REIGATE ST MARY'S
PREPARATORY AND CHOIR SCHOOL

Calculation Guidance

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Next Review Date: 16 September 2025

Rationale

At St Mary's, we believe a clear progression in calculation will support the learning and teaching of maths throughout the school, allow clarity and provide a secure foundation upon which to build and develop mathematical skills. The aim is to have a steady progression of understanding in maths as your child moves through school. Different methods are taught that will build on one another, according to the level your child is working at.

This guidance contains the key calculation methods and procedures that will be taught within St Mary's and should be read alongside the Maths Policy. Although the focus of the guidance is building towards formal written methods, it is important to recognise that the ability to calculate mentally lies at the heart of the maths framework. In every written method there is an element of mental processing. Sharing written methods with the teacher encourages children to think about the mental strategies that underpin them and develop innovative ideas. Therefore, written recording both helps children to extend and clarify their thinking. Children should be encouraged to see mathematics as both a written and a spoken language.

Teachers should support and guide children through the following stages:

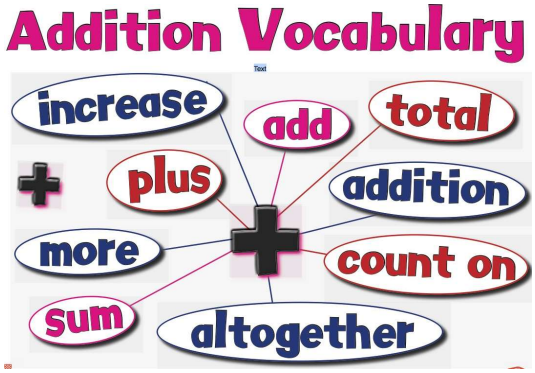
1) Handle objects and develop ways of recording calculations using pictures.
2) Develop the use of pictures, words and symbols to represent numerical activities.
3) Use standard symbols and conventions.
4) Use of jottings to aid a mental strategy.
5) Use of formal procedures to create efficient written methods.
6) It is important that children do not abandon jottings and mental methods once other written procedures are introduced. Children will always be encouraged to look at a calculation/problem and then decide on the best method.

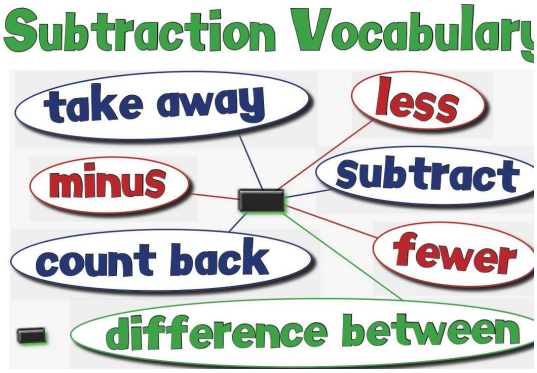
Progression in calculation should include these skills:

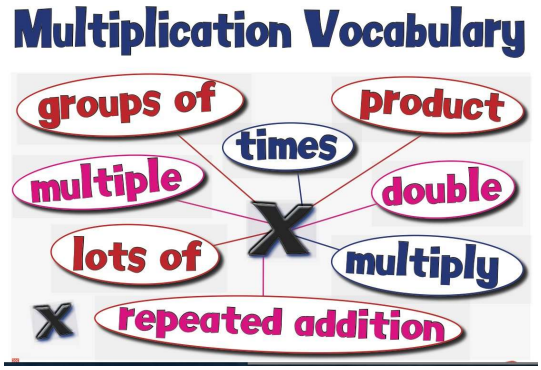
1) An ability to understand and use the relationships between the four operations of number.
2) An ability to explain, describe and record their methods.
3) An ability to estimate and check whether the answer is correct.
4) An ability to solve a wide range of problems involving calculation in a wide variety of contexts.
5) An ability to choose and use the most appropriate method of calculation; mental, jottings, written or using a calculator.
6) An ability to take the initiative to return to an earlier method that children are more confident with.

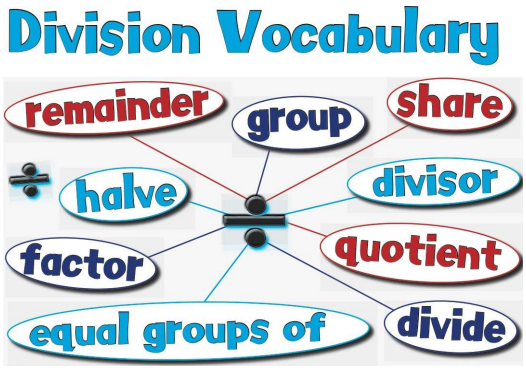
This guidance shows the progression in each operation (addition, subtraction, multiplication, and division). All methods should be taught with understanding rather than by rote and put into real life contexts. Concrete (physical objects), pictorial (diagrams and pictures) and abstract (numerals and symbols) methods will be used alongside each other to enable children to deepen their understanding and develop a mental picture of the number system in their head.

Vocabulary


Addition Vocabulary
increase
add
total
plus
addition
more
count on
sum
altogether


Subtraction Vocabulary
take away
less
minus
subtract
count back
fewer
difference between

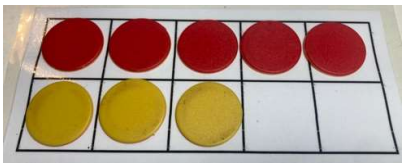

Multiplication Vocabulary
groups of
product
times
multiple
double
lots of
multiply
repeated addition

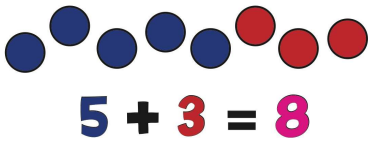

Division Vocabulary
remainder
group
share
halve
divisor
factor
quotient
equal groups of
divide

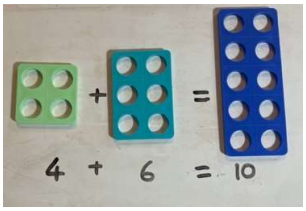
Addition

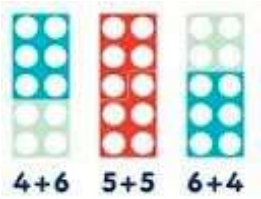
Combining 2 numbers

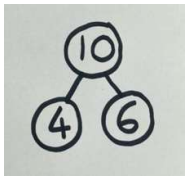
First, children handle objects to add two numbers and develop ways of recording calculations using pictures and simple equations. Children begin to learn number bonds to 10 and know that addition can be done in any order. They can show number bonds in a part-part whole model.

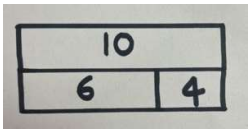






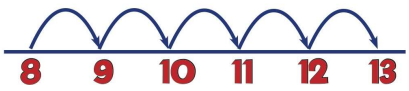


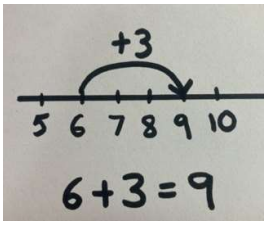




Counting on

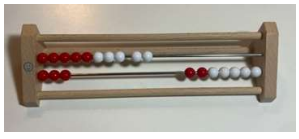
Children need to count on from any number, combining two groups. Children use number lines to support their own calculations, first by using a numbered line, then a marked unlabelled line, then by drawing their own number lines.

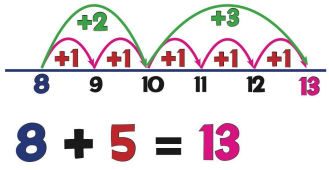


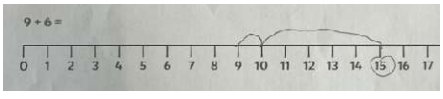


Bridging 10

Children use number bond knowledge to help them 'bridge' to the next 10 to become more efficient in adding. Bead strings, rekenreks and number lines can be used to illustrate bridging through ten. This skill can be extended to bridging to the next 100, or next hour.

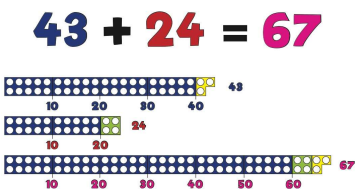


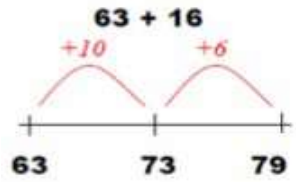


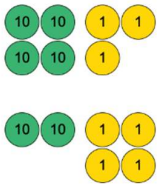


Partitioning for addition

Children will use partitioning to see how numbers are broken down into their different values.

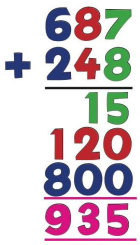






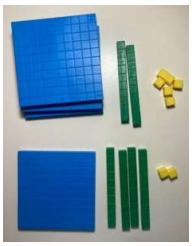
Expanded addition

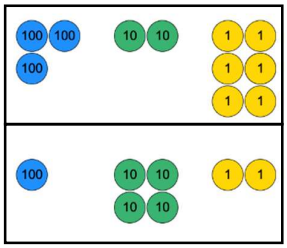
Children will first be introduced to the expanded column method before moving onto the formal column method. They will add the least significant digits first, in preparation for the column method.

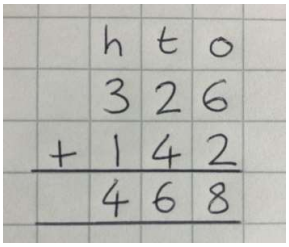


Simple Column addition

Children will use base 10 blocks and place value counters to understand how adding ones, then tens then hundreds can be recorded using the column addition method.

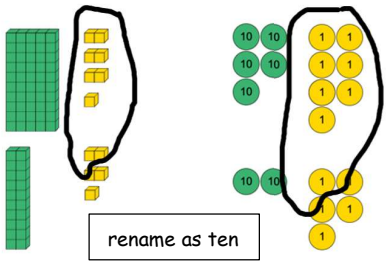


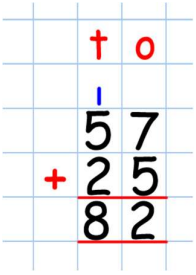


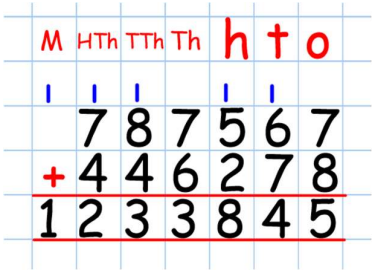


Column addition with renaming (exchanging)

Children will use base 10 blocks and place value counters to understand the concept of renaming/ exchanging for example 10 ones as 1 ten and 10 tens as 1 hundred, and how this renaming can be recorded in the column addition method.



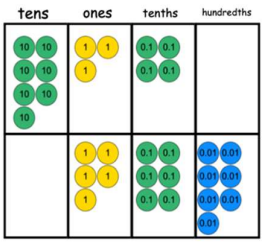


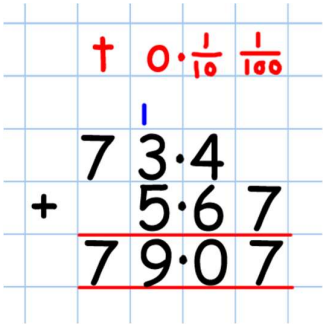


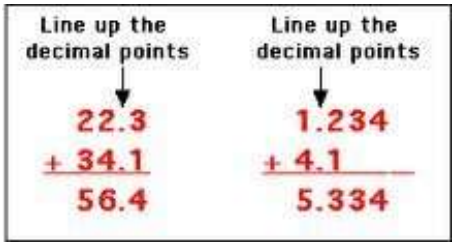
Although different conventions can be used, at RSM we teach the children to notate the renaming/exchanging above the column method as shown in the images above.

Column addition with decimals

Children add numbers with more than 4 digits including money, measures and decimals with different numbers of decimal places. The decimal point should be aligned in the same way as the other place value columns and must be in the same column in the answer.



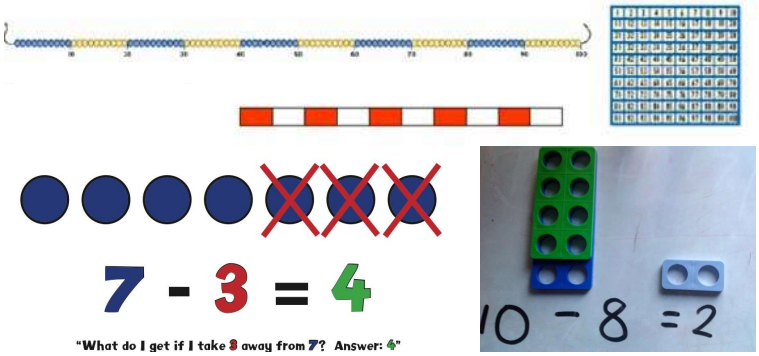




Subtraction

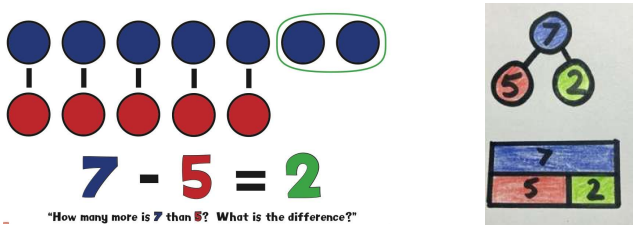
Counting up and counting back

Before children can move onto the methods for subtraction, they need to be able to count up or back from any number. Children will understand subtraction as taking away and will use objects and Numicon tiles to subtract numbers.



Finding the difference

Finding the difference is a useful strategy when subtracting two numbers that are close together. By finding the difference between two numbers, children will begin to know the inverse relationship of number bonds to 20.

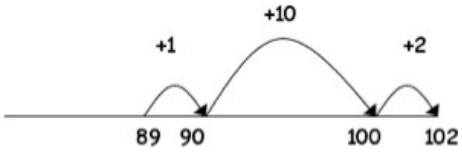


Number lines and bridging 10

Numberlines are often used to subtract by counting on to see how many jumps they are apart (finding the difference) or, when a small number is being subtracted, by counting back. Children bridge through ten by counting on or back to the nearest multiple of 10 first. Children use their knowledge of number patterns to count back in different sized jumps and near multiples of 10, 100 etc.

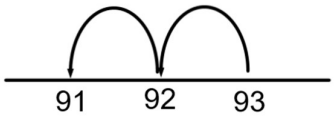
Counting on to find the difference

102 - 89



Counting back to take away

93-2



Although different conventions can be used, at RSM we teach the children to write the numbers underneath the line, and draw the arrows above the line.

Expanded subtraction

Children will use partitioning to see how numbers are broken down into their different values. Children will be introduced to expanded subtraction. They will use the expanded column method (sometimes known as decomposition) to partition the number and subtract each place value separately always starting with the least significant digits (e.g. the units). First they will work with numbers that have no exchanging, then they will learn how to exchange from the tens to the units.

87 - 23 = 64

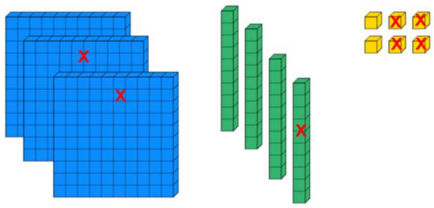
80	7
20	3
60	4

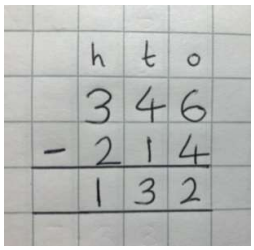
75 - 37 = 38

60	70	15
	30	7
	30	8

Simple Column subtraction

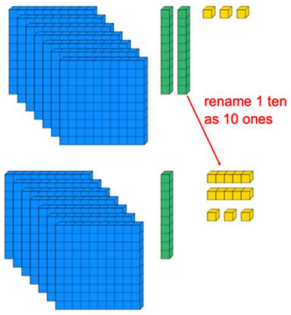
When learning the written column subtraction method, first the children will work with numbers that have no exchanging (e.g. the units or tens of the number being subtracted is smaller than the starting number). It is very important they understand the importance of keeping the digits lined up.



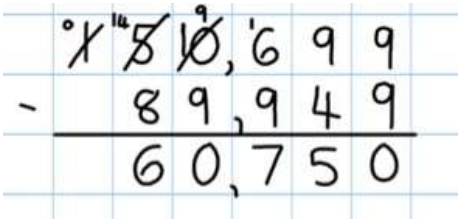


Column subtraction with renaming (exchanging)

Next they will learn how to exchange from the tens to the ones. They need to recognise when the starting digits are less than the digits being subtracted. When this is the case, they need to rename 1 ten as 10 ones, or 1 hundred as 10 tens, in order to be able to subtract the digits. The base 10 blocks or place value counters help the children to visualise what happens and how the exchange takes place.

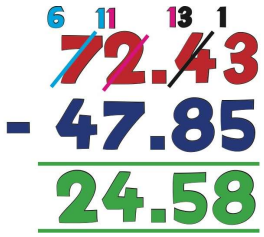


6 11 1
7 2 3
- 3 5 6
3 6 7



Decimal subtractions

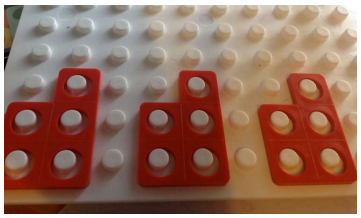
Children will subtract numbers with more than 4 digits including money, measures and decimals with different numbers of decimal places. The decimal point should be aligned in the same way as the other place value columns and must be in the same column in the answer.

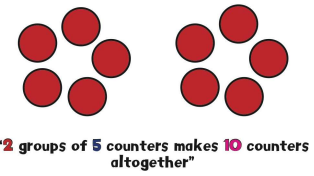


Multiplication

Counting equal sets or groups

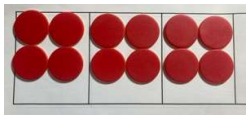
Children will experience equal groups of objects and work on solving practical problems involving equal sets or groups. Objects, Numicon tiles and counters will help the children to visualise the grouping of numbers and to support the concept of repeated addition. They will count in 2s and 10s and begin to count in 5s.

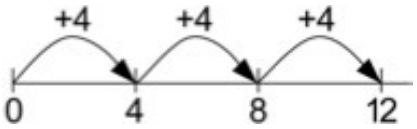


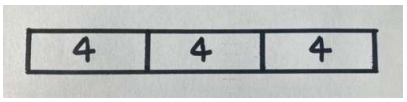


Repeated addition

The children will be able to represent jumps on a number line and relate it to the concept of repeated addition. Images and counters will help the children to visualise the grouping and repeated addition concept. They will see the relationship between addition and multiplication: 4+4+4=12 being the same as 4 x 3= 12.

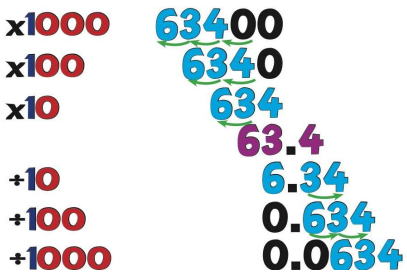




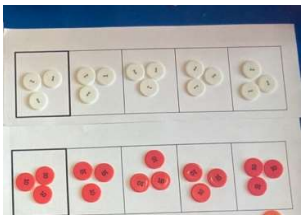


Multiplying multiples of 10

Children will be comfortable with the concept of multiplying and dividing by powers of ten. They will then extend this skill to multiplying with multiples of ten.

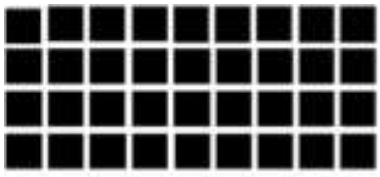


5 x 30 = 15 tens = 150



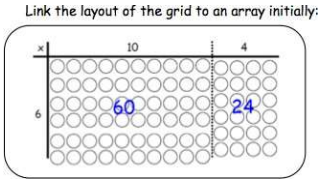
Arrays and Grid Method

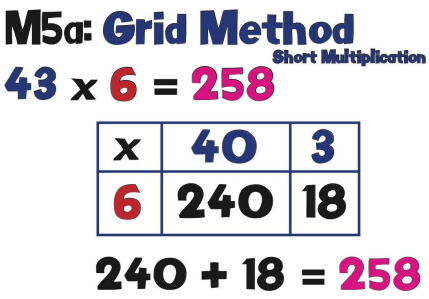
Children should be able to model a multiplication calculation using an array which will help them understand that 9 x 4 = 4 x 9 and how multiplication relates to division.



9 x 4 = 36

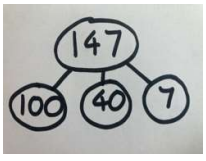
They can then use arrays to help visualise multiplying larger numbers by partitioning. Understanding of arrays then supports children learning the grid and column methods of multiplication.

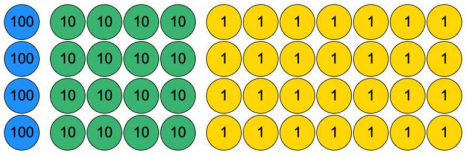


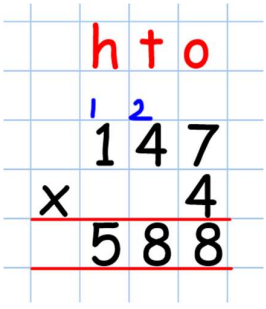


Short multiplication column method

Column multiplication is introduced, first without renaming and then with renaming. Column multiplication is linked to arrays of place value counters or base 10 blocks. Children start by multiplying the ones, then the tens, then the hundreds.



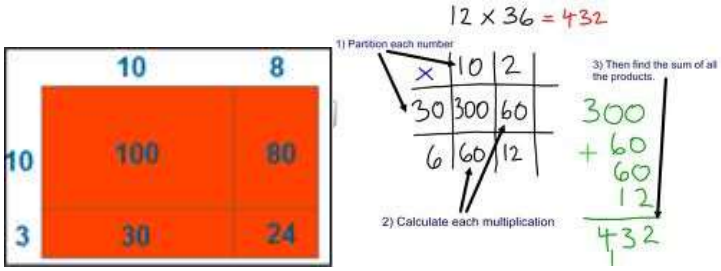


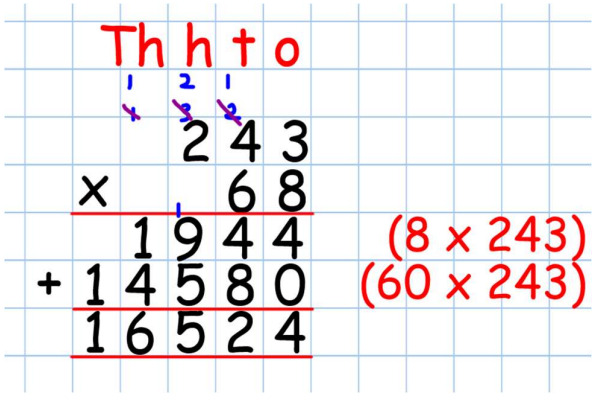


Although different conventions can be used, at RSM we teach the children to notate the renaming above the column method as shown in the image above.

Long multiplication

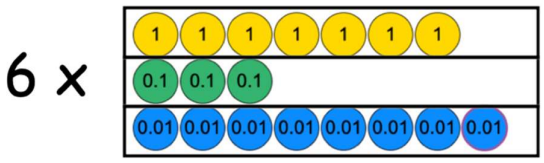
Long multiplication is introduced to multiply by 2-digit numbers. Area models and the grid methods can help understanding of the long multiplication written method.

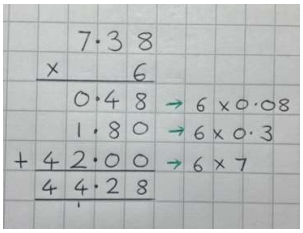




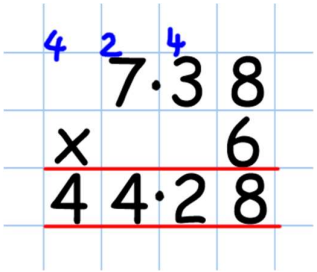
Multiplying decimals

Children will apply their understanding to multiplying decimal numbers by whole numbers, first by using the grid or expanded method, and then the compact column method.





Compact column method



Division

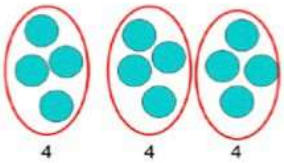
Grouping and Sharing

Children will understand division through creating equal groups and sharing items out in play and problem solving. They will make groups of 2s and 10s and later in 5s. They will draw pictures in groups or sets. 6 sweets shared between 2 people, how many do they each get?

Grouping:

If I put 12 stars into groups of 4, I can make 3 groups

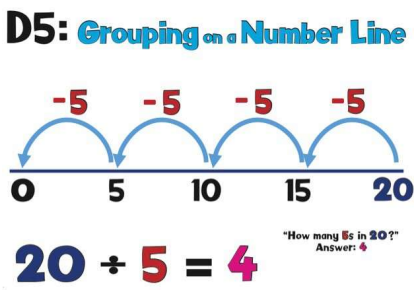
Sharing:



If I share 12 counters between 3 people, we get 4 counters each

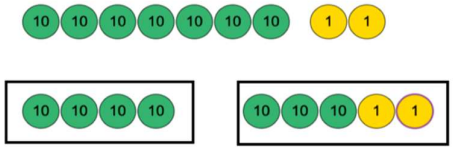
Repeated subtraction

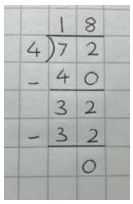
Children will show groupings on a number line using repeated subtraction e.g. 20 take away 5, take away 5 more, take away 5 more and take away 5. They will begin to recognise how multiplication facts can help them the inverse relationship between division and multiplication.

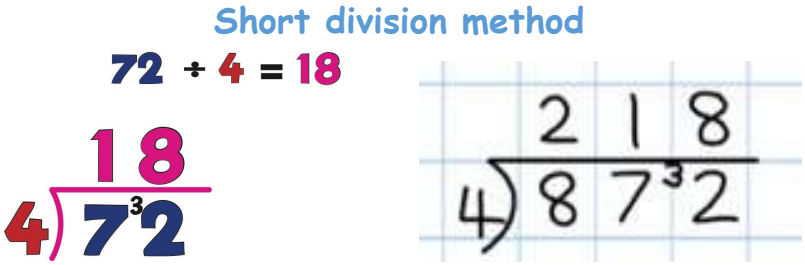


Short division

This method relies heavily on times tables knowledge. In contrast to the column methods, start by looking at the most significant number and work out how many times it can go into the number. Carry over the remainders. First, children use base 10 blocks, place value counters and an expanded method to gain understanding of the method, before moving onto the more compact, short division method.

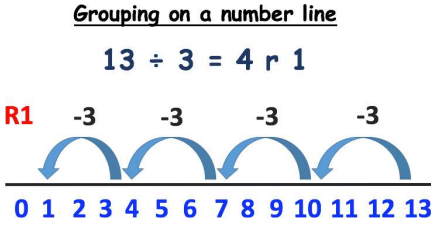


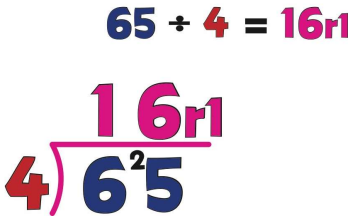




Remainders

Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real-life problem-solving context. The pupils consider the meaning of the remainder depending upon the context of the word problem.

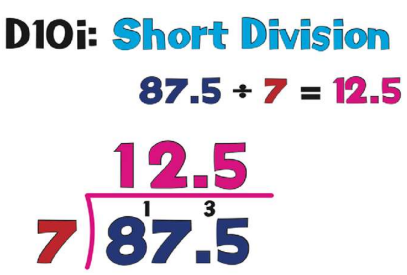




Division with decimals

Children will apply their understanding of short division and place value to divide decimal numbers. Short division can also be used to convert fractions to decimals e.g. 3/8 = 3 divided by 8.

Children will also learn how to give remainders as decimals or fractions and must consider the meaning of the remainder and choose how to express it i.e. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the word problem.



Dividing by 2-digit numbers

To divide by 2-digit numbers, children return to the expanded method of division (long division). It is useful for children to write out the multiples of the 2-digit number before they begin. Once secure in the method, children can choose between short and long division methods to divide by 2-digit numbers.