Mathematics Calculation Policy

Contents Page

1. Vision and values – rooted and grounded in love

Our school vision is based on the writings of Paul to the Ephesians. This highlights three principles which form our decision making. We seek for all people in our school community to:

- Feel grounded and rooted in love
- To grow in breadth and depth of understanding
- To be filled with the fullness of life

Our school has adopted seven values and seven attributes which form the basis of the work we do, particularly in relation to our curriculum. It is these values and attributes that all of our subjects focus on instilling in our pupils.
Values: courage, compassion, thankfulness, forgiveness, wisdom, justice, truthfulness
Attributes: knowledge, perseverance, collaboration, curiosity, comprehension, reasoning, creativity

2. Intent

The National Curriculum for maths aims to ensure that all children:

- Become fluent in the fundamentals of mathematics
- Are able to reason mathematically
- Can solve problems by applying their mathematics

At Abberley, these skills are embedded within maths lessons and developed consistently over time. This policy aims to ensure consistency in the mathematical written methods and approaches to calculation across years 1-6 and ensure that the expectations set out by the 2014 National Curriculum are being met. Reception needs will be met through Development Matters and Early Learning Goals.
See Appendix I for detailed information for EYFS, KS1, LKS2 and UKS2

3. Implementation

Our skills progression shows how our expectations and teaching of associated skills develop during the course of study at Abberley Parochial Primary School can be seen by following the link below:
https://www.abberley.worcs.sch.uk/attachments/download.asp?file=172&type=pdf
Please go to appendix II to see how calculation progresses through the school.

A variety of strategies are used to teach children calculation methods. They include a range of physical, verbal, aural and visual methods in order to encompass all learning styles. Teachers will expose children a variety of teaching methods so that children develop the skills to fluently move between representations of the calculation method. For example: missing digits, money or algebra.

As part of a child's learning in calculation, they need to be taught how to select the best method according to the numbers. The hierarchy of thinking should be:

- Can I do it in my head?
- Can I use some jottings to help me?
- Should I use a written method?

Activities are planned so that children build upon their prior learning, form a deep understanding, and address misconceptions in their understanding of the calculation methods. While there are opportunities for children of all abilities to develop their skills, knowledge and understanding in each activity, there is planned differentiation and progression built in, so that the children are increasingly challenged as they move up through the school.

Allocation

EYFS	3 hours
Year 1	5 hours 40 minutes a week
Year 2	5 hours 40 minutes a week
Year 3	5 hours 40 minutes a week
Year 4	5 hours 40 minutes a week
Year 5	5 hours 40 minutes a week
Year 6	5 hours 40 minutes a week

4. Impact (including monitoring of standards)

Termly book reviews and learning walks ensure that our curriculum is being covered and that the standard of learning enables all pupils to progress, access the learning and be challenged in their thinking.

Pupils' progress in maths is monitored through our school tracking system based on teacher assessments against our curriculum content and skills progression and analysis of this is included in our termly pupil progress meetings which may lead to intervention strategies of a varied classroom practice being adopted to support those pupils.

5. Curriculum overview/Planning

https://www.abberley.worcs.sch.uk/attachments/download.asp?file=172&type=pdf

We follow the national curriculum:

https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study

6. Subject progression

Through a rich and progressive mathematics curriculum, children will be taught to become fluent with key written methods for addition, subtraction, multiplication and division. They will have a developed understanding of number so that they can reason mathematically with the calculations they are faced with. In addition, children will be able to use their knowledge and understanding of the written calculations in order to solve a range of mathematical problems. Whilst the National Curriculum does not feature Using and Applying as a discrete mathematical area, it is important that teachers provide real-life, contextualised opportunities for learning in maths.

See Appendix II for detailed progression and clear calculation methods from EYFS to Y6.

7. Assessment/inclusion and challenge

The children's work in maths is assessed daily by their maths teacher through careful observation and questioning during each lesson and the marking of recorded work. Children should receive clear feedback linked to their learning in exercise books. Marking should be in line with the school's feedback policy. Teachers record the progress made by the children against the learning objectives for that particular lesson. More-able mathematicians are challenged to develop their higher order thinking skills through investigative work, using searching and engaging questions. Their knowledge and understanding is broadened through the use of reasoning and problem solving.

Maths skills, both key calculation skills and the recall of facts (and their application), are assessed weekly during the Big Maths lesson. These assessments are progressive and the children move on to the next 'level' once they have shown a secure understanding of those concepts covered in their current 'level'. The findings from these assessments help to inform teachers of each pupil's current understanding and any misconceptions. They are then able to plan for the next steps in their learning. Teachers are able to track progress using the results from the Big Maths assessments and provide the necessary pupil support. Maths targets are identified and shared with the pupils

Pupils are also assessed at the end of each term across all the strands using the appropriate HeadStart assessment for each year group. This too is used as tool for tracking progress, reporting and informing planning.

Pupils are formally assessed at the end of Key Stage 1 and Key Stage 2, taking the National Curriculum Tests. At Key Stage 1 the results of these tests are used to help the teacher make an informed judgement about the attainment of individual pupils in maths. At Key Stage 2 the results of these tests are used to evaluate the progress of individual pupils. They make comparisons between children against the average attainment expectations for their respective age group.

8. Cross curricular and computing links

Opportunities should be made, wherever possible, to apply important maths skills.

Reading scales in science.

Calculating results in science.

Representing, using and interpreting data in science and geography.

Recognition of shapes and their properties in art and DT.

Ratio and proportion in art.

Scaling up and down in DT and art.

Purposeful apps and IT software can also be used to achieve the desired learning outcome.

9. Roles and expectations of staff

SLT:

- Support the subject coordinator in the coordination of mathematics.
- Monitor the coordination of mathematics across the school.

Subject coordinator:

- Support colleagues in the teaching of mathematics.
- Remain informed about current developments in the subject.
- Provide a strategic lead and direction for the subject in the school.

Class teachers:

- Deliver mathematics curriculum to each class/set using a variety of stimulating teaching methods and resources and effective differentiation.
- Assess pupils' achievement of lesson objectives, acquisition of maths skills and their ability to apply their knowledge and report progress to parents.
- Mark pupils' written work regularly and provide appropriate feedback relating to their achievement of the learning objective.
- Provide pupils with opportunities for peer and self-assessment of their work.
- To build a sense of enjoyment and curiosity about the subject.
- To enable all pupils to have the opportunity to reach their potential in mathematics.

Teaching assistants:

- Support subject teachers as detailed in planning.

10. Subject Development

September	Carry out subject development planning and share planning with maths teachers throughout the school. Submit subject development plan to the head teacher. Consider the needs of new staff joining the school.
January	Review work scrutiny carried out in the Autumn term. Provide feedback to staff in the maths curriculum meeting. Feedback on the December assessments. Share feedback and discuss priorities. Consider staff development needs.
March	Review assessment data and Subject development plan objectives.
May/June	Review subject development planning and subject policy.

Mathematics coordinator: Jo Gregory
Maths governor: Jamie Pratt
Headteacher: Joel Turvey

APPENDIX I

Reception

Children in reception will be introduced to the processes of calculation through practical, oral and mental activities. First, they will become familiar with numbers 1-10 and then beyond as well as their value so that they will be able to identify one more and one less than a given number from memory. Practical opportunities to accurately count objects that can and cannot be moved using a variety of strategies, will provide them with a solid platform before moving on to completing calculations successfully. When children are confident with the above, they will be introduced to addition and then subtraction and they will be taught the key concepts pupils need to know and understand in order to calculate successfully; children will understand addition as combining two or more groups of objects and understand subtraction as 'taking away' (counting back). Once secure with this, children can solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations. Another important conceptual tool is to count on or back from a given number so that children can become fluent when completing calculations. Children will be able to read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Children will be introduced to counting in 2s and 10s and this will support the teaching of multiplication and division. They will understand multiplication through grouping small quantities of the same amount and this will be enhanced and supported through doubling problems involving plenty of practical opportunities. Children will experience early division through sharing objects and counting how many in each group. This will also link in with the concept of halving. Real life problem solving involving calculations using money, time and measure for example, will also help consolidate and extend children's conceptual understanding and procedural fluency of all of the above.

Key Stage 1

Children in Y1 and Y2 will be given a solid foundation in the basic building blocks of mental and written arithmetic. Through being taught 'place value', they will develop an understanding of how numbers work, so that they are confident in 2-digit numbers and beginning to read and say numbers above 100. A focus on number bonds, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts, and ensures that all children leave Y2 knowing the pairs of numbers which make all the numbers to 10 at least. They will also have a secure knowledge of pairs to 20. Their knowledge of number facts enables them to add several single-digit numbers, and to add/subtract a single digit numbers to/from a 2-digit number. Another important conceptual tool is their ability to add/subtract 1 or 10, and to understand which digit changes and why. This understanding is extended to enable children to add and subtract multiples often to and from any 2-digit number. They most important application of this knowledge is their ability to add or subtract any pair of 2-digit numbers by counting on or back in tens and ones. Children may extend this to adding by partitioning numbers into tens and ones. Children may extend this to adding by partitioning numbers into tens and ones. Children will be taught to count in 2s, 3s, 5s, and 10s, and will have related this skill to repeated addition. They will have met and begun to learn the associated 2x. 3x. 5x and 10x tables. Engaging in a practical way with the concept of repeated addition and the use of arrays enables children to develop a preliminary understanding of multiplication, and asking them to consider how many groups of a given numbers make a total will introduce them to the idea of division. They will also be taught to double and halve whole numbers, and this thus experience scaling up or down as a further aspect of multiplication and division. Fractions will be introduced as numbers and as operators, specifically in relation to halves, quarters and thirds.

Lower Key Stage 2

In lower KS2, children build on the concrete and conceptual understandings they have gained in KS1 to develop a real mathematical understanding of the four operations, in particular, developing arithmetical competence in relation to larger numbers. In addition and subtraction, they are taught to use place value and number facts to add and subtract numbers mentally and will develop a range of strategies to enable them to discard the counting in ones or fingers-based methods previously used. In particular, they will learn to add and subtract multiples and near multiples of 10, 100 and 1000, and will become fluent in complementary addition as an accurate means of achieving fast and accurate answers to 3-digit subtractions. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced.

This key stage is also the period during which multiplication and division facts, up to 12 x 12, are thoroughly memorised. Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by a single-digit number are taught, as are mental strategies for multiplication or division with large but friendly numbers, e.g. when dividing by 5 or multiplying by 20. Children will develop their understanding of fractions, learning to reduce a fraction to its simplest form as well as finding non-unit fractions of amounts and quantities. The concept of a decimal number is introduced and children consolidate a firm understanding of numbers with one decimal place, multiplying and dividing whole numbers by 10 and 100.

Upper Key Stage 2

Children apply the skills previously taught in order to perform arithmetic operations with both decimals and fractions. They will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits and also decimal numbers with up to two decimal places. Mental strategies for adding and subtracting increasingly large numbers will also be taught. These will draw upon children's robust understanding of place value and knowledge of number facts. Efficient and flexible strategies for mental multiplication and division are taught and practised, so that children can perform appropriate calculations even when the numbers are large, such as 40,000 x 6 or 40, 000 ÷6.

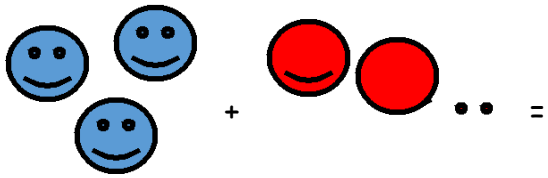
In addition, it is in Y5 and Y6 that children extend their knowledge and confidence in using written algorithms for multiplication and division. Fractions and decimals are also added, subtracted, divided and multiplied, within the bounds of children's understanding of these more complicated numbers, and they will also calculate simple percentages and ratios. Negative numbers will be added and subtracted.

APPENDIX II

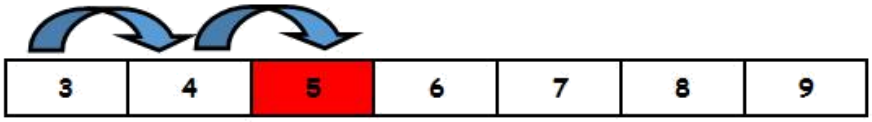
Addition

Reception Adding items in two groups together

1. Use pictorial representations and objects to find the total number of items in two groups, encouraging children to count accurately.



2. Use numbered number track to add, by counting on in ones, using a finger or counter. Ensure that the counting movement goes above the line.



3 + 2 =

Children should:

- Have access to a range of counters, number lines, number cards etc
- Be shown numbers in a range of contexts
- To recognise the + and = symbols
- Begin to count on from the larger number
- Begin to record own number sentences

Key Vocabulary add, more, make, and, total, altogether, addition, number sentence, one more than, most, count on, equals, number track

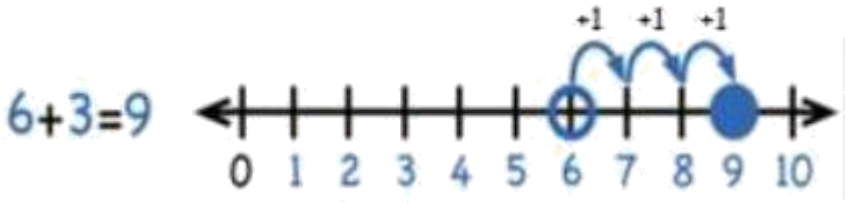
Key Skills for addition in Reception

- Read and order numbers 1-20
- Count to 20 and above
- Say one more than a given number
- Count on in ones from a given number
- Solve problems involving doubles
- Solve real life addition problems involving for example, money and measure

Addition

Year 1 Adding with numbers up to 20

Use numbered lines to add by counting on in ones, encouraging children to begin with the larger number and count on.



Children should:

- Have access to a range of equipment (e.g. number lines, counting apparatus, Base Ten, 100 squares and bead strings).
- Be shown numbers in a range of contexts.
- Be able to read and write number sentences using the + and = signs.
- Interpret number sentences including missing number problems e.g. 3 + ? = 8.

Key Vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on.

Key Skills for addition in Year 1

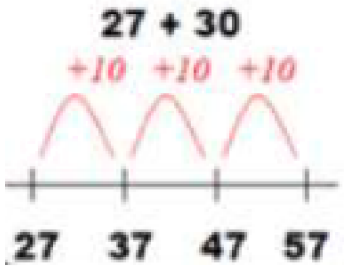
- Read and write numbers to 100 in numerals (1-20 in words).
- Count to and across 100.
- Recall number bonds to 10 and 20 and addition facts within 20.
- Count on in ones from a given 2-digit number.
- Add two single-digit numbers by counting on.
- Add three single-digit numbers spotting doubles or pairs to 10.
- Count on in tens from any given 2-digit number.
- Add 10 to any given 2-digit number.
- Use number facts to add single-digit numbers to two-digit numbers (e.g. use 4 + 3 to calculate 24 + 3).
- Add numbers together by putting the larger number first.
- Recognise double to double 6.

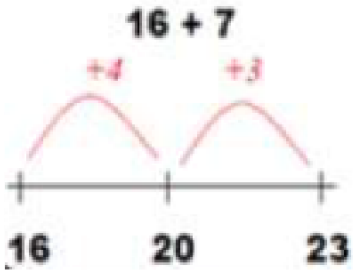
Addition

Year 2 Adding with 2-digit numbers.

Develop mental fluency with place value and addition using 2-digit numbers before moving to formal methods.

Add 2-digit numbers and multiples of ten, 2 digit numbers and ones, two 2-digit numbers first practically using mathematical equipment (Base Ten, 100 squares, place value cards) before beginning to use formal written methods.





Children move to more formal recording using the partitioning method, setting out as follows:

25 + 47

20 + 5 40 + 7

20 + 40 = 60

5+ 7 =12

Key Vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary.

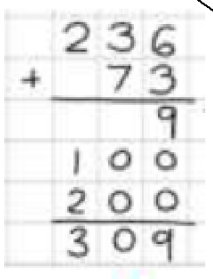
Key Skills for addition in Year 2

- Locate any 2-digit number on a landmarked line and use this to compare numbers; record comparisons using greater than and less than symbols (e.g. 56 > 39).
- Identify any number on a 1-100 grid; understand that each number is some ones added to a multiple of ten (e.g. 54 is 50 and 4 more).
- Add two single digit numbers (e.g. 8 + 7) by counting up; add two 2-digit numbers which total less than 100 by counting on in tens and ones (e.g. 54 + 37 as 50 + 30 + 7).
- Know securely number pairs for all numbers up to and including 20.
- Count in steps on 2, 5 and 10 from 0.
- Know different ones patterns when not crossing a ten (4 + 3 = 7, 14 + 3 = 17, 24 + 3 = 27).
- Begin to recognise ones patterns when crossing a ten (e.g. 5 + 6 = 11).
- Know pairs with a total of 20 and multiples of 10 to 100.
- Count on in ones and tens from any given 2-digit number.
- Add two or three single-digit numbers.
- Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10.
- Add 10 and multiples of 10 to any 2-digit number (not crossing 100).
- Add any pairs of 2-digit numbers.
- Know that adding can be done in any order.
- Solve problems with addition using concrete objects, and/or pictorial representations involving numbers, quantities and measures, applying written and mental methods.

Addition

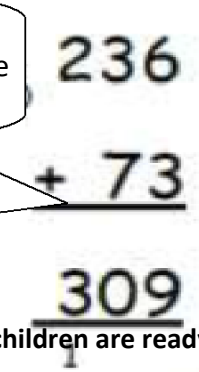
Year 3 adding numbers with up to 3 digits.

Use the partitioning method for addition to add to or three 3-digit numbers or three 2-digit numbers (see Year 2)
Begin to use the formal written method of compact column addition to add numbers with up to three digits



Only use this intermediate step if children experience difficulty moving on from the partitioning method.

Add the ones first, carry numbers underneath the bottom line, reminding pupils of the actual value (e.g. 3 tens add 7 tens).



When do we know children are ready for this method?

Do they know addition and subtraction facts to 20?
Do they understand place value of up to 3-digit numbers and can they partition numbers?
Can they explain their mental strategies orally and record them using informal jottings?

Children who are secure and show confidence with the 3-digit expanded column addition method should be moved on to the compact column addition method involving carrying (regrouping). A comparison of the partitioning addition method to the compact addition method is useful to show the minimising of the number of steps involved.

Key Vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact.

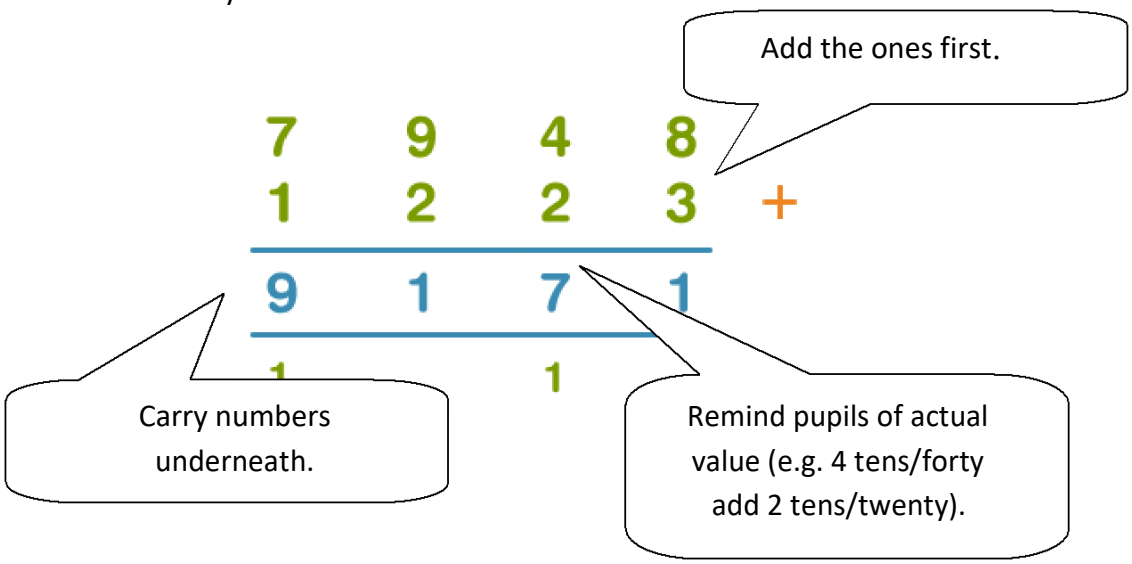
Key Skills for addition in Year 3

- Know pairs which each total 0.
- Know pairs of multiples of 10 with a total of 100.
- Add any 2-digit numbers by counting on in tens and ones or by using partitioning.
- Add multiples and near-multiples of 10 and 100.
- Add 1, 10 and 100 to 3-digit numbers.
- Understand place value of 3-digit numbers.
- Perform place value additions confidently (e.g. 300 + 50 + 8 = 358).
- Use place value and number facts to add a 1-digit number or 2-digit number to a 3-digit number (e.g. 104 + 56 is 160 as 104 + 50 = 154 and 6 + 4 = 10).
- Add pairs of 'friendly' 3-digit numbers mentally (e.g. 320 + 450).
- Begin to add amounts of money using partitioning.
- Solve problems with addition number facts, place value knowledge and missing numbers.

Addition

Year 4 Adding numbers with up to 4 digits.

Continue to use the compact column method, adding ones first and carrying (regrouping) underneath the calculation. This method is also to be used in the context of money and measures.



Key Vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', regroup, expanded, compact, thousands, hundreds, digits, inverse.

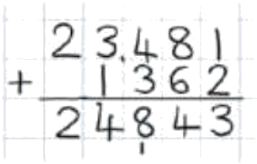
Key Skills for addition in Year 4

- Select appropriate methods, mental jottings, written and explain reasons for choices.
- Add any two 2-digit numbers by partitioning or counting on.
- Know by heart (quickly derive) number bonds to 100 (e.g. 32 + 68) and to £1 (64p + 36p).
- Add to the next hundred, pound and whole number (e.g. 234 + 66 = 300, 3.4 + 0.6 = 4)
- Perform place value additions confidently (e.g. 4000 + 300 +50 + 8 = 4358).
- Add multiples and near multiples of 10, 100 and 1000.
- Add £1, 10p, and 1p to amounts of money.
- Use place value and number facts to add 1, 2, 3 and 4-digit numbers where a mental calculation is appropriate (e.g. 4004 + 156 by knowing that 6 + 4 = 10 and that 4004 + 150 = 4154 so total is 4160).
- Perform inverse operations to check answers to calculations are correct.
- Solve two-step problems in context.
- Continue to practise a wide range of mental addition strategies (e.g. round and adjust, near doubles, number bonds, partitioning and recombining).

Addition

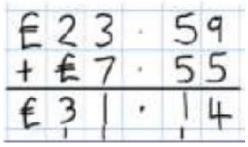
Year 5 Adding numbers with more than 4 digits

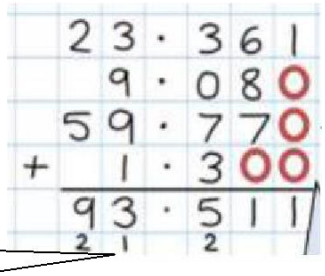
Including money, measures and decimals with different numbers of decimal places.



Use column addition to add two or three whole numbers.

Use column addition to add any pair of two-place decimals including amounts of money.





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

Key Vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', regroup, expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

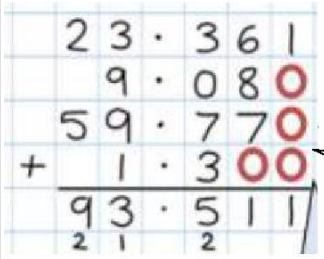
Key Skills for addition in Year 1

- Locate 5 and 6 digit numbers on a landmarked line; use this to compare/order numbers.
- Round to the nearest 10, 100, 1000 and 10,000.
- Use rounding to check accuracy.
- Understand a one-place decimal number as a number of tenths and a two-place decimal as a number of hundredths.
- Add or subtract 0.1 or 0.01 to/from any decimal number with confidence.
- Add and subtract mentally with confidence – where the numbers are less than 100 or the calculation relies upon simple addition and place value.
- Confidently add numbers with more than 4-digits using a secure written method, including
- adding 'piles' of numbers
- Use inverse to check calculations

Addition

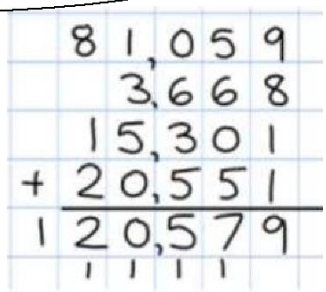
Year 6 Adding several numbers of increasing complexity.

Including money, measures and decimals with different numbers of decimal places.



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

Empty decimal places should be filled with zero to show the place value of each column.



Pupils should apply their knowledge of a range of mental strategies, mental recall skills, informal and formal written methods when selecting the **appropriate method** to work out addition problems. Opportunities to discuss the appropriateness of methods need to be planned for.

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

Key Skills for addition at Year 6

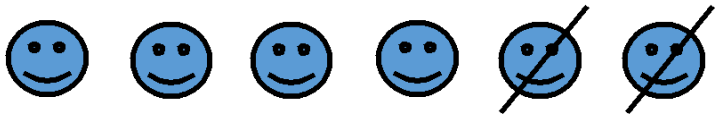
- Add mentally with confidence using larger numbers and calculations of increasing
- complexity
- Add several large numbers using written addition
- Add several large or decimal numbers using written addition
- Perform mental calculations, including with mixed operations and large numbers,
- using a range of strategies
- Solve multi-step problems
- Use estimation and inverse to check the validity of an answer

Subtraction

Reception Subtract one-digit numbers

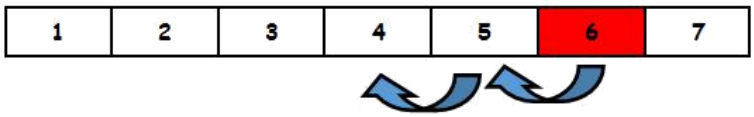
1. Children taught subtraction as taking away using objects and crossing out pictures to represent what has been taken away.

6 - 2 =



2. Use numbered number track to subtract, by counting back in ones, using a finger or counter.

6 - 2 =



Children should:

- Have access to a range of counters, number lines, number cards etc
- Be shown numbers in a range of contexts
- To recognise the - and = symbols
- Begin to count back from the larger number
- To begin to record their own number sentences

Key Vocabulary take away, how many left, how many have gone, one less than, equals

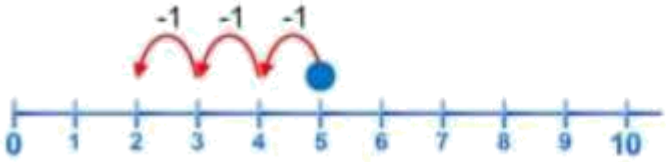
Key Skills for subtraction in Reception

- Say one less than a given number
- Count back in ones from 10 then 20
- Solve one-step problems involving subtraction, using concrete objects (bead strings,
- objects, cubes) and pictures, and missing number problems
- Recognise the – and = signs, and use these to read and write simple subtractions.

Subtraction

Year 1 - Subtract from numbers up to 20.

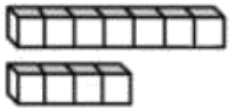
Children consolidate understanding of subtraction practically using bead strings, etc. and in real life contexts. They are introduced to more formal recording using number lines, then using empty numbers lines.



5 - 3 = 2

Model subtraction practically and using number tracks, number lines and 100 squares and practically. Find the difference between - this is to be done practically using the language 'find the distance between' and 'how many more than?'

This will be introduced practically with the language '**find the distance between**' and '**how many more?**' in a range of familiar contexts.



'Seven is 3 more than four'

'I am 2 years older than my sister'

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…

Key Skills for subtraction in Year 1

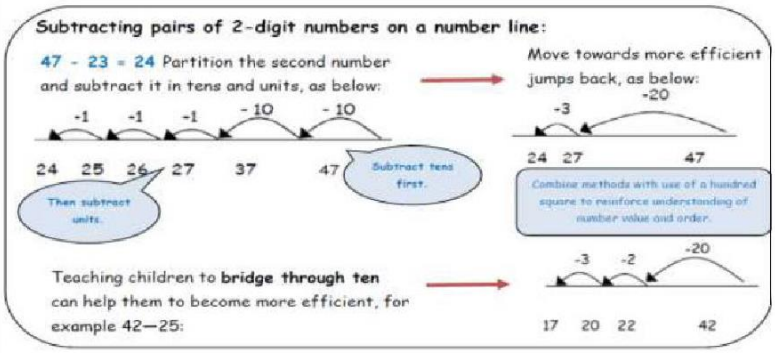
- Say one less than a given number.
- Count back in ones to from 100 and from any single-digit or 2-digit number.
- Count back in tens from any 2-digit number
- Locate any number on a 1-100 grid or a beaded line 0-100.
- Know number bonds to 10, also know what is left if objects are taken from 10, e.g. 10 fingers, fold down 4, leaving 6 standing.
- Solve one-step problems involving subtraction, using concrete objects (bead strings,
- objects, cubes) and pictures, and missing number problems
- Recognise the – and = signs, and use these to read and write simple subtractions.

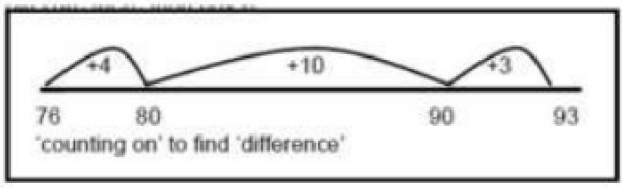
Subtraction

Year 2 – Subtract with 2-digit numbers.

Use practical equipment such as Base Ten and Numicon to model subtraction.

Subtract first on a on a numbered number line, then on an empty number line, by counting back, aiming to develop mental subtraction skills.





Children should also learn how to count on in order to find the difference. They should be given opportunities to explore when to count on and when to count back.

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… difference, count on, strategy, partition, tens, ones

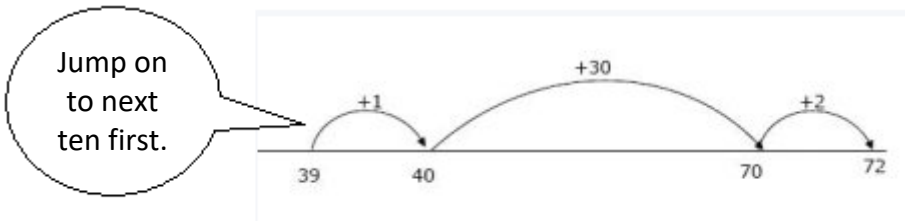
Key Skills for subtraction in Year 2

- 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, e.g. 27 – 3 = or 54 – 20 =.
- Begin to count up to find a difference between two numbers with a small gap (42 –
- 38). Know when to count on and when to count back.
- Recall and use subtraction facts to 20 fluently.
- Derive and use related fact to 100.
- Subtract using concrete objects, pictorial representations, 100 squares, Base Ten, Numicon and mentally, including a 2-digit number and ones, a 2-digit numbers and tens, and two 2-digit numbers.
- Use inverse to check calculations.

Subtraction

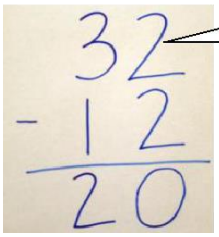
Year 3 - Subtract with 2 and 3-digit numbers

Subtract on an empty number line by counting on.



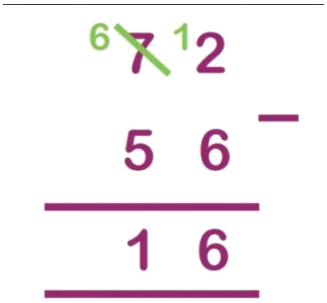
Children should understand when to count back where appropriate, using place value or number facts. This skill should be reinforced through mental work.

Begin to use formal column subtraction method, first using 'friendly numbers'.



'Friendly numbers' – no exchange necessary.

Move to formal subtraction using 'take and make'.



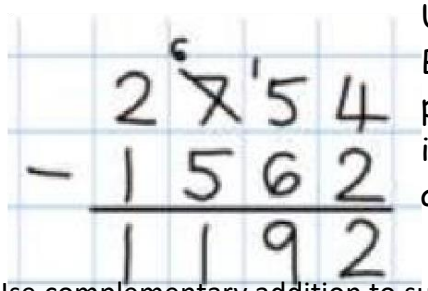
Key Vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds

Key Skills for subtraction in Year 3

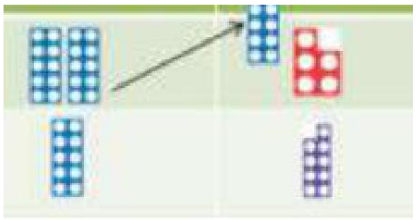
- Understand place value in 3-digit numbers; add and subtract 1s, 10s or
- 100s without difficulty; use this to add and subtract multiples of 1, 10,
- 100 to/from 3-digit numbers.
- Mentally subtract any pair of 2 digit numbers, e.g. 75 – 58
- Recognise that there are two ways of completing subtractions, either by counting up using and empty number line or by counting back, e.g. 54 – 3.
- Subtract mentally using place value and number bonds, e.g. 347-5, 347-
- 40, 347-100)

Subtraction

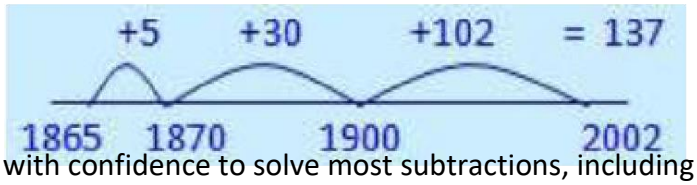
Year 4 Subtract with up to 4 digit numbers.
Subtract using formal column subtraction, using take and make where appropriate.



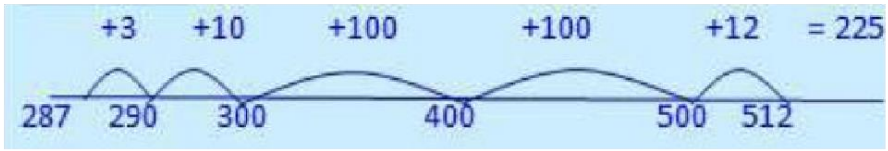
Use Numicon and Base Ten to provide visual images for 'take and make'.



Use complementary addition to subtract amounts of money, and for subtractions where the larger number is a near multiple of 100 or 1000.



Use counting up with confidence to solve most subtractions, including finding complements to multiples of 100. (E.g. 512 – 287 is done by:



Children be encouraged to progress to the fewest number of jumps.

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…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds, inverse.

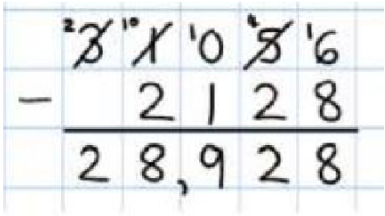
Key Skills for subtraction in Year 4

- Mentally subtract any pair of two digit numbers.
- Subtract 3 digit numbers from 3 digit numbers using counting on, e.g.
- 426 – 278 by jumping along a line from 278 to 426
- Practise mental subtraction strategies, eg. Round and adjust (37—9), using
- place value
- Use counting on in the context of money and also when subtracting from
- numbers ending in zeros eg 4000-372
- Count backwards through zero, using negative numbers

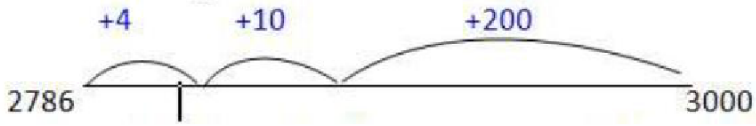
Subtraction

Year 5 Subtract with up to 5 digit numbers, including; money, measures and decimals.

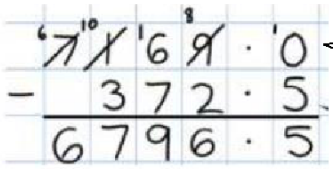
Use compact column subtraction to subtract numbers with up to 5 digits.



Use counting on for subtractions where the larger number is a multiple or near multiple of 1000, or for decimals.



Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal point.



Add a zero as a place-holder in an empty decimal place to aid understanding of what to subtract.

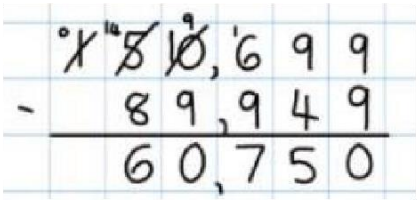
Key Vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal.

Key Skills for subtraction in Year 5

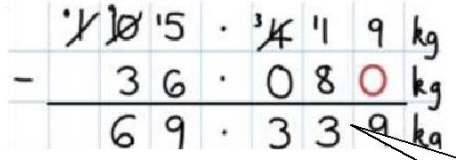
- Count backwards through zero, using negative numbers.
- Add or subtract 0.1 or 0.01 to/from any decimal number with confidence,
- e.g. 5.83 + 0.01 or 4.83 – 0.1.
- Children need to utilise and consider a range of subtraction strategies, jottings and written methods before choosing how to calculate.
- Subtract larger numbers using column subtraction or by counting up.
- Begin to subtract decimal numbers using counting up: 6.2 – 3.5.
- Decide which mental methods to use and explain why.

Subtraction

Year 6 Subtract with increasingly large and more complex numbers and decimal values.



Use the compact column method to subtract more complex integers.



Use compact column method to subtract in context of money, measures, including decimals with different numbers of decimal places.

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

Pupils should apply their knowledge of a range of mental strategies, mental recall skills, informal and formal written methods when selecting the **appropriate method** to work out subtraction problems. Opportunities to discuss the appropriateness of methods need to be planned for.

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…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal.

Key Skills for subtraction in Year 6

- Subtract mentally with confidence – where the numbers are less than 100 or the calculation relies upon simple subtraction and place value. Examples include:
- 6,723 – 400, 72 – 46, 100 – 64.
- Subtract large numbers using column subtraction or counting up, e.g. 1323 – 758.
- Subtract decimal numbers using counting up.
- Use negative numbers in context and calculate intervals across zero.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before deciding how to calculate.
- Decide which methods to use and explain why.

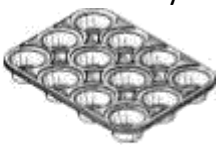
Multiplication ×

Reception - Multiplication taught through doubling using concrete objects and pictorial representations

I have three apples, can you double the number of apples?

There are 6 apples in total.

Children can investigate putting items into resources such as egg boxes, ice cube trays and cake tins which are arrays



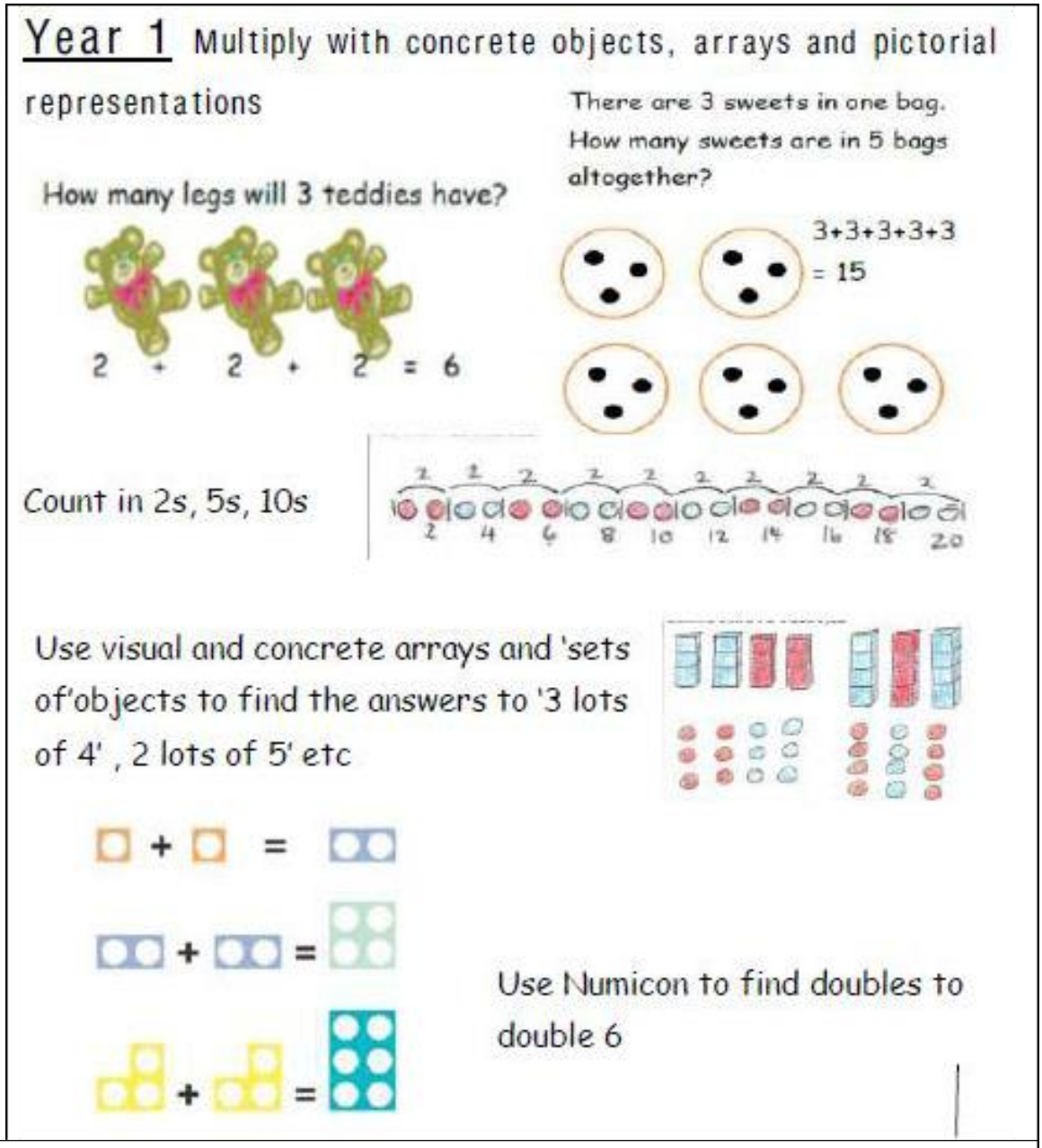
Counting in 2s and 10s.

Key Vocabulary doubling, groups, lots of, altogether, count

Key Skills for multiplication in Reception

- Count in 2s and 5s
- Understand the concept of doubling is adding together 2 groups of the same number
- Begin to solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Multiplication



Key vocabulary groups of, lots of, times, array, altogether, multiply, count

Key Skills for multiplication at Year 1

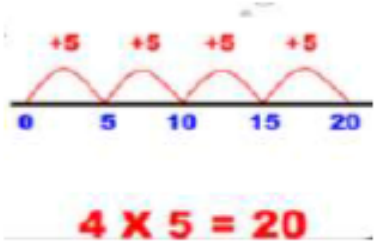
- Count in multiples of 2, 5 and 10
- Recognise doubles to double 6
- Solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

X Multiplication

Year 2 Multiplication using arrays and repeated addition.

(using at least 2s, 5s and 10s)

Starting from zero, make equal jumps on a number line to work out multiplication facts and write multiplication

Use 

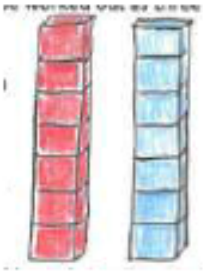
repeated addition on a number line:

Use arrays and Numicon to help teach children to understand the commutative law of multiplication and give

Learn doubles to double 20

Begin to double multiples of 5 to 100

Begin to double two-digit numbers less than 50 with 1s digits of 1, 2, 3 4 or 5



Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as big as, once, twice, three times...

Key Skills for multiplication at Year 2

- Count in steps of 2, 3 and 5 from zero and in 10s from any number
- Know the 2x, 5x and 10x multiplication tables and begin to say how many 10s are in 40 or how many 5s are in 30; recognise odd and even answers
- 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, arrays, repeated addition, Numicon, mental methods and multiplication facts

Multiplication

Year 3 multiply 2-digit numbers by a single digit number

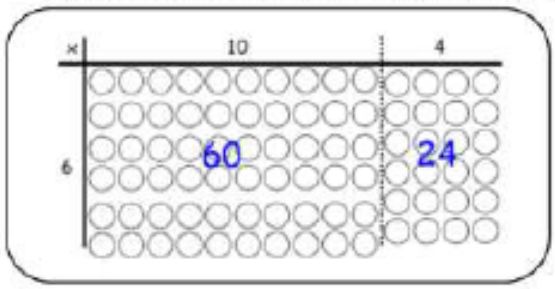
Introduce the grid method for multiplying 2 digits by 1 digit

Eg. 23 x 8 = 184

X	20	3
8	160	24

160 + 24 = 184

Link the layout of the grid to an array initially:



Demonstrate how the array links to the grid calculation

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

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

30 x 80 = 2400
24

Do the tables bit, then make it 10, 100 or 1000 times bigger!

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value

Key Skills for multiplication at Year 3

- Understand that multiplication is commutative, e.g. 4 x 8 is the same as 8 x 4.
- Know the 2x, 3x, 5x and 10x multiplication tables. All tables need to be learned to 12th multiple.
- Multiply any 2-digit number by 10 or a single-digit number by 100;
- 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
- Solve multiplication problems involving missing numbers

Multiplication

Year 4 Multiply 2 and 3 digits by a single digit using all multiplication tables up to 12 x 12

Developing the grid method:

Eg. 136 x 5 = 680

X	100	30	6
5	500	150	30

500
150
+ 30
680

Encourage mental addition or use of column addition to add accurately.

Move onto short multiplication (see Y5) if and when children are confident and accurate multiplying 2 and 3 digit numbers by a single digit this way and are already confident in carrying for written addition.

Children should be able to:

- Approximate before the calculate and make this a regular part of their calculation, using this approximation as a check of the reasonableness of their answer.
- Multiply multiples of 10 and 100 by a single digit.
- Recall all times tables up to 12 x 12

30 x 80 = 2400
24

Do the tables bit, then make it 10, 100 or 1000 times bigger!

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal, groups, times as big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value, inverse

Key Skills for multiplication at Year 4

- Multiply 1 and 2 digit numbers by 10, 100 and 1000; to understand place value in decimal numbers with one place.
- Know and recite 2x, 3x, 4x, 5x, 9x, 10x multiplication tables up to 12th multiple; include multiplying by 0 (e.g. 5 x 0 = 0, 7 x 0 = 0) or by 1 (e.g. 5 x 1 = 5, ½ x 1 = ½).
- 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
- Use doubling as strategy for multiplying by 2, 4, 8
- Count in multiples of 6, 7, 9, 25 and 1000

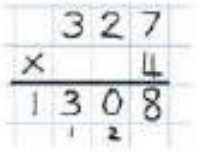
X Multiplication

Year 5 Multiply up to 4 digits by 1 or 2 digits.

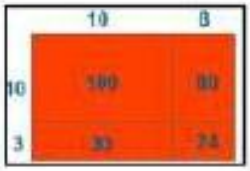
Introducing column multiplication

Introduce column multiplication by comparing a grid method calculation, in order to see how the steps are related. Notice how there are less steps involved.

×	300	20	7
4	1200	80	28



Introduce long multiplication for multiplying by 2 digits



18 x 3 on the first row

(8 x 3 =24, carrying the 2 for 20, then 1 x 3)

18 x 10 on the 2nd row.

Show multiplying by 10 by putting zero in units first

Move towards more complex numbers

1234 × 16

7404 (1234 × 6)

12340 (1234 × 10)

19,744

3652 × 8

29,216

Children should approximate first

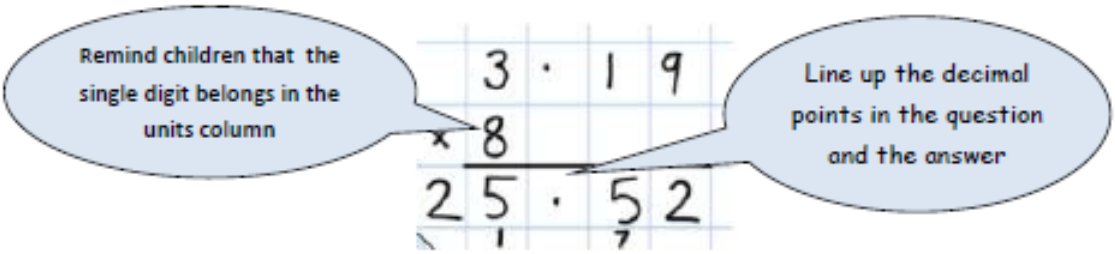
Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value, inverse, square, factor , integer , decimal , short/long multiplication, 'carry'

Key Skills for multiplication at Year 5

- Know and recite all times tables including division facts.
- Multiply 2- and 3-digit numbers by numbers ≤12 using grid method; multiply 2-digit by 2-digit numbers using grid method.
- Identify multiples and factors, using knowledge of multiplication tables up to 12 x 12
- Scale up or down by a factor of 2, 5 or 10
- Multiply integers and decimals by 10, 100, 1000
- Recognise and use squared, cubes and their notations

Multiplication

Year 6 Short and long multiplication, as in year 5, and multiply decimals with up to 2 decimal places by a single digit.



Use this method for money and measures.

Children should:

- Use rounding and place value to make approximations before calculating and use these to check validity of answers
- Use short multiplication to (see Y5) to multiply numbers with more than 4 digits by a single digit; to multiply money and measures; and to multiply decimals up to 2 decimal places by a single digit
- Use long multiplication (see Y5) to multiply numbers with at least 4 digits by a 2-digit number

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry', tenths, hundredths, decimal

Key Skills for multiplication at Year 6

- Recall multiplication facts up to 12 x 12
- Use short multiplication to multiply a 1-digit number by a number with up to 4 digits
- Use long multiplication to multiply a 2-digit by a number with up to 4 digits
- Use short multiplication to multiply a 1-digit number by a number with one or two decimal places, including amounts of money.
- Multiply fractions and mixed numbers by whole numbers.
- Multiply fractions by proper fractions.
- Use percentages for comparison and calculate simple percentages.
- Estimate answers using rounding and approximation

Division

Reception - Halve and share small numbers of groups

Children to halve a number and share equally between 2, e.g. can you share the sweets between Stacey and Stan

To share objects into equal groups and count how many items there are in each group, e.g. count 6 counters and pretending they are spots, share them equally between the ladybird wings.

Making use of everyday situations – sharing fruit out at snack time etc.

In the role play area – sharing objects in a practical way e.g. sharing out cutlery and crockery items for setting a table.

Key Vocabulary Halve, share, share equally, one each, two each, three each. Threes... tens, equal groups of, left, left over

Key Skills for division in Reception

- To understand the concept of halving and making sure there are an equal number of items in both groups
- Begin to solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

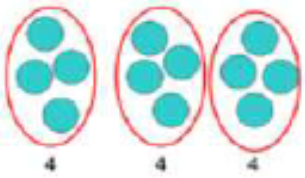
Division

Year 1 Group and share small quantities

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

Grouping:

Sharing:



12 shared between 3 is 4

Children should solve a division problem within a context.

E.g. 5 children share 15 sweets. How many does each child get?

Can they solve this and write a division statement eg. 15 sweets shared between 5 children gives 3 each.

Pupils should :

- use lots of practical apparatus, arrays and picture representations
- Be taught to understand the difference between „grouping" objects (How many groups of 2 can you make?) and „sharing" (Share these sweets between 2 people)
- Be able to count in multiples of 2s, 5s and 10s.
- Find half of a group of objects by sharing into 2 equal groups.

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

Key Skills for division at Year 1

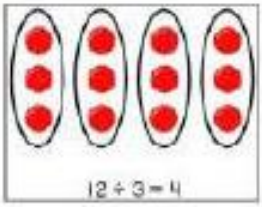
- Solve one-step problems involving multiplication and division, by calculating the answer
- using concrete objects, pictorial representations arrays with the support of the teacher
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of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

Division

Year 2 Group and share using the ÷ and = signs.

Use objects, Numicon, arrays, pictorial representations and grouping on a

Arrays:



This represents **12 ÷ 3, posed as** how many groups of 3 are in 12?

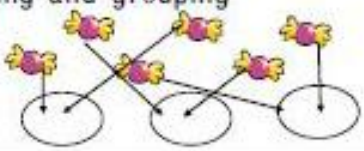
Pupils should also show that the same array can represent **12 ÷ 4 = 3** if grouped horizontally.

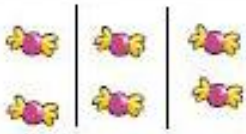
24 divided into groups (chunks) of 6

There are 4 groups of 6 in 24

Know and understand sharing and grouping

6 sweets shared between 3 people, how many do each get?

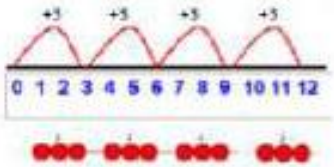




Grouping using a number line

Group from zero in equal jumps to find 'how many groups of _ in _?

Use bead-bars/strings to make link to number line.



12 ÷ 3 = 4

Pose 12÷3 as "How many groups of 3 are there in 12?"

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over

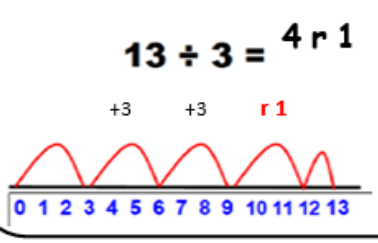
Key Skills for division at Year 2

- 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 multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Division

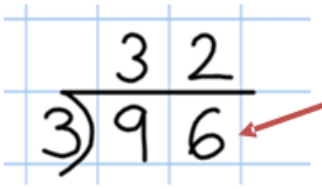
Year 3 Divide 2-digit numbers by a single digit

Grouping on a number line:

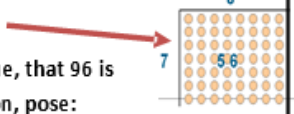


STEP 1: Children continue to work out unknown division facts by grouping on a number line from zero. They are also now taught the concept of remainders, as in the example. This should be introduced practically and with arrays, as well as being translated to a number line. Children should work towards calculating some basic division facts with remainders mentally for the 2s, 3s, 4s, 5s, 8s and 10s, ready for 'carrying' remainders across within the short division method.

Short division: Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).



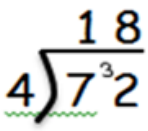
STEP 2: Once children are secure with division as grouping and demonstrate this using number lines, arrays etc., **short division** for larger 2-digit numbers should be introduced, initially with carefully selected examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array.



Remind children of correct place value, that 96 is equal to 90 and 6, but in short division, pose:

- How many 3's in 9? = 3, and record it above the **9 tens.**
- How many 3's in 6? = 2, and record it above the **6 units.**

Short division: Limit numbers to NO remainders in the final answer, but with remainders occurring within the question



STEP 3: Once children demonstrate a full understanding of remainders, and also the short division method taught, they can be taught how to use the method when remainders occur within the calculation (e.g. 96÷4), and be taught to 'carry' the remainder onto the next digit. **If needed, children should use the number line to work out individual division facts that occur which they are not yet able to recall mentally.**

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple

Key Skills for division at Year 3

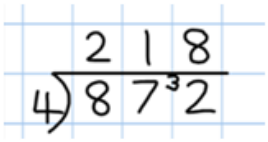
- Recall and use division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one digit
- Solve problems, in contexts, and including missing number problems, involving division.
- Pupils develop efficient mental methods, for example, using division facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (30 × 2 = 60, so 60 ÷ 3 = 20 and 20 = 60 ÷ 3).
- Pupils develop reliable written methods for division, starting with calculations of 2- digit numbers by 1-digit numbers using a ENL.
- Halve even numbers up to 50 and multiples of ten to 100
- Perform divisions within the tables including those with remainders, e.g. 38 ÷ 5.

Division

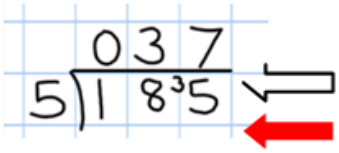
Year 4 Divide up to 3-digit numbers by a single digit (without remainders initially)

Short division should only be taught once children have secured the skill of calculating 'remainders'.

STEP 1: Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit (**those that do not result in a final remainder** —see steps in Y3), but must understand how to calculate remainders, using this to 'carry' remainders within the calculation process (see example).



STEP 2: Pupils move onto dividing numbers with up to 3-**digits** by a single digit, however problems and calculations provided should **not result in a final answer with remainder** at this stage. Children who exceed this expectation may progress to Y5 level.



When the answer for the **first column** is zero (1 ÷ 5, as in example), children could initially write a zero above to acknowledge its place, and must always 'carry' the number (1) over to the next digit as a remainder.

Include money and measure contexts

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor

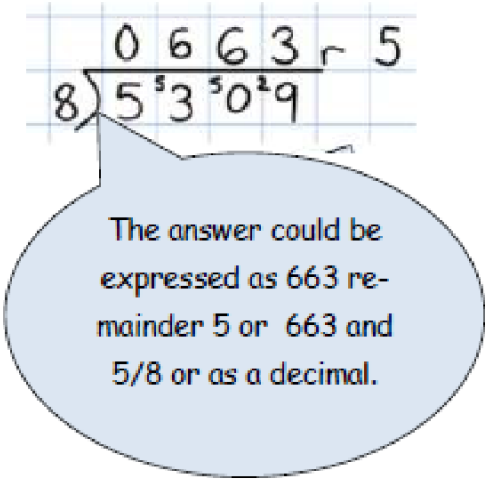
Key Skills for division at Year 4

- Use a written method to divide a 2-digit or a 3-digit number by a single-digit number.
- Give remainders as whole numbers.
- 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, including: multiplying and dividing by 10 and 100 and 1.
- Pupils 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
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

Division

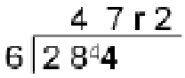
Year 5 Divide up to 4 digits by a single digit < or = to 12, including answers with remainders.

Short division including remainder answers. Please refer to Y4 or Y3 if necessary to ensure children are confident in the steps towards short division.



Division should be given in a real life context, including using money and measures, so that pupils know to round the answer up or down.

Answers could also be given as remainders, decimals or fractions.



Once children's understanding of this method is secure they might shorten their dialogue to:

"How many 6s in 28?"
"4 remainder 4"
"How many 6s in 44?"
"7 remainder 2"

BUT ensure children have a secure understanding of what they are doing and are able to use their knowledge of related facts to either make a rough estimate first or have an idea about whether their final answer is reasonable or not.

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor quotient, prime number, prime factors, composite number (non-prime)

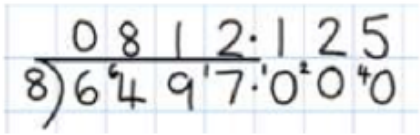
Key Skills for division at Year 5

- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Use multiplication and division as inverses. Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. 98 ÷ 4 = 24 r 2 = 241/2 = 24.5 ≈ 25).

Division

Year 6 Divide 4-digits numbers by single and 2-digit numbers (including decimals)

Short division (for dividing by a single or 2-digit numbers)



Children should continue to use short division with remainders.

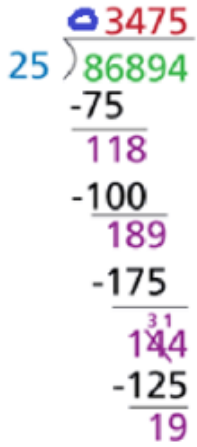
They need to learn how to express an answer as a remainder, a fraction or as a decimal as in in this example.

Introduce long division for dividing by 2 digits

Write out your 25 times table up to 6 x 25:

25
50
75
100
125
150

Of course, 25s are fairly easy, but not all numbers are so straightforward!



Begin by writing out the first 6 numbers of the times table of the divisor (in this case 25). Then see how many 25s fit into the first digit of the divided (the number you are dividing, in this case 86894). This is 0, so move onto how many 25s fit into 86. This is 3, so write the 3 above the dividend and then subtract 75 (our 3x25) from 86 and write the answer, 11, below. Bring the next digit from the divided down (8) and put it next to the 11, making 118, and then repeat the process until you have reached the end of the dividend. If you end up with a remainder, remember that it is part of the answer!

Key vocabulary As previously, & common factor

Key Skills for division at Year 6

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more
- complex calculations
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Solve problems involving all 4 operations.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy.