. | <br>Use a number line or pictures to continue support in counting in multiples. | Count in multiples of a number aloud.<br>Write sequences with multiples of numbers.<br>**2, 4, 6, 8, 10**<br>**5, 10, 15, 20, 25, 30** |
| Repeated addition | <br><br>Use different objects to add equal groups. | There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?<br> | Write addition sentences to describe objects and pictures.<br><br>2 + 2 + 2 = 6 |
| Arrays- showing commutative multiplication | Create arrays using counters/cubes to show multiplication sentences.<br><br> | Draw arrays in different rotations to find **commutative** multiplication sentences.<br><br>2 × 4 = 8<br><br>4 × 2 = 8<br>Link arrays to area of rectangles.<br> | Use an array to write multiplication sentences and reinforce repeated addition.<br><br>5 + 5 + 5 = 15<br>3 + 3 + 3 + 3 + 3 = 15<br>5 x 3 = 15<br>3 x 5 = 15 |

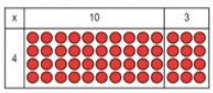
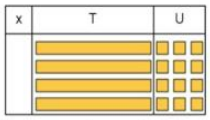
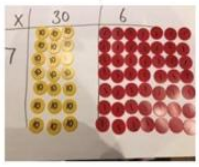
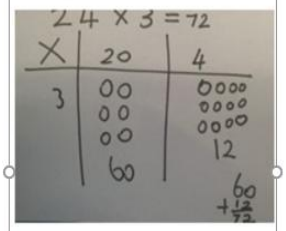
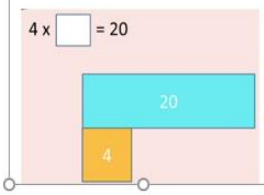
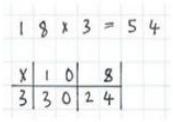
# Raglan Primary School
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Year 2

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition) | Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.<br><br>5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40<br><br> | Number lines, counting sticks and bar models should be used to show representation of counting in multiples.<br> | Count in multiples of a number aloud.<br><br>Write sequences with multiples of numbers.<br>0, 2, 4, 6, 8, 10<br>0, 3, 6, 9, 12, 15<br>0, 5, 10, 15, 20, 25 , 30<br><br>$4 \times 3 = \square$ |
| Multiplication is commutative | Create arrays using counters and cubes and Numicon.<br><br><br>Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.<br> | Use representations of arrays to show different calculations and explore commutativity.<br> | 12 = 3 × 4<br>12 = 4 × 3<br>Use an array to write multiplication sentences and reinforce repeated addition.<br><br>5 + 5 + 5 = 15<br>3 + 3 + 3 + 3 + 3 = 15<br>5 x 3 = 15<br>3 x 5 = 15 |
| Using the Inverse<br>*This should be taught alongside division, so pupils learn how they work alongside each other.* |  |  | 2 x 4 = 8<br>4 x 2 = 8<br>8 ÷ 2 = 4<br>8 ÷ 4 = 2<br>8 = 2 x 4<br>8 = 4 x 2<br>2 = 8 ÷ 4<br>4 = 8÷ 2<br>Show all 8 related fact family sentences. |

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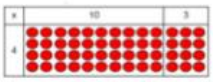
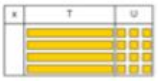
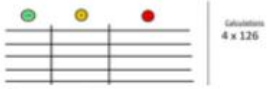
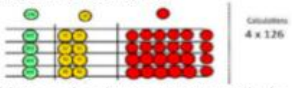
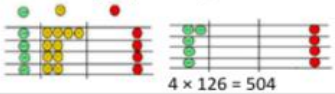
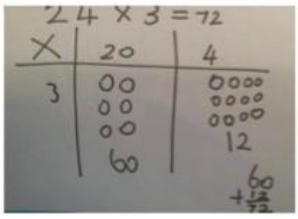
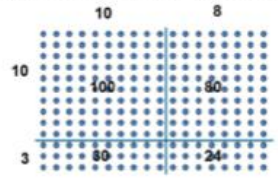
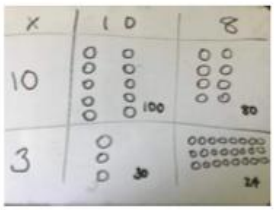
**Year 3**

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Multiplying two digit number by a one digit number*<br><br>Grid method progressing to the formal method.<br><br>Solving problems including missing number problems, integer scaling problems. | Show the link with arrays to first introduce the grid method.<br><br><br>Move on to using Base 10 to move towards a more compact method.<br><br><br>Move on to place value counters to show how we are finding groups of a number.<br><br><br>Add up each column, starting with the ones making any exchanges needed.<br><br>The calculation will be shown alongside the model chosen to see the connection<br><br>**Model** / **Calculation** | Children can represent their work with place value counters in a way that they understand.<br><br>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 below.<br><br><br>Bar model are used to explore missing numbers<br><br> | Start with multiplying by one digit numbers and showing the clear addition alongside the grid.<br><br>TO x O<br><br><br>Children to add up each column to find the answer. |

**Arrays/Dienes (base 10) continue to be used as a method to support multiplication**

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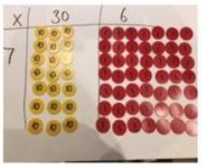
Year 3/4

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Grid method | Show the link with arrays to first introduce the grid method.<br><br>4 rows of 10<br>4 rows of 3<br>Move on to using Base 10 to move towards a more compact method.<br><br>4 rows of 13<br>Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.<br><br>Fill each row with 126.<br><br>Add up each column, starting with the ones making any exchanges needed.<br><br>4 × 126 = 504 | Children can represent the work they have done with place value counters in a way that they understand.<br><br>They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.<br><br> | Start with multiplying by one digit numbers and showing the clear addition alongside the grid.<br><br>\| × \| 30 \| 5 \|<br>\| --- \| --- \| --- \|<br>\| 7 \| 210 \| 35 \|<br><br>210 + 35 = 245<br><br>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.<br><br>\| \| 10 \| 8 \|<br>\| --- \| --- \| --- \|<br>\| 10 \| 100 \| 80 \|<br>\| 3 \| 30 \| 24 \|<br><br>\| X \| 1000 \| 300 \| 40 \| 2 \|<br>\| --- \| --- \| --- \| --- \| --- \|<br>\| 10 \| 10000 \| 3000 \| 400 \| 20 \|<br>\| 8 \| 8000 \| 2400 \| 320 \| 16 \| |
| Expanded method | Show the link with arrays to first introduce the expanded method.<br><br> | <br> | Start with long multiplication, reminding the children about lining up their numbers clearly in columns.<br><br>18<br>x 13<br>24 (3 x 8)<br>30 (3 x 10))<br>80 (10 x 8)<br>100 (10 x 10)<br>234 |

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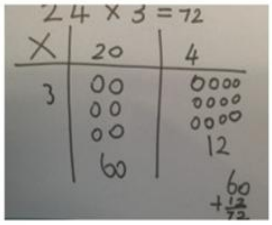
Year 4

*Multiply two-digit and three-digit numbers by a one-digit number using formal written layout*

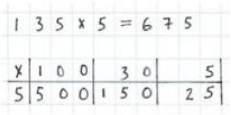



Children can represent their work with place value counters in a way that they understand.

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 below.

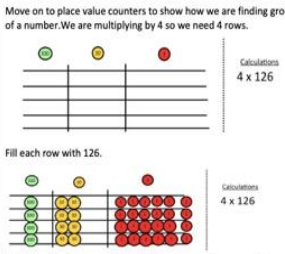



HTO x O

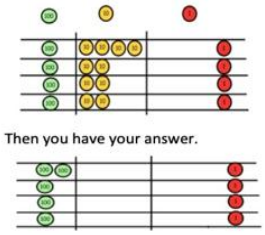



Children to add up each column to find the answer.

Grid method recap from year 3 for 2 digits x 1 digit

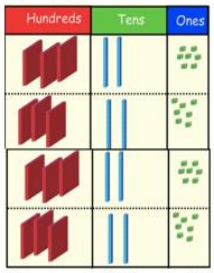



Multiplying numbers by 1 digit (year 4 expectation)




Column multiplication

Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642



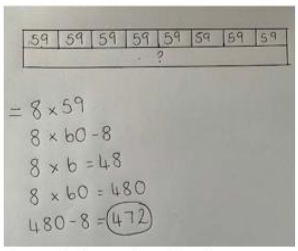

It is important at this stage that they always multiply the ones first.

The corresponding long multiplication is modelled alongside

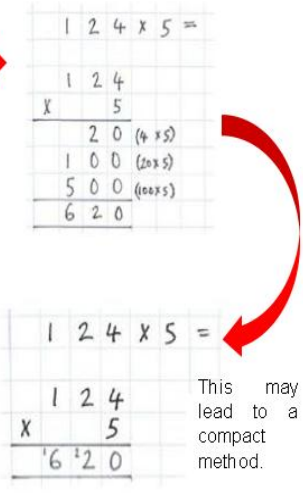
| Model | Calculation |
|---|---|
| | |

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

| x | 100 | 20 | 4 |
|---|---|---|---|
| 5 | 500 | 100 | 20 |



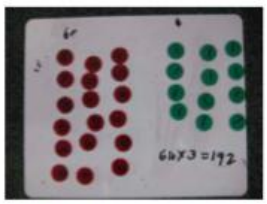
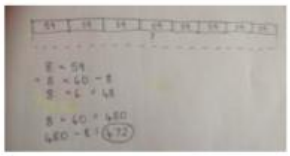
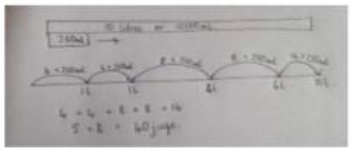
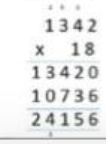

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.




This may lead to a compact method.

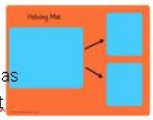
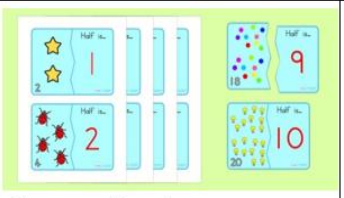
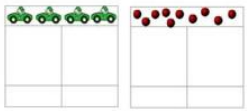
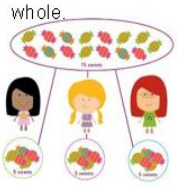
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Year 5/6

| | | | |
|---|---|---|---|
| Compact method | Children can continue to be supported by place value counters at the stage of multiplication.<br><br>It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below. | Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.<br><br> | Start with long multiplication, reminding the children about lining up their numbers clearly in columns.<br>If it helps, children can write out what they are solving next to their answer.<br><br>This moves to the more compact method.<br> |

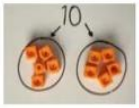
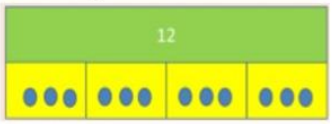
## Calculation Guidance- Division

EYFS

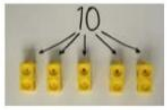
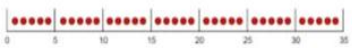
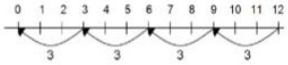
| Objectives | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Solve problems including halving and sharing.<br><br>Halving a whole, halving a quantity of objects.<br><br>Sharing a quantity of objects. | <br><br>Children have the opportunity to physically cut objects, food or shapes in half.<br><br> Counting and other maths resources for children to share into two equal groups.<br><br><br>Use visual supports such as halving mats and part part whole, with the physical objects and resources that can be manipulated.<br><br> Counting and other maths resources for children to explore sharing between 3 or more. | <br>Pictures and icons that encourage children to see concept of halving in relation to subitising, addition and subtraction knowledge. i.e. Knowing 4 is made of 2 groups of 2, so half of 4 is 2.<br><br><br>Bar model with pictures or icons to support understanding of finding 2 equal parts of a number, to further understand how two halves make a whole.<br><br> Pictures for children to create and visualise 3 or more equal groups. | |

# Raglan Primary School
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### Year 1

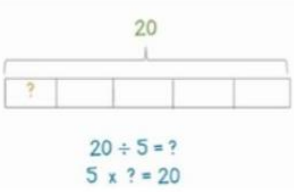
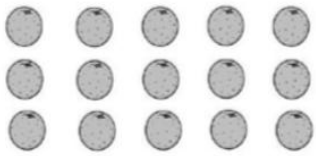
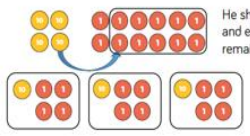
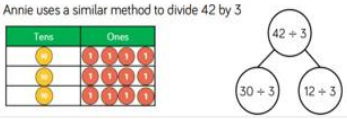
| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Division as sharing (sharing objects into groups) |     I have 10 cubes, can you share them equally in 2 groups? | Children use pictures or shapes to share quantities.  8 ÷ 2 = 4 Children use bar modelling to show and support understanding.   12 ÷ 4 = 3 | **Share 9 buns between three people.** **9 ÷ 3 = 3** |

### Year 2

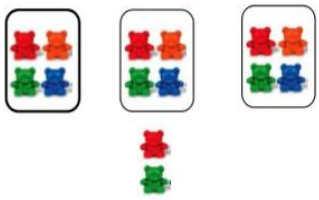
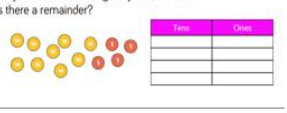
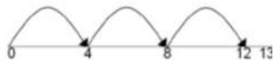
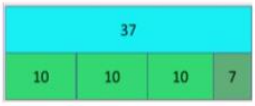
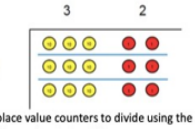
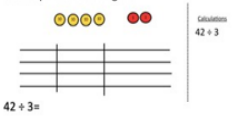
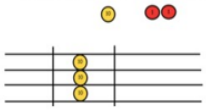
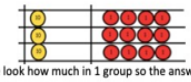
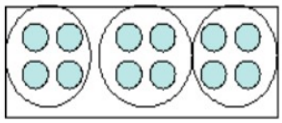
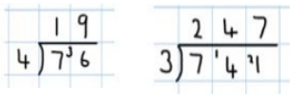
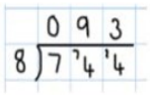
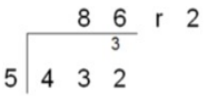
| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Division as grouping | Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.   96 ÷ 3 = 32    | Use a number line to show jumps in groups. The number of jumps equals the number of groups.   Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.   20 ÷ 5 = ? 5 x ? = 20 | **28 ÷ 7 = 4** **Divide 28 into 7 groups. How many are in each group?** |

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Year 3

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Division as grouping | Use cubes, counters, objects or place value counters to aid understanding.<br><br>24 divided into groups of 6 = 4<br>96 ÷ 3 = 32<br> | Continue to use bar modelling to aid solving division problems.<br> | How many groups of 6 in 24?<br>24 ÷ 6 = 4 |
| Division with arrays | <br>Link division to multiplication by creating an array and thinking about the number sentences that can be created.<br>Eg 15 ÷ 3 = 5 5 x 3 = 15<br>15 ÷ 5 = 3 3 x 5 = 15 | Draw an array and use lines to split the array into groups to make multiplication and division sentences<br> | Find the inverse of multiplication and division sentences by creating eight linking number sentences.<br>7 x 4 = 28<br>4 x 7 = 28<br>28 ÷ 7 = 4<br>28 ÷ 4 = 7<br>28 = 7 x 4<br>28 = 4 x 7<br>4 = 28 ÷ 7<br>7 = 28 ÷ 4 |
| Divide 2-digit numbers by a 1-digit number by partitioning into tens and ones using a py grid | Eva uses a place value grid and part-whole model to solve 66÷ 3<br> | See part- whole model | |
| Divide numbers that involve exchanging between the tens and ones. The answers do not have remainders. | Ron uses place value counters to divide 42 into three equal groups<br><br>He shares the tens first and exchanges the remaining ten for ones.<br>Then he shares the ones.<br>42 ÷ 3 = 14 | Annie uses a similar method to divide 42 by 3<br><br>Children may use pictorial representation for the py counters, alongside the part-whole model<br>Children use their times-tables to partition the number into multiples of the divisor. | 96 ÷ 8<br>96 ÷ 4<br>96 ÷ 3<br>96 ÷ 6<br>Compare the statements using <, > or =<br>48 ÷ 4 ◯ 36 ÷ 3<br>52 ÷ 4 ◯ 42 ÷ 3<br>60 ÷ 3 ◯ 60 ÷ 4 |

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| | | | | |
|---|---|---|---|---|
| | Division with a remainder | **14 ÷ 3 =**<br>Divide objects between groups and see how much is left over<br><br>Moving on to:<br>Use place value counters to work out 94 ÷ 4<br>Did you need to exchange any tens for ones?<br>Is there a remainder?<br><br>29 | Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.<br><br>Draw dots and group them to divide an amount and clearly show a remainder.<br><br>Use bar models to show division with remainders.<br><br>37<br>10 10 10 7 | Complete written divisions and show the remainder using r.<br><br>29 ÷ 8 = 3 REMAINDER 5<br>dividend divisor quotient remainder |
| Year 4 | **Objective** | **Concrete** | **Pictorial** | **Abstract** |
| | Divide up to 3 digit numbers by 1 digit.<br><br>Short Division | 96 ÷ 3<br>Tens Units<br>3 2<br>3<br><br>Use place value counters to divide using the bus stop method alongside<br><br>42 ÷ 3=<br>Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.<br><br>We exchange this ten for ten ones and then share the ones equally among the groups.<br><br>We look how much in 1 group so the answer is 14. | Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.<br><br>Encourage them to move towards counting in multiples to divide more efficiently. | Begin with divisions that divide equally with no remainder<br><br>Children should be aware that a 0 is used to keep place value, if the number is not divisible.<br><br>Move onto divisions with a remainder.<br><br>8 6 r 2<br>3<br>5 4 3 2 |

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## Year 5

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| *Divide at least 4 digit numbers by 1 digit. Interpret remainders appropriately for the context*<br><br>Short Division | 96 ÷ 3<br>Tens Units<br>3 2<br>3<br>Use place value counters to divide using the bus stop method alongside<br>42 ÷ 3=<br>Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.<br>We exchange this ten for ten ones and then share the ones equally among the groups.<br>We look how much in 1 group so the answer is 14. | Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.<br>Encourage them to move towards counting in multiples to divide more efficiently. | 0 6 6 3 r 5<br>8)5 5 3 5 0 2 9<br>Finally move into decimal places to divide the total accurately.<br>1 4 . 6<br>16 21<br>3 5 5 1 1 . 0 |

## Year 5/6 - Additional Information

| Objective | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Division with remainders | 14 ÷ 3 =<br>Divide objects between groups and see how much is left over | Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.<br>0 4 8 12 13<br>Draw dots and group them to divide an amount and clearly show a remainder. | Complete written divisions and show the remainder using r.<br>29 ÷ 8 = 3 REMAINDER 5<br>dividend divisor quotient remainder |
| Short division with remainders | 364 ÷ 3 =<br>1 2 1 rem 1<br>3 \| 3 6 4 | | Move onto divisions with a remainder. Once children understand remainders, begin to express as a fraction or decimal according to the context.<br>8 6 r 2<br>3<br>5 4 3 2<br>1 8 6 1/5<br>5 9 3 1<br>1 4 . 6<br>16 21<br>3 5 5 1 1 . 0 |

Year 6- Long Division

Step 1 – a remainder in the ones

```
   h t o
   0 4 1 R1
4 ) 1 6 5
```

4 does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160).

4 goes into 16 four times.

4 goes into 5 once, leaving a remainder of 1.

```
    th h t o
    0 4 0 0 R7
8 ) 3 2 0 7
```

8 does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200).

8 goes into 32 four times (3,200 ÷ 8 = 400)
8 goes into 0 zero times (tens).
8 goes into 7 zero times, and leaves a remainder of 7.

```
    h t o
    0 6 1
4 ) 2 4 7
    - 4
      3
```

When dividing the ones, 4 goes into 7 one time. Multiply 1 × 4 = 4, write that four under the 7, and subract. This finds us the remainder of 3.

Check: 4 × 61 + 3 = 247

```
    th h t o
    0 4 0 2
4 ) 1 6 0 9
    - 8
      1
```

When dividing the ones, 4 goes into 9 two times. Multiply 2 × 4 = 8, write that eight under the 9, and subract. This finds us the remainder of 1.

Check: 4 × 402 + 1 = 1,609

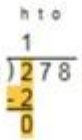
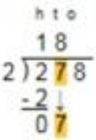
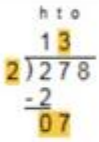
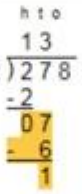
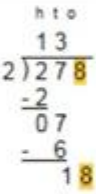
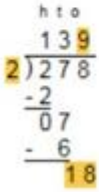
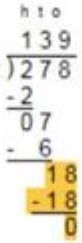
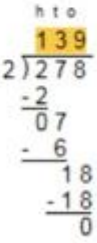
Step 2 – a remainder in the tens

| 1. Divide. | 2. Multiply & subtract. | 3. Drop down the next digit. |
|---|---|---|
| t o<br>2<br>2 ) 5 8 | t o<br>2<br>2 ) 5 8<br>- 4<br>1 | t o<br>2 9<br>2 ) 5 8<br>- 4 ↓<br>1 8 |
| Two goes into 5 two times, or 5 tens ÷ 2 = 2 whole tens -- but there is a remainder! | To find it, multiply 2 × 2 = 4, write that 4 under the five, and subtract to find the remainder of 1 ten. | 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. |

| 1. Divide. | 2. Multiply & subtract. | 3. Drop down the next digit. |
|---|---|---|
| t o<br>2 9<br>2 ) 5 8<br>- 4<br>1 8 | t o<br>2 9<br>2 ) 5 8<br>- 4<br>1 8<br>- 1 8<br>0 | t o<br>2 9<br>2 ) 5 8<br>- 4<br>1 8<br>- 1 8<br>0 |
| Divide 2 into 18. Place 9 into the quotient. | Multiply 9 × 2 = 18, write that 18 under the 18, and subtract. | The division is over since there are no more digits in the dividend. The quotient is 29. |

Step 3 – a remainder in any of the place values

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| 1. Divide. | 2. Multiply & subtract. | 3. Drop down the next digit. |
|---|---|---|
|  |  |  |
| Two goes into 2 one time, or 2 hundreds ÷ 2 = 1 hundred. | Multiply 1 × 2 = 2, write that 2 under the two, and subtract to find the remainder of zero. | Next, drop down the 7 of the tens next to the zero. |
| **Divide.** | **Multiply & subtract.** | **Drop down the next digit.** |
|  |  |  |
| Divide 2 into 7. Place 3 into the quotient. | Multiply 3 × 2 = 6, write that 6 under the 7, and subtract to find the remainder of 1 ten. | Next, drop down the 8 of the ones next to the 1 leftover ten. |
| **1. Divide.** | **2. Multiply & subtract.** | **3. Drop down the next digit.** |
|  |  |  |
| Divide 2 into 18. Place 9 into the quotient. | Multiply 9 × 2 = 18, write that 18 under the 18, and subtract to find the remainder of zero. | There are no more digits to drop down. The quotient is 139. |

**White Rose- Long Division (Support)**

Video 1: Aut6.5.5 - Long division (1) on Vimeo
Video 2: Aut6.6.1 - Long division (2) on Vimeo
Video 3: Aut6.6.2 - Long division (3) on Vimeo
Video 4: Aut6.6.3 - Long division (4) on Vimeo