Sheddingdean Primary

Calculation Policy

Helping your Children with Maths

Dear Parents & Carers,

This booklet is designed to aid your understanding of the way your child will be taught to calculate, in order to help you support your child more effectively with calculations and at home.

This policy gives an outline of the methods your child will be learning to add, subtract, multiply and divide with.

We welcome and encourage you to drop in and ask your child's class teacher if any questions arise about this, or there are any methods you are unsure about, so that we can work together to help your child succeed.

When faced with a calculation problem, encourage your child to ask…

- Can I do this in my head?
- Could I do this in my head using drawings or jottings to help me?
- Do I need to use a written method?

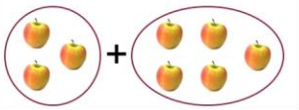
Also help your child to estimate and then check the answer. Encourage them to ask…

- Is the answer sensible?

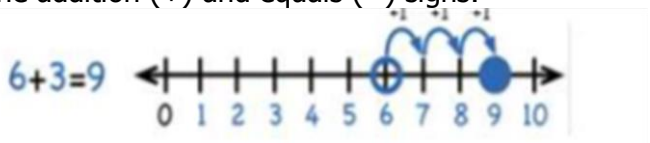
Addition

Year 1 – Add with numbers up to 20.

Build on from prior learning of adding by combining two sets of objects into one



Use number tracks, practical methods and numbered number lines to add by counting on in ones, and using the addition (+) and equals (=) signs.



Key Skills needed in year 1

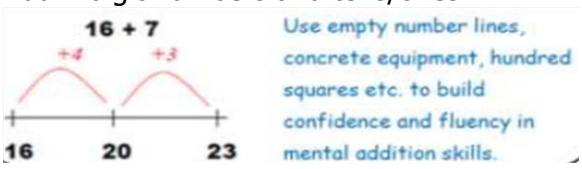
- Read and write numbers to 100 in numerals, including 1—20 in words
- Count to and across 100
- Count in multiples of 1, 2, 5 and 10
- Recall bonds to 10 and 20, and addition facts within 20
- Add and subtract one-digit and two-digit numbers to 20, including zero
- Solve one-step problems that involve addition e.g. 3 + ☐ = 8

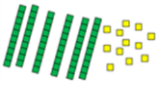
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals

Year 2 – Add with 2-digit numbers.

Number lines should continue to be an important image to support mathematical thinking.

Add 2-digit numbers and tens/ones



47 +25 60+12=72 

Partitioning in different ways and recombine

-Model using apparatus such as Dienes and Numicon.

Key Skills needed in year 2

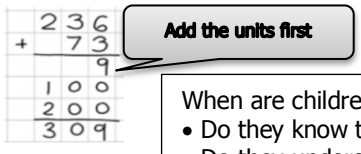
- Add a 2-digit number and ones (e.g. 27+6)
- Add a 2-digit number and tens (e.g. 23+40)
- Add pairs of 2-digit numbers (e.g. 35+47)
- Add three 1-digit numbers (e.g. 5 + 9 + 7)
- Recall bonds to 20 and bonds of tens to 10
- Understand the place value of 2-digit numbers (tens and ones)
- Compare numbers to 100 using < > and =.
- Read and write numbers to at least 100 in numerals and words.

Key vocabulary: As before, & sum, tens, ones, partition, addition, column, tens boundary

Year 3 - Add numbers up to 3 digits

Begin to use compact column addition to add numbers with three digits.

Introduce the expanded column addition method



When are children ready for this method?

- Do they know their number bonds to 20?
- Do they understand place value and can they explain their mental strategies orally?

Use place value counters to help children visualise

200 + 40 + 7
100 + 20 + 5
300 + 60 +12 = 372

247
+125
12
60
300
372

Key Skills needed in year 3

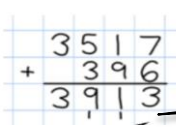
- Read and write numbers to 1000 in numerals and words.
- Add 2-digit numbers mentally, incl. those exceeding 100.
- Add a three-digit number and ones mentally
- Add a three-digit number and tens mentally
- Add a three-digit number and hundreds mentally (381 + 400)
- Recognise place value of each digit in 3-digit numbers

Key vocabulary: As before, & hundreds boundary, increase, vertical, 'carry', expanded, compact

Addition

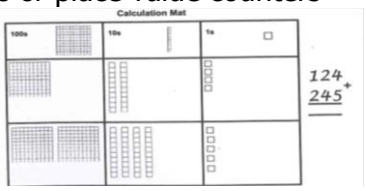
Year 4 – Add numbers with up to 4 digits.
Move from expanded addition to the compact column method, adding units first and 'carrying' numbers underneath the calculation.

e.g. 3517 + 396 = 3913



Reinforce the correct place value. Remind children that it is 500 and 300 etc.

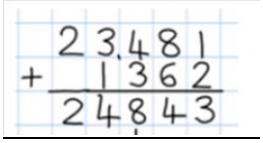
Use practical apparatus alongside the written calculation; such as Dienes or place value counters



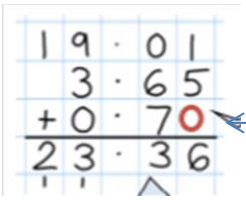
Key Skills needed in year 4
- Select appropriate method: mental, jottings, written and explain why.
- Continue to practise a wide range of mental addition strategies, i.e. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles
- Recognise the place value of each digit in a four-digit number.
- Round numbers to the nearest 10/100/1000
- Find 1000 more or less than a given number
- Solve 2 step problems in context

Key vocabulary: As before, & thousands, hundreds, digits, inverse.

Year 5 – Add numbers with more than 4 digits
Children should use the compact column method including money, measure and decimals with different numbers of decimal places.



Use column addition to add two or three numbers. Some numbers should exceed 4 digits.

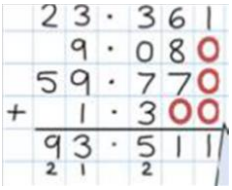


Empty decimal places can be filled with the zero to show the place value in each column

Key Skills needed in year 5
- Add numbers mentally with increasingly large numbers
- Use rounding to check answers and accuracy
- Read, write, order and compare numbers to at least 1 million and know the value
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Solve multi-step problems in contexts, deciding which operations

Key vocabulary: As before & decimal places, decimal point, tenths, hundredths, thousandths

Year 6 – Add several numbers of increasing complexity.
Children should progress to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured.



Zeros could be added in to any empty decimal places, to show there is no value to add

Tenths, hundredths and thousandths should be correctly aligned, with the decimal point aligned vertically, including in the answer.

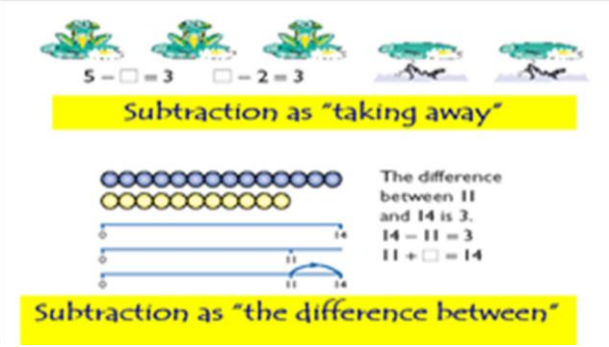
Key Skills needed in year 6
- Add mental using larger numbers and calculations of increasing complexity.
- Read, write, order and compare numbers up to 10 000 000
- Round any whole number to a required degree of accuracy.
- Use negative numbers in context, and calculate intervals across zero.
- Add several large or decimal numbers using written addition
- Use estimation and inverse to check the answer

Key vocabulary: As previous years

Subtraction

Year 1 – Subtract numbers up to 20.

Children should begin to understand subtraction as both taking away and finding the difference between, and should find small differences by counting on.



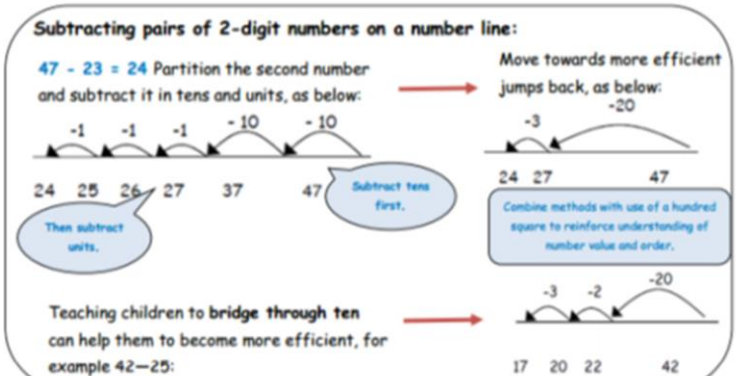
Key Skills needed in year 1

- Given a number say one less.
- Count back in ones to and from 100.
- Count back in tens from any 2-digit number
- Solve multi-step problems in contexts.
- Subtract with one-digit and two-digit numbers to 20, including zero.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_?

Year 2 – Subtract with 2-digit numbers.

Children are taught to recognise that when numbers are close together, it is more efficient to count on the difference.



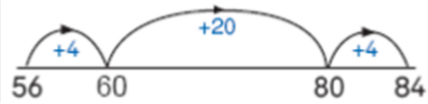
Key Skills needed in year 2

- Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.
- Recognise that addition and subtraction are inverse operations and understand that 10-4=6 as well as 6+4=10.
- Count back in ones or tens to take away.
- Begin to count up to find a difference between two numbers with a small gap
- Know when to count on and when to count back.

Key vocabulary: As before, & difference, count on, strategy, partition, tens, units

Year 3 – Subtract with 2 and to 3 digits

The number line should continue to be used as an important image to support thinking.



84 -56 = ?

When children have a good understanding of place value, counting on and counting back; introduce partitioned column subtraction method.

89 - 35 = 54

80 + 9

- 30 + 5

50 + 4

It is important that children have a really god understanding of place value before moving to this method

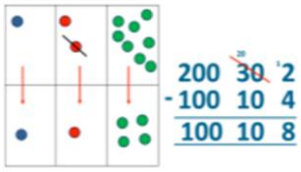
Key Skills needed in year 3

- Understand place value in 3-digit number; subtract 1s, 10s or 100s without difficulty
- Mentally subtract any pair of 2 digit numbers, e.g. 75 – 58.
- Subtract mentally using place value and number bonds, e.g. 347-5, 347-40, 347-100
- Practise mental subtraction strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or 21.

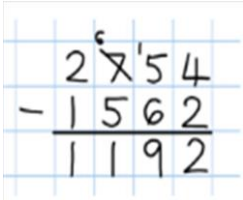
Key vocabulary: As before, & exchange, decrease, hundreds, value, digit

Subtraction

Year 4 – Subtract with up to 4 digits numbers.
Continue from year 3 and introduce partitioned column subtraction with 'exchanging'



As introduced in Y3, but moving towards more complex numbers and values. Use place counters to reinforce "exchanging".
232-114 = 118



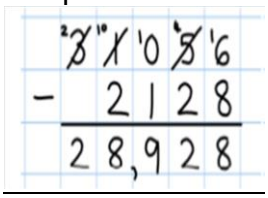
Once children have a full understanding of exchanging and understand place value the compact column method could be introduced. Ask children to use the partitioned column subtraction alongside the compact method,

Key Skills needed in year 4

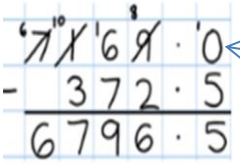
- Count backwards through zero to include negative numbers.
- Find 1000 less than a given number
- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Subtract numbers with up to 4 digits
- Estimate and use inverse operations

Key vocabulary: As before, & inverse, how many more/fewer? Equals sign, is the same as, rearrange

Year 5 – Subtract with at least 4 digits numbers
Compact Column method



If children are not secure with number facts and/or place value, they need to remain on the partitioning column method. Only move them to this method when they are ready



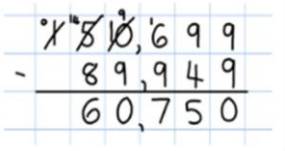
Add a zero in any empty decimal place to aid understanding of what to subtract

Key Skills needed in year 5

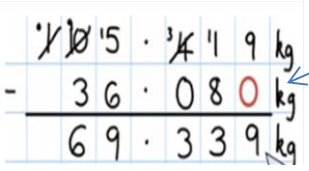
- Interpret negative numbers in context, including through zero
- Add or subtract 0.1 or 0.01 to/from any decimal number with confidence
- Subtract numbers mentally with increasingly large numbers.
- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- Solve subtraction multi-step problems in contexts

Key vocabulary: As before, & tenths, hundredths, decimal point, decimal

Year 6 – Subtract with increasingly large and more complex numbers and decimal values
Consolidate previous years.



Use the compact column method to subtract more complex integers, including money, measure and decimals



Empty decimal places can be filled with a zero to show the place value of each column

Key Skills needed in year 6

- Use negative numbers in context.
- Subtract numbers mentally with increasingly large numbers.
- Read, write, order and compare numbers up to 10 000 000.
- Round any whole number to a required degree of accuracy.
- Solve subtraction multi-step problems in context
- Children need to utilise and consider a range of mental subtraction strategies

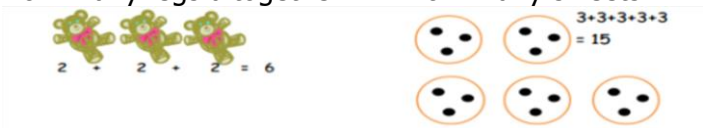
Key vocabulary: As previous years

Mulitiplication

Year 1 – Multiply with concrete objects, arrays and pictorial representations.

Children should understand multiplication is related to doubling and combining groups of the same size (repeated addition)

How many legs altogether? How many sweets?



Children should:

- Begin to understand multiplication as scaling in terms of double and half.
- Use arrays to understand multiplication can be done in any order (commutative)

Key Skills needed in year 1

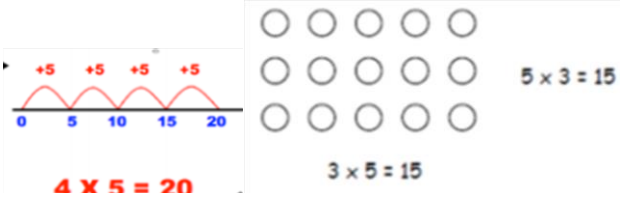
- Count in multiples of 2, 5 and 10
- Solve simple one-step problems involving multiplication, calculating the answer using concrete objects, pictorial representations.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, total, count up in...

Year 2 – Multiply using arrays and repeated addition.

Children should begin to develop understanding of multiplication as scaling (3 times bigger/taller)

Use repeated addition on a number line and arrays



Key Skills needed in year 2

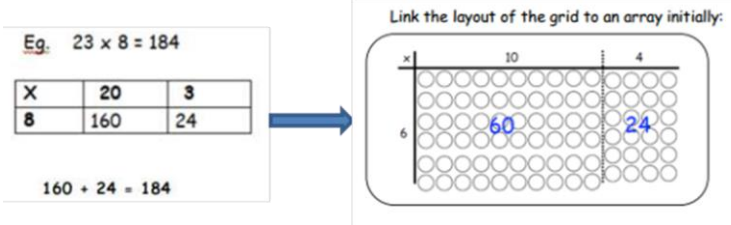
- Recall and use multiplication facts from the 2, 5 and 10 multiplication tables
- Write and calculate number statements using x and = signs
- Show that multiplication can be done in any order
- Solve a range of problems involving multiplication, using concrete objects
- Pupils use a variety of language to discuss and describe multiplication.

Key vocabulary: As before, & multiplied by, column, row, repeated addition, commutative, sets of, equal groups, times as big as, once, twice, three times etc.

Year 3 – Multiply 2-digit numbers by a single digit number

Children MUST be able to do the following before moving onto grid method:

- Partition numbers into tens and units
- Multiply multiples of ten by a single digit.
- Recall and work out multiplication facts in the 2,3,4,5,8 and 10 times tables



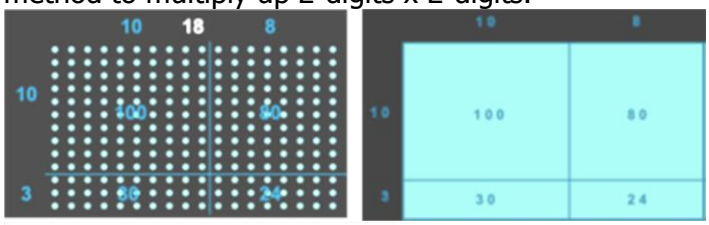
Key Skills needed in year 3

- Recall and use multiplication facts for the 2, 3, 4, 5, 8 and 10 multiplication tables.
- Write and calculate number statements using x and = signs.
- Understand that multiplication is commutative,
- Understand the effect of multiplying whole numbers by 10 and 100.
- Multiply a 1 digit number by a 2 digit number starting to use the grid.

Key vocabulary: As before, & partition, grid method, multiple, product, tens, units, value

Mulitiplication

Year 4 – Multiply 2 and 3 digits by a single digit.
Children to deepen their understanding of the grid method to multiply up 2-digits x 2-digits.



Developing the grid method:

Eg. 136 x 5 = 680

X	100	30	6
5	500	150	30

500
150
+ 30
680

Move onto short multiplication (see Y5) if and when children are confident

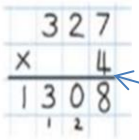
Key Skills needed in year 4

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for all multiplication tables up to 12 x 12.
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.
- Multiply 1- digit numbers by 2-digit or friendly 3-digit numbers using grid method.
- Find doubles to double 100 and beyond, using partitioning
- Begin to double amounts of money.

Key vocabulary: As before, & square, factor, integer, decimal, short / long multiplication, 'carry'

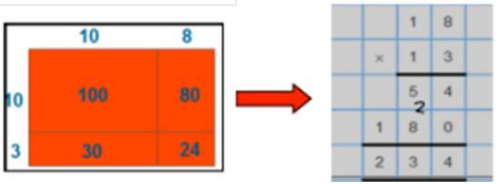
Year 5 – Multiply up to 4 digits by 1 or 2 digits.
Moving on from grid and expanded method - Introduce short multiplication for multiplying by a single digit.

x	300	20	7
4	1200	80	28



Use the grid method and then compare it to the column method.

Introduce long multiplication for a 2-digit number multiplied by a 2-digit number.

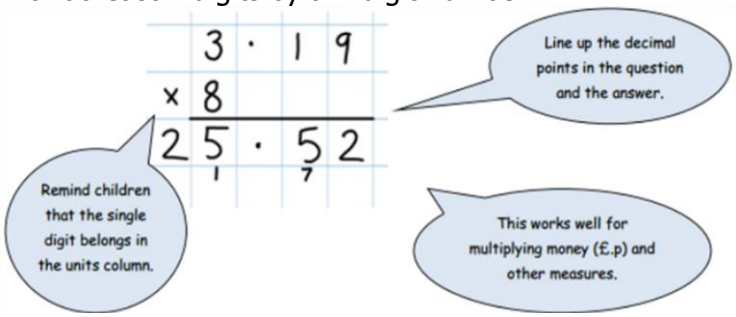


Key Skills needed in year 5

- Know and recite all times tables.
- Identify multiples and factors, using knowledge of multiplication tables to 12x12.
- Multiply 2/3-digit numbers by numbers 2-digit numbers using grid method.
- Solve problems where larger numbers are decomposed into their factors
- Multiply and divide integers and decimals by 10, 100 and 1000
- Recognise and use square and cube number

Key vocabulary: As before, & cubed, integer, square, factor, integer, decimal, short/long multiplication, 'carry'

Year 6 – Short and long multiplication, as in year 5, and multiply decimals with up to 2 dp by a single digit.
Use short multiplication (see Y5) to multiply numbers with more than 4-digits by a single digit
Use long multiplication (see Y5) to multiply numbers with at least 4 digits by a 2-digit number.



Key Skills needed in year 6

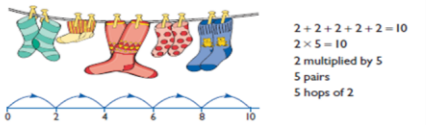
- Recall multiplication facts up to 12 x 12
- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.
- Solve multi-step problems in a range of contexts.
- Estimate answers.
- Multiply fractions and mixed numbers by whole numbers.
- Multiply fractions by proper fractions.
- Use percentages for comparison and calculate simple percentages.

Key vocabulary: As previous years

Division

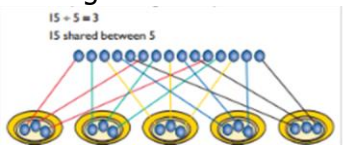
Year 1 – Group and share small quantities

Begin to recognise the number of groups counted to support understanding of relationship between multiplication and division.



Group AND share small quantities- understanding the difference between the two concepts.

Sharing



Grouping

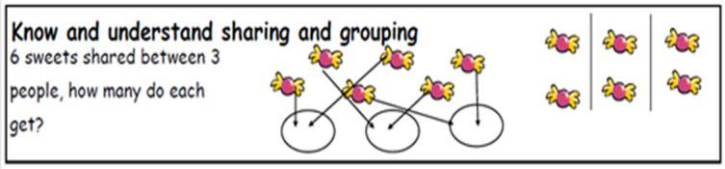
Key Skills needed in year 1

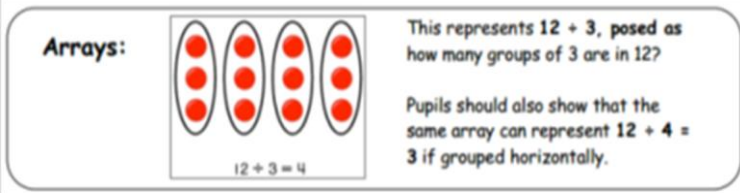
- Solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations array
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

Key vocabulary: share, share equally, one each, two each…, group, groups of, lots of, array

Year 2 – Group and share, using the ÷ and = sign

Using both objects diagrams and pictorial representations, to solve problems involving both **grouping** and **sharing**.





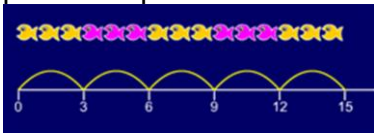
Key Skills needed in year 2

- Count in steps of 2, 3, and 5 from 0
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷ and = signs.
- Show that division cannot be done in any order.

Key vocabulary: As before, & divide, divided by, divided into, division, grouping, number line, left, left over

Year 3 – Divide 2-digit numbers by a single digit

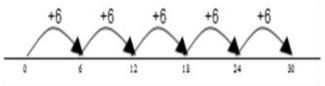
Children should continue to use grouping and sharing for division using practical apparatus, arrays and pictorial representations.



15 ÷ 3 =?

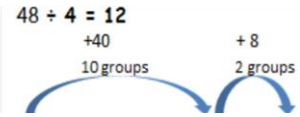
They are also now taught the concept of remainders.

Grouping



Moving to a more efficient numberline

Children need to be able to partition the dividend in different ways



Key Skills needed in year 3

- Recall and use division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- Write and calculate mathematical statements for division using the multiplication tables that they know.
- Solve division problems, in contexts,
- Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using 3 × 2 =6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts
- Pupils develop reliable written methods for division.

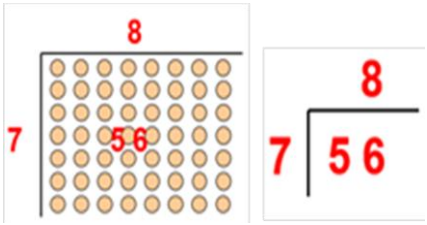
Key vocabulary: As before, & inverse, short division, 'carry', remainder, multiple

Division

Year 4 – Divide up to 3-digit numbers by a single digit (without remainders)

Children will continue to explore division as sharing and grouping, and to represent calculations on a number line **until they have a secure understanding**. (see year 3) mover towards formal written method.

Short division



Reference should be made to the value of each digit in the dividend.

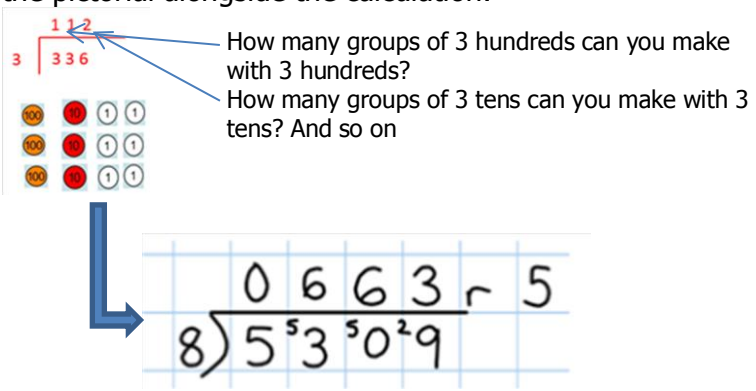
Key Skills needed in year 4

- Recall multiplication and division facts for all numbers up to 12 x 12.
- Use place value, known and derived facts to multiply and divide mentally.
- Practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example 200 × 3 = 600 so 600 ÷ 3 = 200

Key vocabulary: As before, & divisible by, factor.

Year 5 – Divide up to 4 digits by a single digit, including those with remainders.

Short division - place value counters so children can have the pictorial alongside the calculation.



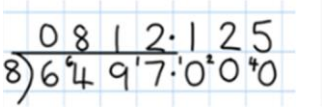
Key Skills needed in year 5

- Recall multiplication / division facts for all numbers up to 12 x 12.
- Identify multiples and factors of any number
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Work out if numbers to 100 are prime, recalling primes to 19.
- Use multiplication and division as inverses.
- Express remainder answers as fractions, decimals or rounded numbers, as appropriate to the context of the problem.

Key vocabulary: As before, & quotient, prime number, prime factors, composite number (non-prime)

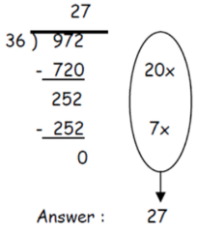
Year 6 – Divide at least 4 digits by both single-digit and 2-digit numbers (Inc. Decimal numbers/quantities

Real life problem solving contexts.



Short Division

Once fully confident with the method above introduce long division by chunking for dividing by 2-digits



Key Skills needed in year 6

- Use multiplication and division facts for all numbers to 12 x 12.
- Solve problems which require answers to be rounded to specified degrees of accuracy, and remainders to be expressed as rounded numbers, fractions or decimals.
- Identify common factors, common multiples and prime numbers
- Use estimation to check answers.
- Use written division methods in cases where the answer has up to two decimal places.

Key vocabulary: As before, & common factor

Counting ideas

- Practice chanting the number names. Encourage your child to join in with you when they are confident, try starting from different numbers; 4, 5, 6…
- Sing number rhymes together – there are lots of commercial tapes and CD's available.
- Give your child the opportunity to count a range of interesting objects (coins, pasta shapes, buttons etc.) Encourage them to touch and move objects as they count.
- Count things you cannot touch or see (more difficult). Try lights on the ceiling, window panes, jumps, claps or oranges in a bag.
- Play games that involve counting (e.g. snakes and ladders, dice games, games that involve collecting objects).
- Look for numerals in the environment. You can spot numbers at home, in the street or when out shopping.
- Cut out numerals from newspapers, magazines or birthday cards. The help to put the numbers in order.
- Make mistakes when chanting, counting or ordering numbers. Can your children spot what you have done wrong?
- Choose a number of the week e.g. 25. Practise counting to this number and from it. Count out groups of etc.

Practising Number Facts

- Find out which number facts your child is learning at school (addition to 10, times tables, doubles etc.) Try to practise for a few minutes each day using a range of vocabulary.

- Have a 'fact of the day'. Pin this fact up around the house. Practising reading it in a quiet, loud, squeaky … voice, Ask your child over the day if they can recall the fact.

- Play 'ping pong' to practise complements with your child. You say a number. They reply with how much more is need to make 10. You can play this game with numbers totalling 20, 100 or 1000. Encourage your child to answer quickly, without counting or using their fingers.

- Throw 2 dice. Ask your child to find the total of the numbers (+). The difference (-) or the product (x). Can they do this without counting?

- Use a set of playing cards (no pictures). Turn over two cards and ask your child to add or multiply the numbers. If they answer correctly, they keep the cards. How many cards can they collect in 2 minutes?

- Play bingo. Each player chooses five answers (e.g. numbers to 10 to practise simple addition, multiples of 5 to practise the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first player to cross off all their answers.

- Give your child an answer. Ask them to write as many addition sentences as they can with the answer (e.g. 10 = ___ +___). Try with multiplication or subtraction.

- Give your child a number fact (e.g. 5+3=8). Ask them what else they can find out from this fact (e.g. 3+5=8, 8-3=5, 8-5=3, 50+30=80, 500+300=800) Add to the list over a few days. Try starting with a x fact as well.